Permit Tracking Coversheet ORIGINAL

Facility AI Name ☒ Tempo Name OK ☐ Use name specified below.

Tyrone Mine

Company Name ☒ Tempo Name OK ☐ Application Name OK ☐ Owner/Operator Change

Freeport-McMoRan Tyrone Inc

Tech Services Staff & Assigning Manager

Airs #: **35-017-0002** Use portable Airs# (777) for GCPs 2, 3, TC; Streamlines, etc.

Tech Serv Staff Date & Initials: 4/7/20 AEE

AI Number: **527** | Permit No.: **PSD2448M5**

AI Type: **Mining: Copper Mine** | Assigned To: Joe Kimbrell

Previously assigned to (or Major Source Assignment matrix): **Joe Kimbrell**

Activity Class: **NSR**

Activity Type (Graybar)! ☐ Use tempo assist to delete actuals

Regular - Significant Revision

☐ Relocation - Update physical address and Location-Cultural Window

Supervisor Date & Initials: AEE per TB 4/7/20

User Group: **AQB - NSR**

General Attribute for New Actions: **Not Required**

☐ Changing permit type *(end old User Group in MF and add new one.)*

☐ Add end date to AQB user groups 1 AI *(permit being closed)*

Data Steward

☐ Permittee & Consultant info updated?

WAL Updated: ☐ Staff Assigned

☐ App Received Date [redacted]

Data Steward Date & Initials:

PRN or PRT

Outstanding invoice? ☐ No ☐ Yes - $

Fee: **NSR Filing Fee $500 and SJ GRF, Invoice ID:** _____

Permit Fee type: **NOI/NSR Filing Fee ($500)**

Check Amount: **$500**

Admin Staff 2 days

Create: **Folder & Insert**

Folder Color: **Yellow**

Date & Initials:

Permit Specialist

☐ Provided modeling application & CD to modeling manager.

☐ My current plan is to have emissions reviewed by: _____

☐ Requested date for modeling to be complete:

☐ Permit due date:

Date & Initials:

Permit Specialist

☐ Requested invoice due date: (based on 30 days after ruled complete)

If NSR action is Withdrawn or Denied: Take to Data Steward to discuss balance due and invoicing options.

Date & Initials:

Data Steward (NSR only)

☐ Created permitting Balance Due Invoice and Return to Staff

Date & Initials:

Permit Specialist

☐ Permit conversion! In WAL of previous permit actions add "closed" task and enter issuance date of this action.

Date & Initials:

GCP-O&G Int. Review

Assigned to:

Date Completed & put in Mailbox:

Date & Initials:

Notes: Air Permit Contact: Nina Astillero, nastille@fmi.com, 575-912-5297

Consultant: Robin Bronstein, rbronstein@trinityconsultants.com

Mail Application To:		For Department use only:
New Mexico Environment Department Air Quality Bureau Permits Section 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone: (505) 476-4300 Fax: (505) 476-4375 www.env.nm.gov/aqb		Received APR 06 2020 Air Quality Bureau AIRS No.:

Universal Air Quality Permit Application

Use this application for NOI, NSR, or Title V sources.

Use this application for: the initial application, modifications, technical revisions, and renewals. For technical revisions, complete Sections, 1-A, 1-B, 2-F, 3, 9 and any other sections that are relevant to the requested action: coordination with the Air Quality Bureau permit staff prior to submittal is encouraged to clarify submittal requirements and to determine if more or less than these sections of the application are needed. Use this application for streamline permits as well. See Section 1-I for submittal instructions for other permits.

This application is submitted as (check all that apply): ☐ Request for a No Permit Required Determination (no fee)
☐ **Updating** an application currently under NMED review. Include this page and all pages that are being updated (no fee required).
Construction Status: ☐ Not Constructed ☑ Existing Permitted (or NOI) Facility ☐ Existing Non-permitted (or NOI) Facility
Minor Source: ☐ a NOI 20.2.73 NMAC ☑ 20.2.72 NMAC application or revision ☐ 20.2.72.300 NMAC Streamline application
Title V Source: ☐ Title V (new) ☐ Title V renewal ☐ TV minor mod. ☐ TV significant mod. TV Acid Rain: ☐ New ☐ Renewal
PSD Major Source: ☐ PSD major source (new) ☐ minor modification to a PSD source ☐ a PSD major modification

Acknowledgements:

☑ I acknowledge that a pre-application meeting is available to me upon request. ☐ Title V Operating, Title IV Acid Rain, and NPR applications have no fees.

☑ $500 NSR application Filing Fee enclosed OR ☐ The full permit fee associated with 10 fee points (required w/ streamline applications).

☑ Check No.: 0000942876 in the amount of $500

☑ I acknowledge the required submittal format for the hard copy application is printed double sided 'head-to-toe', 2-hole punched (except the Sect. 2 landscape tables is printed 'head-to-head'), numbered tab separators. Incl. a copy of the check on a separate page.

☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance program (SBEAP) and qualifies for 50% of the normal application and permit fees. Enclosed is a check for 50% of the normal application fee which will be verified with the Small Business Certification Form for your company.

☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance Program (SBEAP) but does not qualify for 50% of the normal application and permit fees. To see if you qualify for SBEAP assistance and for the small business certification form go to https://www.env.nm.gov/aqb/sbap/small_business_criteria.html).

Citation: Please provide the **low level citation** under which this application is being submitted: **20.2.72.219.D.(1)(a) NMAC**
(e.g. application for a new minor source would be 20.2.72.200.A NMAC, one example for a Technical Permit Revision is 20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

Section 1 – Facility Information

Section 1-A: Company Information

		AI # if known (see 1st 3 to 5 #s of permit: IDEA ID No.): 527	Updating Permit/NOI #: 2448-M4
1	Facility Name: Tyrone Mine	Plant primary SIC Code (4 digits): 1021	
		Plant NAIC code (6 digits): 212230	
a	Facility Street Address (If no facility street address, provide directions from a prominent landmark): Highway 90 South, Tyrone Mine Road, Tyrone, NM 88065		
2	Plant Operator Company Name: Freeport-McMoRan Tyrone Inc.	Phone/Fax: 575-912-5101 / 575-912-5021	
a	Plant Operator Address: P.O. Box 571, Tyrone, NM 88065		
b	Plant Operator's New Mexico Corporate ID or Tax ID: 02-952187-00M		

NSR SIGNIFICANT REVISION APPLICATION

Freeport-McMoRan Tyrone Inc.
Tyrone Mine

Prepared By:

Nina Astillero – Senior Environmental Engineer

Freeport-McMoRan Tyrone Inc.
P.O. Box 571
Tyrone, NM 88065

Adam Erenstein – Manager of Consulting Services

TRINITY CONSULTANTS
9400 Holly Ave NE
Bldg 3 Suite 300
Albuquerque, NM 87122
(505) 266-6611

April 2020

Project 193201.0166

Environmental solutions delivered uncommonly well

9400 Holly Avenue NE | Bldg 1, Suite 300 | Albuquerque, NM 87122 | P (505) 266-6611
trinityconsultants.com

Trinity Consultants

April 3, 2020

Mr. Ted Schooley
Permit Programs Manager
NMED Air Quality Bureau
525 Camino de los Marquez Suite 1
Santa Fe, NM 87505-1816

NSR Significant Revision Application
Freeport-McMoRan Tyrone Inc.: Tyrone Mine

Dear Mr. Schooley:

Freeport-McMoRan Tyrone Inc. is submitting this NSR significant revision application for its existing Tyrone Mine facility. This facility is located 4.5 miles southwest of Tyrone, New Mexico in Grant County. The facility's major product is copper cathode, and the expected maximum production rate is 225 tons per day.

The format and content of this application are consistent with the Bureau's current policy regarding NSR applications; it is a complete application package using the most current required forms. Enclosed is one hard copy and one working copy of the application, including an original certification page, two disks containing the electronic files, and an application check. Please feel free to contact me at (505) 266-6611 or by email at aerenstein@trinityconsultants.com if you have any questions regarding this application. Alternatively, you may contact Ms. Nina Astillero with Freeport-McMoRan Tyrone Inc. at (575) 912-5297 or by email at nastille@fmi.com.

Sincerely,

Adam Erenstein
Manager of Consulting Services

CC: Nina Astillero (Freeport-McMoRan Tyrone Inc.)
Trinity Project File: 193201.0166

Mail Application To:		**For Department use only:**
New Mexico Environment Department Air Quality Bureau Permits Section 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone: (505) 476-4300 Fax: (505) 476-4375 www.env.nm.gov/aqb		AIRS No.:

Universal Air Quality Permit Application

Use this application for NOI, NSR, or Title V sources.

Use this application for: the initial application, modifications, technical revisions, and renewals. For technical revisions, complete Sections, 1-A, 1-B, 2-E, 3, 9 and any other sections that are relevant to the requested action; coordination with the Air Quality Bureau permit staff prior to submittal is encouraged to clarify submittal requirements and to determine if more or less than these sections of the application are needed. Use this application for streamline permits as well. See Section 1-I for submittal instructions for other permits.

This application is submitted as (check all that apply)**:** ☐ Request for a No Permit Required Determination (no fee)
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Acknowledgements:

☑ I acknowledge that a pre-application meeting is available to me upon request. ☐ Title V Operating, Title IV Acid Rain, and NPR applications have no fees.

☑ $500 NSR application Filing Fee enclosed OR ☐ The full permit fee associated with 10 fee points (required w/ streamline applications).

☑ Check No.: 0000942876 in the amount of $500

☑ I acknowledge the required submittal format for the hard copy application is printed double sided 'head-to-toe', 2-hole punched (except the Sect. 2 landscape tables is printed 'head-to-head'), numbered tab separators. Incl. a copy of the check on a separate page.

☐ This facility qualifies to receive assistance from the Small Business Environmental Assistance program (SBEAP) and qualifies for 50% of the normal application and permit fees. Enclosed is a check for 50% of the normal application fee which will be verified with the Small Business Certification Form for your company.

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Citation: Please provide the **low level citation** under which this application is being submitted: **20.2.72.219.D.(1)(a) NMAC**
(e.g. application for a new minor source would be 20.2.72.200.A NMAC, one example for a Technical Permit Revision is 20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

Section 1 – Facility Information

Section 1-A: Company Information

AI # if known (see 1st 3 to 5 #s of permit IDEA ID No.): 527

Updating Permit/NOI #: 2448-M4

1	Facility Name: Tyrone Mine	Plant primary SIC Code (4 digits): 1021 Plant NAIC code (6 digits): 212230
a	Facility Street Address (If no facility street address, provide directions from a prominent landmark): Highway 90 South, Tyrone Mine Road, Tyrone, NM 88065	
2	Plant Operator Company Name: Freeport-McMoRan Tyrone Inc.	Phone/Fax: 575-912-5101 / 575-912-5021
a	Plant Operator Address: P.O. Box 571, Tyrone, NM 88065	
b	Plant Operator's New Mexico Corporate ID or Tax ID: 02-952187-004	

3	Plant Owner(s) name(s): Freeport-McMoRan Tyrone Inc.	Phone/Fax: 575-912-5101 / 575-912-5021
a	Plant Owner(s) Mailing Address(s): P.O. Box 571, Tyrone, NM 88065	
4	Bill To (Company): Freeport-McMoRan Tyrone Inc.	Phone/Fax: 575-912-5101 / 575-912-5021
a	Mailing Address: P.O. Box 571, Tyrone, NM 88065	E-mail: Ebower@fmi.com
5	☐ Preparer: ☑ Consultant: Trinity Consultants	Phone/Fax: 505-266-6611
a	Mailing Address: 9400 Holly Ave NE, Bldg 3 Ste 300, Albuquerque, NM 87122	E-mail: aerenstein@trinityconsultants.com
6	Plant Operator Contact: Erich Bower	Phone/Fax: 575-912-5101 / 575-912-5021
a	Address: P.O. Box 571, Tyrone, NM 88065	E-mail: Ebower@fmi.com
7	Air Permit Contact: Nina Astillero	Title: Senior Environmental Engineer
a	E-mail: nastille@fmi.com	Phone/Fax: (575) 912-5297 / 575-912-5031
b	Mailing Address: P.O. Box 571, Tyrone, NM 88065	
c	The designated Air permit Contact will receive all official correspondence (i.e. letters, permits) from the Air Quality Bureau.	

Section 1-B: Current Facility Status

1.a	Has this facility already been constructed? ☑ Yes ☐ No	1.b If yes to question 1.a, is it currently operating in New Mexico? ☑ Yes ☐ No
2	If yes to question 1.a, was the existing facility subject to a Notice of Intent (NOI) (20.2.73 NMAC) before submittal of this application? ☐ Yes ☑ No	If yes to question 1.a, was the existing facility subject to a construction permit (20.2.72 NMAC) before submittal of this application? ☑ Yes ☐ No
3	Is the facility currently shut down? ☐ Yes ☑ No	If yes, give month and year of shut down (MM/YY): N/A
4	Was this facility constructed before 8/31/1972 and continuously operated since 1972? ☑ Yes ☐ No	
5	If Yes to question 3, has this facility been modified (see 20.2.72.7.P NMAC) or the capacity increased since 8/31/1972? ☐Yes ☐No ☑N/A	
6	Does this facility have a Title V operating permit (20.2.70 NMAC)? ☑ Yes ☐ No	If yes, the permit No. is: P147-R2
7	Has this facility been issued a No Permit Required (NPR)? ☐ Yes ☑ No	If yes, the NPR No. is: N/A
8	Has this facility been issued a Notice of Intent (NOI)? ☐ Yes ☑ No	If yes, the NOI No. is: N/A
9	Does this facility have a construction permit (20.2.72/20.2.74 NMAC)? ☑ Yes ☐ No	If yes, the permit No. is: 2448-M4
10	Is this facility registered under a General permit (GCP-1, GCP-2, etc.)? ☐ Yes ☑ No	If yes, the register No. is: N/A

Section 1-C: Facility Input Capacity & Production Rate

1	What is the facility's maximum input capacity, specify units (reference here and list capacities in Section 20, if more room is required)			
a	Current	Hourly: N/A	Daily: 480,000 tons rock	Annually: 175,200,000 tons rock
b	Proposed	Hourly: N/A	Daily: 400,000 tons rock	Annually: 146,000,000 tons rock
2	What is the facility's maximum production rate, specify units (reference here and list capacities in Section 20, if more room is required)			
a	Current	Hourly: N/A	Daily: 225 tons copper cathode	Annually: 82,125 tons copper cathode
b	Proposed	Hourly: N/A	Daily: 225 tons copper cathode	Annually: 82,125 tons copper cathode

Section 1-D: Facility Location Information

1	Section: 10, 11, 13-17, 21-28	Range: 15W	Township: 19S	County: Grant	Elevation (ft): 5,801 ft
2	UTM Zone: ☑ 12 or ☐ 13			UTM Zone: ☑ 12 or ☐ 13	
a	UTM E (in meters, to nearest 10 meters): 744,430 m E			UTM E (in meters, to nearest 10 meters): 744,430 m E	
b	**AND** Latitude (deg., min., sec.): 32° 40' 34.50" N			**AND** Latitude (deg., min., sec.): 32° 40' 34.50" N	
3	Name and zip code of nearest New Mexico town: Tyrone, NM 88065				
4	Detailed Driving Instructions from nearest NM town (attach a road map if necessary): From Tyrone, NM, head south on NM Hwy 90. After approximately 5.4 miles the facility will be on the right.				
5	The facility is 4.5 miles southwest of Tyrone.				
6	Status of land at facility (check one): ☑ Private ☐ Indian/Pueblo ☑ Federal BLM ☑ Federal Forest Service ☑ Other: State				
7	List all municipalities, Indian tribes, and counties within a ten (10) mile radius (20.2.72.203.B.2 NMAC) of the property on which the facility is proposed to be constructed or operated: Municipalities: Silver City, NM. Indian Tribes: None. Counties: Grant, Luna				
8	**20.2.72** NMAC applications **only**: Will the property on which the facility is proposed to be constructed or operated be closer than 50 km (31 miles) to other states, Bernalillo County, or a Class I area (see www.env.nm.gov/aqb/modeling/class1areas.html)? ☑ Yes ☐ No (20.2.72.206.A.7 NMAC) If yes, list all with corresponding distances in kilometers: Gila Wilderness Area, 37 km				
9	Name nearest Class I area: Gila Wilderness Area				
10	Shortest distance (in km) from facility boundary to the boundary of the nearest Class I area (to the nearest 10 meters): 37 km				
11	Distance (meters) from the perimeter of the Area of Operations (AO is defined as the plant site inclusive of all disturbed lands, including mining overburden removal areas) to nearest residence, school or occupied structure: 110 m				
12	Method(s) used to delineate the Restricted Area: Fencing, rugged physical terrain with steep grades "**Restricted Area**" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area.				
13	Does the owner/operator intend to operate this source as a portable stationary source as defined in 20.2.72.7.X NMAC? ☐ Yes ☑ No A portable stationary source is not a mobile source, such as an automobile, but a source that can be installed permanently at one location or that can be re-installed at various locations, such as a hot mix asphalt plant that is moved to different job sites.				
14	Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes If yes, what is the name and permit number (if known) of the other facility? N/A				

Section 1-E: Proposed Operating Schedule (The 1-E.1 & 1-E.2 operating schedules may become conditions in the permit.)

1	Facility **maximum** operating ($\frac{\text{hours}}{\text{day}}$): 24	($\frac{\text{days}}{\text{week}}$): 7	($\frac{\text{weeks}}{\text{year}}$): 52	($\frac{\text{hours}}{\text{year}}$): 8,760		
2	Facility's maximum daily operating schedule (if less than 24 $\frac{\text{hours}}{\text{day}}$)? Start: N/A	☐AM ☐PM	End: N/A	☐AM ☐PM		
3	Month and year of anticipated start of construction: Upon receipt of permit					
4	Month and year of anticipated construction completion: TBD					
5	Month and year of anticipated startup of new or modified facility: TBD					
6	Will this facility operate at this site for more than one year? ☑ Yes ☐ No					

Section 1-F: Other Facility Information

1	Are there any current Notice of Violations (NOV), compliance orders, or any other compliance or enforcement issues related to this facility? ☐ Yes ☑ No If yes, specify: N/A		
a	If yes, NOV date or description of issue: N/A		If yes, NOV date or description of issue: N/A
b	Is this application in response to any issue listed in 1-F, 1 or 1a above? ☐ Yes ☐ No If Yes, provide the 1c & 1d info below: N/A		
c	Document Title: N/A	Document Title: N/A	Document Title: N/A
d	Provide the required text to be inserted in this permit: N/A		
2	Is air quality dispersion modeling or modeling waiver being submitted with this application? ☑ Yes ☐ No		
3	Does this facility require an "Air Toxics" permit under 20.2.72.400 NMAC & 20.2.72.502, Tables A and/or B? ☐ Yes ☑ No		
4	Will this facility be a source of federal Hazardous Air Pollutants (HAP)? ☑ Yes ☐ No		
a	If Yes, what type of source? ☐ **Major** (☐ ≥10 tpy of any single HAP **OR** ☐ ≥25 tpy of any combination of HAPS) **OR** ☑ **Minor** (☑ <10 tpy of any single HAP **AND** ☑ <25 tpy of any combination of HAPS)		
5	Is any unit exempt under 20.2.72.202.B.3 NMAC? ☑ Yes ☐ No		
a	If yes, include the name of company providing commercial electric power to the facility: PNM Commercial power is purchased from a commercial utility company, which specifically does not include power generated on site for the sole purpose of the user.		

Section 1-G: Streamline Application

(This section applies to 20.2.72.300 NMAC Streamline applications only)

1	☐ I have filled out Section 18, "Addendum for Streamline Applications." ☑ N/A (This is not a Streamline application.)

Section 1-H: Current Title V Information - Required for all applications from TV Sources

(Title V-source required information for all applications submitted pursuant to 20.2.72 NMAC (Minor Construction Permits), or 20.2.74/20.2.79 NMAC (Major PSD/NNSR applications), and/or 20.2.70 NMAC (Title V))

1	Responsible Official (R.O.) (20.2.70.300.D.2 NMAC): Erich J. Bower	Phone: (575) 912-5101
a	R.O. Title: President; General Manager	R.O. e-mail: ebower@fmi.com
b	R. O. Address: Hwy 90 South, Tyrone Mine Road, Tyrone, NM 88065	
2	Alternate Responsible Official (20.2.70.300.D.2 NMAC): Ronald Gerdes	Phone: (575) 912-5801
a	A. R.O. Title: Manager, Operations	A. R.O. e-mail: rgerdes@fmi.com
b	A. R. O. Address: Hwy 90 South, Tyrone Mine Road, Tyrone, NM 88065	
3	Company's Corporate or Partnership Relationship to any other Air Quality Permittee (List the names of any companies that have operating (20.2.70 NMAC) permits and with whom the applicant for this permit has a corporate or partnership relationship): Chino Mines Company	
4	Name of Parent Company ("Parent Company" means the primary name of the organization that owns the company to be permitted wholly or in part.): Freeport-McMoRan Inc.	
a	Address of Parent Company: 333 N. Central Ave, Phoenix, AZ 85004	
5	Names of Subsidiary Companies ("Subsidiary Companies" means organizations, branches, divisions or subsidiaries, which are owned, wholly or in part, by the company to be permitted.): N/A	
6	Telephone numbers & names of the owners' agents and site contacts familiar with plant operations: N/A	

7	Affected Programs to include Other States, local air pollution control programs (i.e. Bernalillo) and Indian tribes: Will the property on which the facility is proposed to be constructed or operated be closer than 80 km (50 miles) from other states, local pollution control programs, and Indian tribes and pueblos (20.2.70.402.A.2 and 20.2.70.7.B)? If yes, state which ones and provide the distances in kilometers: Municipalities: Silver City (9.5 km), Deming (66 km). Indian Tribes: None. States: Arizona (57 km)

Section 1-I – Submittal Requirements

Each 20.2.73 NMAC (**NOI**), a 20.2.70 NMAC (**Title V**), a 20.2.72 NMAC (**NSR** minor source), or 20.2.74 NMAC (**PSD**) application package shall consist of the following:

Hard Copy Submittal Requirements:

1) One hard copy **original signed and notarized application package** **printed double sided** **'head-to-toe'** **2-hole punched** as we bind the document on top, not on the side; except Section 2 (landscape tables), which should be head-to-head. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process. For NOI submittals only, hard copies of UA1, Tables 2A, 2D & 2F, Section 3 and the signed Certification Page are required. Please include a copy of the check on a separate page.

2) If the application is for a minor NSR, PSD, NNSR, or Title V application, include one working hard **copy** for Department use. This copy should be printed in book form, 3-hole punched, and **must be double sided**. Note that this is in addition to the head-to-to 2-hole punched copy required in 1) above. Minor NSR Technical Permit revisions (20.2.72.219.B NMAC) only need to fill out Sections 1-A, 1-B, 3, and should fill out those portions of other Section(s) relevant to the technical permit revision. TV Minor Modifications need only fill out Sections 1-A, 1-B, 1-H, 3, and those portions of other Section(s) relevant to the minor modification. NMED may require additional portions of the application to be submitted, as needed.

3) The entire NOI or Permit application package, including the full modeling study, should be submitted electronically. Electronic files for applications for NOIs, any type of General Construction Permit (GCP), or technical revisions to NSRs must be submitted with compact disk (CD) or digital versatile disc (DVD). For these permit application submittals, **two** CD copies are required (in sleeves, not crystal cases, please), with additional CD copies as specified below. NOI applications require only a single CD submittal. Electronic files for other New Source Review (construction) permits/permit modifications or Title V permits/permit modifications can be submitted on CD/DVD or sent through AQB's secure file transfer service.

Electronic files sent by (check one):

☑ CD/DVD attached to paper application

☐ secure electronic transfer. Air Permit Contact Name_____

Email_____

Phone number _____

a. If the file transfer service is chosen by the applicant, after receipt of the application, the Bureau will email the applicant with instructions for submitting the electronic files through a secure file transfer service. Submission of the electronic files through the file transfer service needs to be completed within 3 business days after the invitation is received, so the applicant should ensure that the files are ready when sending the hard copy of the application. The applicant will not need a password to complete the transfer. **Do not use the file transfer service for NOIs, any type of GCP, or technical revisions to NSR permits.**

4) Optionally, the applicant may submit the files with the application on compact disk (CD) or digital versatile disc (DVD) following the instructions above and the instructions in 5 for applications subject to PSD review.

5) If **air dispersion modeling** is required by the application type, include the **NMED Modeling Waiver** and/or electronic air dispersion modeling report, input, and output files. The dispersion modeling ***summary report only*** should be submitted as hard copy(ies) unless otherwise indicated by the Bureau.

6) If the applicant submits the electronic files on CD and the application is subject to PSD review under 20.2.74 NMAC (PSD) or NNSR under 20.2.79 NMC include,
   a. one additional CD copy for US EPA,
   b. one additional CD copy for each federal land manager affected (NPS, USFS, FWS, USDI) and,
   c. one additional CD copy for each affected regulatory agency other than the Air Quality Bureau.

   If the application is submitted electronically through the secure file transfer service, these extra CDs do not need to be submitted.

Electronic Submittal Requirements [in addition to the required hard copy(ies)]:

1) All required electronic documents shall be submitted as 2 separate CDs or submitted through the AQB secure file transfer service. Submit a single PDF document of the entire application as submitted and the individual documents comprising the application.

2) The documents should also be submitted in Microsoft Office compatible file format (Word, Excel, etc.) allowing us to access the text and formulas in the documents (copy & paste). Any documents that cannot be submitted in a Microsoft Office compatible

format shall be saved as a PDF file from within the electronic document that created the file. If you are unable to provide Microsoft office compatible electronic files or internally generated PDF files of files (items that were not created electronically: i.e. brochures, maps, graphics, etc,), submit these items in hard copy format. We must be able to review the formulas and inputs that calculated the emissions.

3) It is preferred that this application form be submitted as 4 electronic files (3 MSWord docs: Universal Application section 1 [UA1], Universal Application section 3-19 [UA3], and Universal Application 4, the modeling report [UA4]) and 1 Excel file of the tables (Universal Application section 2 [UA2]). Please include as many of the 3-19 Sections as practical in a single MS Word electronic document. Create separate electronic file(s) if a single file becomes too large or if portions must be saved in a file format other than MS Word.

4) The electronic file names shall be a maximum of 25 characters long (including spaces, if any). The format of the electronic Universal Application shall be in the format: "A-3423-FacilityName". The "A" distinguishes the file as an application submittal, as opposed to other documents the Department itself puts into the database. Thus, all electronic application submittals should begin with "A-". Modifications to existing facilities should use the core permit number (i.e. '3423') the Department assigned to the facility as the next 4 digits. Use 'XXXX' for new facility applications. The format of any separate electronic submittals (additional submittals such as non-Word attachments, re-submittals, application updates) and Section document shall be in the format: "A-3423-9-description", where "9" stands for the section # (in this case Section 9-Public Notice). Please refrain, as much as possible, from submitting any scanned documents as this file format is extremely large, which uses up too much storage capacity in our database. Please take the time to fill out the header information throughout all submittals as this will identify any loose pages, including the Application Date (date submitted) & Revision number (0 for original, 1, 2, etc.; which will help keep track of subsequent partial update(s) to the original submittal. Do not use special symbols (#, @, etc.) in file names. The footer information should not be modified by the applicant.

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Table 2-A: Regulated Emission Sources

Unit and stack numbering must correspond throughout the application package. If applying for a NOI under 20.2.73 NMAC, equipment exemptions under 2.72.202 NMAC do not apply.

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufacturer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classification Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
SX/EW-1 (Fugitive)	Mixer/Settlers (6 Extraction & 4 Stripping)	N/A	N/A	N/A	61,366 SF	61,366 SF	1/2/2001 1/2/2001	N/A N/A	30388801	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
SX/EW-2 (Fugitive)	SX/EW (3) Acid Tank House	N/A	N/A	N/A	24,000 gal/min	24,000 gal/min	1/2/1984 1/2/1984	N/A N/A	30388801	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
SX/EW-3 (Fugitive)	Raffinate Tank 1 - Open	N/A	N/A	N/A	2 million gallons	2 million gallons	1/2/2001 1/2/2001	N/A N/A	30388801	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
SX/EW-4 (Fugitive)	Raffinate Tank 2 - Open	N/A	N/A	N/A	0.4 million gallons	0.4 million gallons	1/2/2001 1/2/2001	N/A N/A	30388801	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
B-748	Water Boiler	Lochinvar Corporation	Unknown	C11H00231748	1256 MBtu/hr	1256 MBtu/hr	6/26/2012 	N/A Boil	10201002	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
B-951	Water Boiler	Lochinvar Corporation	Unknown	DI2H00239951	1256 MBtu/hr	1256 MBtu/hr	2/28/2012 	N/A Boil	10201002	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
ENV-101	Engine for Water Pump	John Deere	4050TF250	T04045T780502	125 hp	125 hp	7/23/1998 1/25/2000	N/A ENV-101	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
ENV-111	Engine for Water Pump	John Deere	4050TF250	117368-5	125 hp	125 hp	5/16/2001 12/8/2004	N/A ENV-111	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
ENV-122	Engine for Water Pump	Caterpillar	3054C	33408431	125 hp	125 hp	5/1/2005 6/3/2005	N/A ENV-122	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
ENV-123	Engine for Water Pump	Caterpillar	C7.1 Acert	BEJ10905	225 hp	225 hp	6/29/2005 12/14/2005	N/A ENV-123	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
Mine Fugitives (Blasting)	Blasting	N/A	N/A	N/A	N/A	N/A	1/2/2001 	N/A N/A	30388801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced	N/A	N/A
Mine Fugitives (Handling)	Handling	N/A	N/A	N/A	N/A	N/A	1/2/2001 	N/A N/A	30388801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced	N/A	N/A
Mine Fugitives (Hauling)	Hauling	N/A	N/A	N/A	N/A	N/A	1/2/2001 	N/A N/A	30388801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced	N/A	N/A
Mine Fugitives (Stockpiles)	Stockpiles	N/A	N/A	N/A	N/A	N/A	1/2/2001 	N/A N/A	30388801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced	N/A	N/A
SPCC-TYR-061 (GDF1)	Gasoline Dispensing Facility	N/A	N/A	N/A	20,000 gal	20,000 gal	N/A 	N/A N/A	30388801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced	N/A	N/A
SPCC-TYR-119 (GDF2)	Gasoline Dispensing Facility	N/A	N/A	N/A	2,000 gal	2,000 gal	N/A 	N/A N/A	30388801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced	N/A	N/A

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufacturer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classification Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
SP-7A Fugitives	Hauling, Handling, Crushing, and/or Screening Plant	N/A	N/A	N/A	N/A	N/A	7/16/2010 N/A	N/A N/A	30388801	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
OP-2	Diesel Engine	Perkins	403C-15	401164N	32.5 hp	32.5 hp	2/27/2006 3/19/2008	N/A OP-2	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
OP-8	Diesel Engine	Caterpillar	C7	JTF16844	225 hp	225 hp	5/29/2012 11/21/2012	N/A OP-8	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
ENV-120	Diesel Engine	Caterpillar	C6.6	3753-V039	250 hp	250 hp	7/27/2008 7/16/2008	N/A ENV-120	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
OP-4	Diesel Engine	Caterpillar	C6.6	66609304	175 hp	175 hp	2/27/2008 TBD	N/A OP-4	20200102	☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
OP-7	Diesel Engine	Caterpillar	C7	JTF19093	168 hp	168 hp	2/27/2013 TBD	N/A OP-7	20200102	☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
EMP-1	Diesel Engine	Caterpillar	C7	7AS10507	190 hp	190 hp	4/21/1998 TBD	N/A EMP-1	20200102	☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
EMP-2	Diesel Engine	Caterpillar	3126	BEJ08982	200 hp	200 hp	1/12/2005 TBD	N/A EMP-2	20200102	☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
ENV-117	Diesel Engine	John Deere	4045TF275	PE4045T236464	350 hp	350 hp	10/22/2002 TBD	N/A ENV-117	20200102	☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
SD-1	Diesel Engine	Caterpillar	C9	CLJ00001	225 hp	225 hp	9/2/2010 12/16/2010	N/A SD-1	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
SD-2	Diesel Engine	Caterpillar	C9	JSC25024	225 hp	225 hp	5/25/2012 2/1/2013	N/A SD-2	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
IPG	LPG Engine	Generac	OHVI	8609506	18.8 hp	18.8 hp	12/30/2013 2/13/2014	N/A IPG	20201012	☐ Existing (unchanged) ☑ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI	N/A
CE-1	Diesel Cold Start Compressor Engine	Ford-New Holland	N/A	544593-T26KK	100 hp	100 hp	1/1/1967 7/11/2005	N/A CE-1	20200102	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
PPG-1	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301202	3,090 hp	3,090 hp	1/1/1967 7/11/2005	N/A PPG-1	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-3	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301207	3,090 hp	3,090 hp	1/1/1967 7/11/2005	N/A PPG-3	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-4	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301208	3,090 hp	3,090 hp	1/1/1967 7/11/2005	N/A PPG-4	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-7	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301211	3,090 hp	3,090 hp	1/1/1967 7/11/2005	N/A PPG-7	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-8	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301212	3,090 hp	3,090 hp	1/1/1971 7/11/2005	N/A PPG-8	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-11	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301283	3,090 hp	3,090 hp	1/1/1971 7/11/2005	N/A PPG-11	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-12	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301304	3,090 hp	3,090 hp	1/1/1972 7/11/2005	N/A PPG-12	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-13	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301305	3,090 hp	3,090 hp	1/1/1972 7/11/2005	N/A PPG-13	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-14	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301306	3,090 hp	3,090 hp	1/1/1972 7/11/2005	N/A PPG-14	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A
PPG-15	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316-HSC	10301307	3,090 hp	3,090 hp	1/1/1972 7/11/2005	N/A PPG-15	20200402	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	SI/CI	N/A

[1] Unit numbers must correspond to unit numbers in the previous permit unless a complete cross reference table of all units in both permits is provided.
[2] Specify dates required to determine regulatory applicability.
[3] To properly account for power conversion efficiencies, generator set rated capacity shall be reported as the rated capacity of the engine in horsepower, not the kilowatt capacity of the generator set.
[4] "4SLB" means four stroke lean burn engine, "4SRB" means four stroke rich burn engine, "2SLB" means two stroke lean burn engine, "CI" means compression ignition, and "SI" means spark ignition

Table 2-B: Insignificant Activities[1] (20.2.70 NMAC) OR Exempted Equipment (20.2.72 NMAC)

All 20.2.70 NMAC (Title V) applications must list all Insignificant Activities in this table. All 20.2.72 NMAC applications must list Exempted Equipment in this table. If equipment listed on this table is exempt under 20.2.72.202.B.5, include emissions calculations and emissions totals for 202.B.5 "similar functions" units, operations, and activities in Section 6, Calculations. Equipment and activities exempted under 20.2.72.202 NMAC may not necessarily be Insignificant under 20.2.70 NMAC (and vice versa). Unit & stack numbering must be consistent throughout the application package. Per Exemptions Policy 02-012.00 (see http://www.env.nm.gov/aqb/permit/aqb_pol.html), 20.2.72.202.B NMAC Exemptions do not apply, but 20.2.72.202.A NMAC exemptions do apply to NOI facilities under 20.2.73 NMAC. List 20.2.72.301.D.4 NMAC Auxiliary Equipment for Streamline applications in Table 2-A. The List of Insignificant Activities (for TV) can be found online at http://www.env.nm.gov/aqb/forms/InsignificantListTitleV.pdf . TV sources may elect to enter both TV Insignificant Activities and Part 72 Exemptions on this form.

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-261	6000 weight lube oil	Advanced Pacific Tank Manufacturing, Inc.	N/A N/A	2,000 gal	20.2.72.202.B.2 NMAC IA List Item #5	Unknown Sep-16	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-264	Diesel Tank	Unknown	N/A N/A	300 gal	20.2.72.202.B.2 NMAC IA List Item #5	Unknown Aug-17	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Generac Emergency Generator 1	Generac Guardian Series 5872	Generac	5872 E897264613305	14,000 W	20.2.72.202.B.3 NMAC IA List Item #7	6/9/2014 7/25/2015	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Generac Emergency Generator 2	Generac Guardian Series 5872	Generac	5872 E922169515155	14,000 W	20.2.72.202.B.3 NMAC IA List Item #7	8/7/2015 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Generac Emergency Generator 3	Generac Guardian Series 6462	Generac	6462 9001396	16,000 W	20.2.72.202.B.3 NMAC IA List Item #7	10/2015 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Generac Emergency Generator 4	Generac Guardian Series 6462	Generac	6462 9972091	16,000 W	20.2.72.202.B.3 NMAC IA List Item #7	1/1/2016 5/2016	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
IPG	Indian Peak Generator	Generac	OHVI 3003527048	18.8 hp	20.2.72.202.B.3 NMAC IA List Item #7	7/24/2018 10/2018	☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
GO Generator Backup E1-128	Onan Genset	Onan Genset/Ford	LRG-425I6005A 1494610899	97 hp	20.2.72.202.B.3 NMAC IA List Item #7	1/8/1999 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SX/EW Fire Water Pump	Cummins Fire Water Pump	Cummins	Cummins 73388396	122 hp	20.2.72.202.A.4 NMAC IA List Item #7	1/29/2000 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SX Tankhouse Generator	Emergency Generator for Tankhouse Control Room	Caterpillar	CAT CATODG60CT3700362	67 hp	20.2.72.202.B.3 NMAC IA List Item #7	6/12/2006 5/28/2019	☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Maintenance Area							
SPCC-TYR-001	Diesel Storage Tank	Unknown	N/A N/A	550 gal	20.2.72.202.B.(2) NMAC IA List Item #8	 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-002	Safety Kleen - Petroleum Based Solvent Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5	 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-003	Motor Oil Storage Tank	Unknown	N/A N/A	550 gal	20.2.72.202.B.(2) NMAC IA List Item #5	 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-004	Power drive Fluid Storage Tank	Unknown	N/A N/A	550 gal	20.2.72.202.B.(2) NMAC IA List Item #5	 	☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-005	Power drive Fluid Storage Tank	Unknown	N/A N/A	550 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-006	Power drive Fluid Storage Tank	Unknown	N/A N/A	550 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-007	Power drive Fluid Storage Tank	Unknown	N/A N/A	550 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-012	Used Oil Storage Tank	Unknown	N/A N/A	5,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-014	SAE 15W-40 Motor Oil Storage Tank	Unknown	N/A N/A	132 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-015	SAE 10W Motor Oil Storage Tank	Unknown	N/A N/A	132 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-016	SAE 30W Motor Oil Storage Tank	Unknown	N/A N/A	132 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-017	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-018	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-019	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-020	Used Oil Storage Tank	Unknown	N/A N/A	95 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-021	Used Oil Storage Tank	Unknown	N/A N/A	75 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-022	Used Oil Storage Tank	Unknown	N/A N/A	75 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-023	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-024	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-166	Used Oil Storage Tank	Unknown	N/A N/A	150 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-167	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-177	Safety Kleen - Petroleum Based Solvent Storage Tank	Unknown	N/A N/A	460 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-189	Used Oil Storage Tank	Unknown	N/A N/A	300 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-190	Diesel Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-191	Clean Oil Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-192	Clean Oil Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-206	Used Oil Storage Tank	Unknown	N/A N/A	130 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-207	Used Oil Storage Tank	Unknown	N/A N/A	95 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-208	Used Oil Storage Tank	Unknown	N/A N/A	175 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-253	Used Oil Storage Tank	Unknown	N/A N/A	300 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area A	Used Oil Storage Tank	Unknown	N/A N/A	55 (4 drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area B	Lube and Oil Storage Tank	Unknown	N/A N/A	55 (3 drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area C	Super Hydraulic Oil, Lube Oil Storage Tank	Unknown	N/A N/A	55 (5 drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area P	Used Oil Storage Tank	Unknown	N/A N/A	1,050 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area Z	New Oil Storage Tank	Unknown	N/A N/A	825 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area D	Lube and Hydraulic Oil Storage Tank	Unknown	N/A N/A	55 (30 drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage AA	Lube Oil Storage Tank	Unknown	N/A N/A	65 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area Y	Lube, Hydraulic ,and Motor Oil Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-201	Used Oil Storage Tank	Unknown	N/A N/A	95 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-205	Used Oil Storage Tank	Unknown	N/A N/A	175 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-263	Lube Gear Oil Tank	Unknown	N/A N/A	2,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Powerhouse Area Tanks							
SPCC-TYR-027	Diesel Storage Tank	Unknown	N/A N/A	120000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-028	Diesel Storage Tank	Unknown	N/A N/A	120000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-029	Used Oil Storage Tank	Unknown	N/A N/A	20000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-030	Lube Oil Storage Tank	Unknown	N/A N/A	15000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-031	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-033	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-034	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-037	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-038	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-041	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-042	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-043	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-044	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-045	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-046	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 (approx.) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-048	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 (approx.) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-049	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 (approx.) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-052	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 (approx.) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-053	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 (approx.) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-056	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 (approx.) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-058	Lube Oil Storage Tank	Unknown	N/A N/A	1100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-059	Used Oil Storage Tank	Unknown	N/A N/A	270 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-209	Lube Oil Storage Tank	Unknown	N/A N/A	1000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-210	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-211	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-212	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-213	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-214	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-215	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-216	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

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SPCC-TYR-217	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-218	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-219	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-220	Lube Oil Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area W	Lube Oil Storage Tank	Unknown	N/A N/A	55 (30 Drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-025	Diesel Storage Tank	Unknown	N/A N/A	500000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-026	Diesel Storage Tank	Unknown	N/A N/A	225000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-255	Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Lube Shop Area Tanks							
SPCC-TYR-061	Unleaded gasoline Storage Tank	Unknown	N/A N/A	20,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-062	Red Dyed Diesel Storage Tank	Unknown	N/A N/A	40,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-063	Red Dyed Diesel Storage Tank	Unknown	N/A N/A	50,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-065	Diesel Storage Tank	Unknown	N/A N/A	2,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-066	Used Oil Storage Tank	Unknown	N/A N/A	10,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-073	SAE 15W-40 Motor Oil Storage Tank	Unknown	N/A N/A	300 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-074	Diesel No. 2 Storage Tank	Unknown	N/A N/A	300 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-075	15W-40 Motor Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-076	SAE 30 Motor Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

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SPCC-TYR-077	SAE 10 Motor Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-078	SAE 60 Motor Oil Storage Tank	Unknown	N/A N/A	2,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-079	SAE 15W-40 Storage Tank	Unknown	N/A N/A	1,100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-080	SAE 10W Storage Tank	Unknown	N/A N/A	575 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-081	SAE 30W Storage Tank	Unknown	N/A N/A	575 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-082	SAE 30 Engine Oil Storage Tank	Unknown	N/A N/A	450 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-083	SAE 10W Power drive Fluid Storage Tank	Unknown	N/A N/A	450 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-084	Oily water Storage Tank	Unknown	N/A N/A	10,000 (estimated) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-086	Used Oil Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-087	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-088	Used Oil Storage Tank	Unknown	N/A N/A	215 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-089	Used Oil Storage Tank	Unknown	N/A N/A	525 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-093	SAE 15W-40 Storage Tank	Unknown	N/A N/A	2,700 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-094	SAE 10 W Storage Tank	Unknown	N/A N/A	2,700 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-095	SAE 30W Storage Tank	Unknown	N/A N/A	2,700 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-096	Diesel Storage Tank	Unknown	N/A N/A	40,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-097	Diesel Storage Tank	Unknown	N/A N/A	40,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-104	Used Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-133	Diesel Storage Tank	Unknown	N/A N/A	12,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-165	Used Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-174	Megaplex XD5 #2 Grease Storage Tank	Unknown	N/A N/A	1,050 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-204	Megaplex XD5 #2 Grease Used Oil Storage Tank	Unknown	N/A N/A	333 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-230	Gear Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-231	Used Oil Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-232	Used Oil Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-233	Used Oil Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-234	Used Oil Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-236	Turbine Oil Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-237	15-40 Oil Storage Tank	Unknown	N/A N/A	70 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-244	15-40 Oil Storage Tank	Unknown	N/A N/A	70 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-245	Used Oil Storage Tank	Unknown	N/A N/A	70 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-246	Used Oil Storage Tank	Unknown	N/A N/A	70 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-247	Used Oil Storage Tank	Unknown	N/A N/A	70 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-250	Lube oil Storage Tank	Unknown	N/A N/A	150 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-251	Lube Oil Storage Tank	Unknown	N/A N/A	250 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-252	Lube Oil Storage Tank	Unknown	N/A N/A	150 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area X	ATF and Lube Oil Storage Tank	Unknown	N/A N/A	55 (2) drums gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area G	Used Oil Storage Tank	Unknown	N/A N/A	55 (2 drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area F	Turbine Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area O	Used Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-184	Used Oil Storage Tank	Unknown	N/A N/A	538 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-235	Oil Storage Tank	Unknown	N/A N/A	70 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-238	Diesel Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-239	Diesel Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-240	Diesel Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-241	Diesel Storage Tank	Unknown	N/A N/A	300 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-242	Diesel Storage Tank	Unknown	N/A N/A	300 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Magazine Area Tanks							
SPCC-TYR-090	Diesel Storage Tank	Unknown	N/A N/A	9500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-091	Diesel Storage Tank	Unknown	N/A N/A	1000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SX/EW Area Tanks							
SPCC-TYR-105	Extractant Acorga M5910 Storage Tank	Unknown	N/A N/A	10,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-106	Extractant Acorga M5910 Storage Tank	Unknown	N/A N/A	10,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-107	Diluent (Organic) - Conosol 170 Storage Tank	Unknown	N/A N/A	34,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-109	Organic Makeup (Diluent-Conosol 170) Storage Tank	Unknown	N/A N/A	13,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-110	Barren Organic Surge Tank Storage Tank	Unknown	N/A N/A	120,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-111	Barren Organic Holding Tank Storage Tank	Unknown	N/A N/A	120,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-112	"Organic Gunk" Storage Tank	Unknown	N/A N/A	15,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-113	"Organic Gunk" Storage Tank	Unknown	N/A N/A	15,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-114	Organic Recovery (Acorga M5910) Storage Tank	Unknown	N/A N/A	12,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-115	Organic Recovery (Acorga M5910) Storage Tank	Unknown	N/A N/A	12,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-116	Organic Wash (Acorga M5910) Storage Tank	Unknown	N/A N/A	137,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-117	Acorga M5910 Storage Tank	Unknown	N/A N/A	50,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-118	Diesel Storage Tank	Unknown	N/A N/A	2,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-119	Unleaded Gasoline Storage Tank	Unknown	N/A N/A	2,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-120	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-140	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 118,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-141	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 127,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-142	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 127,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-143	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 127,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-144	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 118,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-145	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 127,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-146	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 127,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-147	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 127,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-148	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 118,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-149	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 118,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area H	Super Hydraulic Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area R	Lube Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area I	Super Hydraulic Oil, Used Oil, 90W Motor Oil, 10W Motor Oil Storage Tank	Unknown	N/A N/A	55 (7 drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area K	Used Oil and Motor Oil Storage Tank	Unknown	N/A N/A	55 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-249	Organic Recovery Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

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Other Areas/Transformers							
SPCC-TYR-137A	Diesel Storage Tank	Unknown	N/A N/A	12000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Drum Storage Area M	Grease, used oil, transformers, used absorbents Storage Tank	Unknown	N/A N/A	55 (50 - 150 drums) gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
T1-T129	Transformer oil Storage Tank	Unknown	N/A N/A	varies gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-103	Megaplex XD5 #2 Storage Tank	Unknown	N/A N/A	540 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-172	Polyurea Grease #2 Storage Tank	Unknown	N/A N/A	620 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-188	Diesel Storage Tank	Unknown	N/A N/A	164 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-203	Oily Water Storage Tank	Unknown	N/A N/A	2000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-243	Used Oil Storage Tank	Unknown	N/A N/A	213 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-248	Oily Water Storage Tank	Unknown	N/A N/A	20000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-254	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-256	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-257	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-258	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-260	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-262	Grease Storage Tank	Unknown	N/A N/A	625 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
Misc. Transformers	Transformer oil Storage Tank	Unknown	N/A N/A	Varies -	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Mobile Service Tanks							
SPCC-TYR-126	Gasoline Storage Tank	Unknown	N/A N/A	110 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☐ Existing (unchanged) ☑ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-150	Gasoline Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☐ Existing (unchanged) ☑ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-151	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-152	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-153	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☑ To Be Modified ☐ To be Replaced
SPCC-TYR-154	Diesel Storage Tank	Unknown	N/A N/A	175 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-155	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-156	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-157	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-158	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-159	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-160	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-161	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-162	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-163	Diesel Storage Tank	Unknown	N/A N/A	100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-164	Diesel Storage Tank	Unknown	N/A N/A	250 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-170	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-171	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-173	Diesel Storage Tank	Unknown	N/A N/A	200 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-176	Gasoline Storage Tank	Unknown	N/A N/A	105 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☐ Existing (unchanged) ☑ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-178	Gasoline Storage Tank	Unknown	N/A N/A	105 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☐ Existing (unchanged) ☑ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-185	Used Oil Storage Tank	Unknown	N/A N/A	500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-186	Used Oil Storage Tank	Unknown	N/A N/A	130 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Service Vehicles							
LS 3	Misc. Storage Tank	Unknown	N/A N/A	1000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS 5	Misc. Storage Tank	Unknown	N/A N/A	1400 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS 8	Misc. Storage Tank	Unknown	N/A N/A	900 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS 15	Misc. Storage Tank	Unknown	N/A N/A	1000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
FM 8	Misc. Storage Tank	Unknown	N/A N/A	1400 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS 16	Misc. Storage Tank	Unknown	N/A N/A	1000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS 17	Misc. Storage Tank	Unknown	N/A N/A	1000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS 23	Grease Storage Tank	Unknown	N/A N/A	75 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
FM19	Grease, Used Oil, Lube	Unknown	N/A N/A	1500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS4	Diesel Fuel Storage	Unknown	N/A N/A	90 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
LS21	Diesel Fuel Storage	Unknown	N/A N/A	2750 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-268	Diesel Fuel Storage	Unknown	N/A N/A	1500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☐ Existing (unchanged) ☐ To be Removed ☑ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
REC20	Diesel, Oil, and Grease Storage	Unknown	N/A N/A	1000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
Out of Service Tanks							
SPCC-TYR-032	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-035	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-036	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-039	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-040	Diesel Storage Tank	Unknown	N/A N/A	800 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-047	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-050	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-051	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-054	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-055	Lube Oil Storage Tank	Unknown	N/A N/A	1,500 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No. / Serial No.	Max Capacity / Capacity Units	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5) / Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Manufacture /Reconstruction[2] / Date of Installation /Construction[2]	For Each Piece of Equipment, Check Onc
SPCC-TYR-057	Lube Oil Storage Tank	Unknown	N/A N/A	1,100 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-121	Oily Water Storage Tank	Unknown	N/A N/A	20,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-125	Diesel Storage Tank	Unknown	N/A N/A	700 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-194	Used Oil Storage Tank	Unknown	N/A N/A	10,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-202	Diesel Fuel Additive Storage Tank	Unknown	N/A N/A	1,000 gal	20.2.72.202.B.(2) NMAC IA List Item #5		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

[1] Insignificant activities exempted due to size or production rate are defined in 20.2.70.300.D.6, 20.2.70.7.Q NMAC, and the NMED/AQB List of Insignificant Activities, dated September 15, 2008. Emissions from these insignificant activities do not need to be reported, unless specifically requested.

[2] Specify date(s) required to determine regulatory applicability.

Table 2-C: Emissions Control Equipment

Unit and stack numbering must correspond throughout the application package. Only list control equipment for TAPs if the TAP's maximum uncontrolled emissions rate is over its respective threshold as listed in 20.2.72 NMAC, Subpart V, Tables A and B. In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device regardless if the applicant takes credit for the reduction in emissions.

Control Equipment Unit No.	Control Equipment Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s)[1]	Efficiency (% Control by Weight)	Method used to Estimate Efficiency
N/A	Water application and other method(s) approved by NMED to control fugitive dust	N/A	PM_{10}, $PM_{2.5}$	Mine Fugitives (Hauling)	88.8%	NMED guidance; WRAP guidance
				SP-7a Fugitives	80%	NMED guidance

[1] List each control device on a separate line. For each control device, list all emission units controlled by the control device.

Table 2-D: Maximum Emissions (under normal operating conditions)

☐ **This Table was intentionally left blank because it would be identical to Table 2-E.**

Maximum Emissions are the emissions at maximum capacity and prior to (in the absence of) pollution control, emission-reducing process equipment, or any other emission reduction. Calculate the hourly emissions using the worst case hourly emissions for each pollutant. For each pollutant, calculate the annual emissions as if the facility were operating at maximum plant capacity without pollution controls for 8760 hours per year, unless otherwise approved by the Department. List Hazardous Air Pollutants (HAP) & Toxic Air Pollutants (TAPs) in Table 2-I. Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM[1,2]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
SX/EW-1	-	-	-	-	5.15	22.54	-	-	-	-	-	-	-	-	-	-	-	-
SX/EW-2	-	-	-	-	-	-	-	-	1.82	7.98	1.82	7.98	-	-	-	-	-	-
SX/EW-3	-	-	-	-	0.95	4.15	-	-	-	-	-	-	-	-	-	-	-	-
SX/EW-4	-	-	-	-	0.32	1.39	-	-	-	-	-	-	-	-	-	-	-	-
B-748 B-951	0.36	1.56	0.21	0.90	0.027	0.12	0.00049	0.0022	0.019	0.084	0.019	0.084	0.019	0.084	-	-	-	-
ENV-101	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	-	-	-	-
ENV-111	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	-	-	-	-
ENV-122	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	-	-	-	-
ENV-123	0.14	0.61	1.22	5.36	0.066	0.29	0.44	1.91	0.0070	0.031	0.0070	0.031	0.0070	0.031				
Mine Fugitives (Blasting)	144.00	67.50	3,251.20	1,524.00	-	-	0.29	0.14	482.83	125.54	251.07	65.28	14.48	3.77	-	-	-	-
Mine Fugitives (Handling)	-	-	-	-	-	-	-	-	1.39	6.10	0.53	2.34	0.080	0.35	-	-	-	-
Mine Fugitives (Hauling)	-	-	-	-	-	-	-	-	15,699.69	63,423.50	4,001.27	16,164.32	400.13	1,306.43	-	-	-	-
Mine Fugitives (Stockpiles)	-	-	-	-	-	-	-	-	46.43	203.34	21.96	96.18	3.33	14.56	-	-	-	-
SPCC-TYR-061 (GDF1)	-	-	-	-	1.82	7.96	-	-	-	-	-	-	-	-	-	-	-	-
SPCC-TYR-119 (GDF2)	-	-	-	-	0.33	1.46	-	-	-	-	-	-	-	-	-	-	-	-
SP-7A Fugitives (Handling)	-	-	-	-	-	-	-	-	31.00	67.90	9.20	20.20	1.00	2.20	-	-	-	-
OP-2	0.36	1.58	0.28	1.22	0.019	0.083	0.063	0.28	0.031	0.13	0.031	0.13	0.031	0.13	-	-	-	-
OP-8	1.34	5.86	1.22	5.34	0.074	0.33	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	-	-	-	-
ENV-120	1.49	6.51	1.36	5.94	0.078	0.34	0.48	2.12	0.078	0.34	0.078	0.34	0.078	0.34	-	-	-	-
OP-4	1.03	4.53	0.95	4.17	0.054	0.24	0.34	1.49	0.082	0.36	0.082	0.36	0.082	0.36				
OP-7	0.99	4.35	0.91	4.01	0.052	0.23	0.33	1.43	0.052	0.23	0.052	0.23	0.052	0.23				
EMP-1	5.57	24.40	1.20	5.26	0.45	1.98	0.37	1.61	0.40	1.73	0.40	1.73	0.40	1.73				
EMP-2	1.95	8.54	1.09	4.77	0.10	0.45	0.39	1.70	0.062	0.27	0.062	0.27	0.062	0.27				
ENV-117	3.97	17.40	0.49	2.15	0.22	0.95	0.68	2.97	0.15	0.67	0.15	0.67	0.15	0.67				
SD-1	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	-	-	-	-
SD-2	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	-	-	-	-
CE-1	3.10	0.80	0.70	0.20	0.30	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.20	0.10	-	-	-	-
PG-1,3,4,7,8,11-1	499.70	56.20	257.10	37.40	29.00	2.10	12.50	0.49	15.10	0.71	12.40	0.64	10.40	0.58	-	-	-	-
Totals	**678.30**	**262.48**	**3522.88**	**1622.41**	**40.09**	**49.44**	**18.15**	**23.34**	**16280.38**	**63843.56**	**4300.37**	**16365.42**	**431.53**	**1336.38**	**-**	**-**	**-**	**-**

[1]**Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but PM is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

[2] The TSP NMAAQS standard was repealed on November 30, 2018. PM emissions are included for informational purposes only.

Table 2-E: Requested Allowable Emissions

Unit & stack numbering must be consistent throughout the application package. Fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or $1.41E^{-4}$).

Unit No.	NOx		CO		VOC		SOx		PM[1,2]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
SX/EW-1	-	-	-	-	5.15	22.54	-	-	-	-	-	-	-	-	-	-	-	-
SX/EW-2	-	-	-	-	-	-	-	-	1.82	7.98	1.82	7.98	-	-	-	-	-	-
SX/EW-3	-	-	-	-	0.95	4.15	-	-	-	-	-	-	-	-	-	-	-	-
SX/EW-4	-	-	-	-	0.32	1.39	-	-	-	-	-	-	-	-	-	-	-	-
B-748	0.36	1.56	0.21	0.90	0.027	0.12	0.00049	0.0022	0.019	0.084	0.019	0.084	0.019	0.084	-	-	-	-
B-951																		
ENV-101	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	-	-	-	-
ENV-111	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	-	-	-	-
ENV-122	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	-	-	-	-
ENV-123	0.14	0.61	1.22	5.36	0.066	0.29	0.44	1.91	0.0070	0.031	0.0070	0.031	0.0070	0.031				
Mine Fugitives (Blasting)	144.00	67.50	3,251.20	1,524.00	-	-	0.29	0.14	482.83	125.54	251.07	65.28	14.48	3.77	-	-	-	-
Mine Fugitives (Handling)	-	-	-	-	-	-	-	-	1.39	6.10	0.53	2.34	0.080	0.35	-	-	-	-
Mine Fugitives (Hauling)	-	-	-	-	-	-	-	-	1,758.37	7,103.43	448.14	1,810.40	44.81	146.32	-	-	-	-
Mine Fugitives (Stockpiles)	-	-	-	-	-	-	-	-	46.43	203.34	21.96	96.18	3.33	14.56	-	-	-	-
SPCC-TYR-061 (GDF1)	-	-	-	-	1.82	7.96	-	-	-	-	-	-	-	-	-	-	-	-
SPCC-TYR-119 (GDF2)	-	-	-	-	0.33	1.46	-	-	-	-	-	-	-	-	-	-	-	-
SP-7A Fugitives (Handling)	-	-	-	-	-	-	-	-	31.00	67.90	9.20	20.20	1.00	2.20	-	-	-	-
OP-2	0.36	1.58	0.28	1.22	0.019	0.083	0.063	0.28	0.031	0.13	0.031	0.13	0.031	0.13	-	-	-	-
OP-8	1.34	5.86	1.22	5.34	0.074	0.33	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	-	-	-	-
ENV-120	1.49	6.51	1.36	5.94	0.078	0.34	0.48	2.12	0.078	0.34	0.078	0.34	0.078	0.34	-	-	-	-
OP-4	1.03	4.53	0.95	4.17	0.054	0.24	0.34	1.49	0.082	0.36	0.082	0.36	0.082	0.36				
OP-7	0.99	4.35	0.91	4.01	0.052	0.23	0.33	1.43	0.052	0.23	0.052	0.23	0.052	0.23				
EMP-1	5.57	24.40	1.20	5.26	0.45	1.98	0.37	1.61	0.40	1.73	0.40	1.73	0.40	1.73				
EMP-2	1.95	8.54	1.09	4.77	0.10	0.45	0.39	1.70	0.062	0.27	0.062	0.27	0.062	0.27				
ENV-117	3.97	17.40	0.49	2.15	0.22	0.95	0.68	2.97	0.15	0.67	0.15	0.67	0.15	0.67				
SD-1	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	-	-	-	-
SD-2	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	-	-	-	-
CE-1	3.10	0.80	0.70	0.20	0.30	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.20	0.10	-	-	-	-
PPG-1,3,4,7,8,11-15	499.70	56.20	257.10	37.40	29.00	2.10	12.50	0.49	15.10	0.71	12.40	0.64	10.40	0.58	-	-	-	-
Totals	**678.30**	**262.48**	**3522.88**	**1622.41**	**40.09**	**49.44**	**18.15**	**23.34**	**2339.05**	**7523.50**	**747.24**	**2011.51**	**76.22**	**176.27**	**-**	**-**	**-**	**-**

[1] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but PM is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

[2] The TSP NMAAQS standard was repealed on November 30, 2018. PM emissions are included for informational purposes only.

Table 2-F: Additional Emissions during Startup, Shutdown, and Routine Maintenance (SSM)

☑ This table is intentionally left blank since all emissions at this facility due to routine or predictable startup, shutdown, or scehduled maintenance are no higher than those listed in Table 2-E and a malfunction emission limit is not already permitted or requested. If you are required to report GHG emissions as described in Section 6a, include any GHG emissions during Startup, Shutdown, and/or Scheduled Maintenance (SSM) in Table 2-P. Provide an explanations of SSM emissions in Section 6 and 6a.

All applications for facilities that have emissions during routine our predictable startup, shutdown or scheduled maintenance (SSM)[1], including NOI applications, must include in this table the Maximum Emissions during routine or predictable startup, shutdown and scheduled maintenance (20.2.7 NMAC, 20.2.72.203.A.3 NMAC, 20.2.73.200.D.2 NMAC). In Section 6 and 6a, provide emissions calculations for all SSM emissions reported in this table. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (https://www.env.nm.gov/aqb/permit/aqb_pol.html) for more detailed instructions. Numbers shall be expressed to at least 2 decimal points (e.g. 0.41, 1.41, or 1.41E-4).

Unit No.	NOx		CO		VOC		SOx		PM[2]		PM10[2]		PM2.5[2]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Totals																		

[1] **For instance**, if the short term steady-state Table 2-E emissions are 5 lb/hr and the SSM rate is 12 lb/hr, enter 7 lb/hr in this table. If the annual steady-state Table 2-E emissions are 21.9 TPY, and the number of scheduled SSM events result in annual emissions of 31.9 TPY, enter 10.0 TPY in the table below.

[2] **Condensable Particulate Matter:** Include condensable particulate matter emissions for PM10 and PM2.5 if the source is a combustion source. Do not include condensable particulate matter for PM unless PM is set equal to PM10 and PM2.5. Particulate matter (PM) is not subject to an ambient air quality standard, but it is a regulated air pollutant under PSD (20.2.74 NMAC) and Title V (20.2.70 NMAC).

Table 2-G: Stack Exit and Fugitive Emission Rates for Special Stacks

☐ I have elected to leave this table blank because this facility does not have any stacks/vents that split emissions from a single source or combine emissions from more than one source listed in table 2-A. Additionally, the emission rates of all stacks match the Requested allowable emission rates stated in Table 2-E.

Use this table to list stack emissions (requested allowable) from split and combined stacks. List Toxic Air Pollutants (TAPs) and Hazardous Air Pollutants (HAPs) in Table 2-I. List all fugitives that are associated with the normal, routine, and non-emergency operation of the facility. Unit and stack numbering must correspond throughout the application package. Refer to Table 2-E for instructions on use of the "-" symbol and on significant figures.

Stack No.	Serving Unit Number(s) from Table 2-A	NOx		CO		VOC		SOx		PM[1]		PM10		PM2.5		☐ H_2S or ☐ Lead	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Boil	B-748 B-951	0.36	1.56	0.21	0.90	0.027	0.12	0.00049	0.0022	0.019	0.084	0.019	0.084	0.019	0.084	-	-
Totals:		**0.36**	**1.56**	**0.21**	**0.90**	**0.027**	**0.12**	**0.00049**	**0.0022**	**0.019**	**0.084**	**0.019**	**0.084**	**0.019**	**0.084**	**-**	**-**

[1] The TSP NMAAQS standard was repealed on November 30, 2018. PM emissions are included for informational purposes only.

Table 2-H: Stack Exit Conditions

Unit and stack numbering must correspond throughout the application package. Include the stack exit conditions for each unit that emits from a stack, including blowdown venting parameters and tank emissions. If the facility has multiple operating scenarios, complete a separate Table 2-H for each scenario and, for each, type scenario name here:

Stack Number	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Temp. (F)	Flow Rate		Moisture by Volume (%)	Velocity (ft/sec)	Inside Diameter (ft)
						(acfs)	(dscfs)			
Boil	B-951, B-748	V	Yes	35.1	400.7	2.6	-	-	31.2	0.33
ENV-101	ENV-101	V	Yes	9.8	710.3	25.5	-	-	301.8	0.33
ENV-111	ENV-111	V	Yes	9.8	710.3	25.5	-	-	301.8	0.33
ENV-122	ENV-122	V	Yes	9.8	710.3	25.5	-	-	301.8	0.33
ENV-123	ENV-123	V	Yes	8.0	833.0	15.5	-	-	85.8	0.48
OP-2	OP-2	V	Yes	8.0	833.0	12.4	-	-	115.0	0.37
OP-8	OP-8	V	Yes	8.0	833.0	15.5	-	-	85.8	0.48
ENV-120	ENV-120	V	Yes	8.0	833.0	14.1	-	-	162.4	0.33
OP-4	OP-4	V	Yes	8.0	833.0	14.1	-	-	162.4	0.33
OP-7	OP-7	V	Yes	8.0	833.0	15.5	-	-	85.8	0.48
EMP-1	EMP-1	V	Yes	8.0	833.0	17.2	-	-	87.5	0.50
EMP-2	EMP-2	V	Yes	8.0	833.0	17.2	-	-	87.5	0.50
ENV-117	ENV-117	V	Yes	8.0	900.0	12.4	-	-	129.0	0.35
SD-1	SD-1	V	Yes	8.0	833.0	18.9	-	-	138.6	0.42
SD-2	SD-2	V	Yes	8.0	833.0	18.9	-	-	138.6	0.42
CE-1	CE-1	V	Yes	25.0	886.7	0.0	-	-	0.0	3.30
PPG-1	PPG-1	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-3	PPG-3	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-4	PPG-4	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-7	PPG-7	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-8	PPG-8	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-11	PPG-11	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-12	PPG-12	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-13	PPG-13	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26
PPG-14	PPG-14	V	Yes	60.7	830.9	435.8	-	-	108.3	2.26

Table 2-I: Stack Exit and Fugitive Emission Rates for HAPs and TAPs

In the table below, report the Potential to Emit for each HAP from each regulated emission unit listed in Table 2-A, only if the entire facility emits the HAP at a rate greater than or equal to one (1) ton per year For each such emission unit, HAPs shall be reported to the nearest 0.1 tpy. Each facility-wide Individual HAP total and the facility-wide Total HAPs shall be the sum of all HAP sources calculated to the nearest 0.1 ton per year. Per 20.2.72.403.A.1 NMAC, facilities not exempt [see 20.2.72.402.C NMAC] from TAP permitting shall report each TAP that has an uncontrolled emission rate in excess of its pounds per hour screening level specified in 20.2.72.502 NMAC. TAPs shall be reported using one more significant figure than the number of significant figures shown in the pound per hour threshold corresponding to the substance. Use the HAP nomenclature as it appears in Section 112 (b) of the 1990 CAAA and the TAP nomenclature as it listed in 20.2.72.502 NMAC. Include tank-flashing emissions estimates of HAPs in this table. For each HAP or TAP listed, fill all cells in this table with the emission numbers or a "-" symbol. A "-" symbol indicates that emissions of this pollutant are not expected or the pollutant is emitted in a quantity less than the threshold amounts described above.

Stack No.	Unit No.(s)	Total HAPs		Ethylbenzene ☑ HAP or ☐ TAP		Toluene ☑ HAP or ☐ TAP		Xylenes ☑ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP		Provide Pollutant Name Here ☐ HAP or ☐ TAP	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
N/A	SX/EW-1	1.65	7.23	0.65	2.87	0.14	0.60	0.85	3.74										
N/A	SX/EW-2	-	-	-	-	-	-	-	-										
N/A	SX/EW-3	0.30	1.33	0.12	0.53	0.025	0.11	0.16	0.69										
N/A	SX/EW-4	0.097	0.42	0.038	0.17	0.0077	0.034	0.050	0.22										
Boil	B-748	0.0046	0.020	-	-	8.37333E-06	3.66752E-05	-	-										
Boil	B-951																		
ENV-101	ENV-101	0.0035	0.015	-	-	0.00036	0.0016	0.00025	0.0011										
ENV-111	ENV-111	0.0035	0.015	-	-	0.00036	0.0016	0.00025	0.0011										
ENV-122	ENV-122	0.0035	0.015	-	-	0.00036	0.0016	0.00025	0.0011										
ENV-123	ENV-123	0.0051	0.022	-	-	0.000061	0.00027	0.00042	0.0019										
N/A	Mine Fugitives (Blasting)	-	-	-	-	-	-	-	-										
N/A	Mine Fugitives (Handling)	-	-	-	-	-	-	-	-										
N/A	Mine Fugitives (Hauling)	-	-	-	-	-	-	-	-										
N/A	Mine Fugitives (Stockpiles)	-	-	-	-	-	-	-	-										
N/A	SPCC-TYR-061 (GDF1)	0.94	4.13	0.055	0.24	0.45	1.99	0.27	1.19										
N/A	SPCC-TYR-119 (GDF2)	0.17	0.76	0.010	0.044	0.083	0.36	0.050	0.22										
N/A	SP-7A Fugitives (Handling)	-	-	-	-	-	-	-	-										
OP-2	OP-2	0.00046	0.0020	-	-	5.48E-06	2.40E-05	3.82E-05	1.67E-04										
OP-8	OP-8	0.0058	0.025	-	-	6.96E-05	3.05E-04	4.85E-04	2.12E-03										
ENV-120	ENV-120	0.0053	0.023	-	-	6.38E-05	2.79E-04	4.44E-04	1.95E-03										
OP-4	OP-4	0.0040	0.017	-	-	4.74E-05	2.08E-04	3.30E-04	1.45E-03										
OP-7	OP-7	0.0038	0.017	-	-	4.55E-05	1.99E-04	3.17E-04	1.39E-03										
EMP-1	EMP-1	0.0043	0.019	-	-	5.15E-05	2.25E-04	3.59E-04	1.57E-03										
EMP-2	EMP-2	0.0045	0.020	-	-	5.42E-05	2.37E-04	3.77E-04	1.65E-03										
ENV-117	ENV-117	0.0079	0.035	-	-	9.48E-05	4.15E-04	6.61E-04	2.89E-03										
SD-1	SD-1	0.0071	0.031	-	-	8.50E-05	3.72E-04	5.93E-04	2.60E-03										
SD-2	SD-2	0.0071	0.031	-	-	8.50E-05	3.72E-04	5.93E-04	2.60E-03										
CE-1	CE-1	0.0028	0.001	-	-	-	-	-	-										
PPG-1,3,4,7,8,11-15	PPG-1,3,4,7,8,11-15	0.37	0.011	-	-	0.060	0.0018	0.040	0.0013										
Totals:		**3.61**	**14.20**	**0.88**	**3.85**	**0.77**	**3.11**	**1.43**	**6.08**										

Table 2-J: Fuel

Specify fuel characteristics and usage. Unit and stack numbering must correspond throughout the application package.

Unit No.	Fuel Type (low sulfur Diesel, ultra low sulfur diesel, Natural Gas, Coal, …)	Fuel Source: purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other	Specify Units				
			Lower Heating Value	Hourly Usage	Annual Usage	% Sulfur	% Ash
B-748	Propane	Purchased commercial	91.5 MMBtu/10^3 gal	13.7 gal	120,247 gal	N/A	N/A
B-951	Propane	Purchased commercial	91.5 MMBtu/10^3 gal	13.7 gal	120,247 gal	N/A	N/A
ENV-101	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	6.0 gal	52,560 gal	0.0015%	N/A
ENV-111	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	6.0 gal	52,560 gal	0.0015%	N/A
ENV-122	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	6.0 gal	52,560 gal	0.0015%	N/A
ENV-123	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	10.9 gal	95,267 gal	0.0015%	N/A
OP-2	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	1.0 gal	8,562.3 gal	0.0015%	N/A
OP-8	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	12.4 gal	108,765 gal	0.0015%	N/A
ENV-120	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	11.4 gal	99,701 gal	0.0015%	N/A
OP-4	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	8.5 gal	74,096 gal	0.0015%	N/A
OP-7	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	8.1 gal	71,133 gal	0.0015%	N/A
EMP-1	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	9.2 gal	80,447 gal	0.0015%	N/A
EMP-2	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	9.7 gal	84,682 gal	0.0015%	N/A
ENV-117	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	16.9 gal	148,193 gal	0.0015%	N/A
SD-1	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	15.2 gal	132,935 gal	0.0015%	N/A
SD-2	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	15.2 gal	132,935 gal	0.0015%	N/A
CE-1	Biodiesel/Diesel Blend	Purchased commercial	137,000 Btu/gal	158.0 gal	13,262 gal	0.0015%	N/A
Natural Gas Operation of Nordberg Engines							
PPG-1	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-3	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-4	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-7	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-8	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-11	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-12	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-13	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
PPG-14	Natural Gas	Purchased commercial	1,050 Btu/scf	20.97 Mscf	6,989.3 Mscf	0.05%	N/A
Diesel Operation of Nordberg Engines							
PPG-1	Diesel	Purchased commercial	137,000 Btu/gal	158 gal	13,262 gal	0.05%	N/A
PPG-3	Diesel	Purchased commercial	137,000 Btu/gal	159 gal	13,262 gal	0.05%	N/A
PPG-4	Diesel	Purchased commercial	137,000 Btu/gal	160 gal	13,262 gal	0.05%	N/A
PPG-7	Diesel	Purchased commercial	137,000 Btu/gal	161 gal	13,262 gal	0.05%	N/A
PPG-8	Diesel	Purchased commercial	137,000 Btu/gal	162 gal	13,262 gal	0.05%	N/A
PPG-11	Diesel	Purchased commercial	137,000 Btu/gal	163 gal	13,262 gal	0.05%	N/A
PPG-12	Diesel	Purchased commercial	137,000 Btu/gal	164 gal	13,262 gal	0.05%	N/A
PPG-13	Diesel	Purchased commercial	137,000 Btu/gal	165 gal	13,262 gal	0.05%	N/A
PPG-14	**Diesel**	Purchased commercial	137,000 Btu/gal	166 gal	13,262 gal	0.05%	N/A

Table 2-K: Liquid Data for Tanks Listed in Table 2-L

For each tank, list the liquid(s) to be stored in each tank. If it is expected that a tank may store a variety of hydrocarbon liquids, enter "mixed hydrocarbons" in the Composition column for that tank and enter the corresponding data of the most volatile liquid to be stored in the tank. If tank is to be used for storage of different materials, list all the materials in the "All Calculations" attachment, run the newest version of TANKS on each, and use the material with the highest emission rate to determine maximum uncontrolled and requested allowable emissions rate. The permit will specify the most volatile category of liquids that may be stored in each tank. Include appropriate tank-flashing modeling input data. Use additional sheets if necessary. Unit and stack numbering must correspond throughout the application package.

Tank No.	SCC Code	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/lb*mol)	Average Storage Conditions		Max Storage Conditions	
						Temperature (°F)	True Vapor Pressure (psia)	Temperature (°F)	True Vapor Pressure (psia)
SPCC-TYR-061	40400150	Gasoline	Mixed Hydrocarbons	6.17	66	76.33	7.05	93.23	9.50
SPCC-TYR-119	40400150	Gasoline	Mixed Hydrocarbons	6.17	66	72.26	6.54	86.25	8.42

Table 2-L: Tank Data

Include appropriate tank-flashing modeling input data. Use an addendum to this table for unlisted data categories. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary. See reference Table 2-L2. Note: 1.00 bbl = 10.159 M3 = 42.0 gal

Tank No.	Date Installed	Materials Stored	Seal Type (refer to Table 2-LR below)	Roof Type (refer to Table 2-LR below)	Capacity		Diameter (M)	Vapor Space (M)	Color (from Table VI-C)		Paint Condition (from Table VI-C)	Annual Throughput (gal/yr)	Turn-overs (per year)
					(bbl)	(M^3)			Roof	Shell			
SPCC-TYR-061	N/A	Gasoline	N/A	FX	476	75.7	3.35	4.27	OT: Red	OT: Red	Poor	63,353	3.17
SPCC-TYR-119	N/A	Gasoline	N/A	FX	48	7.6	1.62	1.83	OT: Green	OT: Green	Good	62,024	31.01

Table 2-L2: Liquid Storage Tank Data Codes Reference Table

Roof Type	Seal Type, Welded Tank Seal Type		Seal Type, Riveted Tank Seal Type		Roof, Shell Color	Paint Condition
FX: Fixed Roof	**Mechanical Shoe Seal**	**Liquid-mounted resilient seal**	**Vapor-mounted resilient seal**	**Seal Type**	**WH**: White	Good
IF: Internal Floating Roof	**A**: Primary only	**A**: Primary only	**A**: Primary only	**A**: Mechanical shoe, primary only	**AS**: Aluminum (specular)	Poor
EF: External Floating Roof	**B**: Shoe-mounted secondary	**B**: Weather shield	**B**: Weather shield	**B**: Shoe-mounted secondary	**AD**: Aluminum (diffuse)	
P: Pressure	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**C**: Rim-mounted secondary	**LG**: Light Gray	
					MG: Medium Gray	
					BL: Black	
					OT: Other (specify)	

Note: 1.00 bbl = 0.159 M^3 = 42.0 gal

Table 2-M: Materials Processed and Produced (Use additional sheets as necessary.)

Material Processed				Material Produced			
Description	**Chemical Composition**	**Phase (Gas, Liquid, or Solid)**	**Quantity (specify units)[1]**	**Description**	**Chemical Composition**	**Phase**	**Quantity (specify units)[1]**
Mined Material	Copper, minerals, and trace metals	Solid	400,000 tons/day	Copper Cathode	Copper	Solid	225 tons/day

[1] Quantities specified here are for informational purposes only and are not intended to be used for permit conditions.

Table 2-N: CEM Equipment

Enter Continuous Emissions Measurement (CEM) Data in this table. If CEM data will be used as part of a federally enforceable permit condition, or used to satisfy the requirements of a state or federal regulation, include a copy of the CEM's manufacturer specification sheet in the Information Used to Determine Emissions attachment. Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

Stack No.	Pollutant(s)	Manufacturer	Model No.	Serial No.	Sample Frequency	Averaging Time	Range	Sensitivity	Accuracy
N/A - Facility does not have CEM equipment.									

Table 2-O: Parametric Emissions Measurement Equipment

Unit and stack numbering must correspond throughout the application package. Use additional sheets if necessary.

Unit No.	Parameter/Pollutant Measured	Location of Measurement	Unit of Measure	Acceptable Range	Frequency of Maintenance	Nature of Maintenance	Method of Recording	Averaging Time
N/A - Facility does not have PEM equipment.								

Table 2-P: Greenhouse Gas Emissions

Applications submitted under 20.2.70, 20.2.72, & 20.2.74 NMAC are required to complete this Table. Power plants, Title V major sources, and PSD major sources must report and calculate all GHG emissions for each unit. Applicants must report potential emission rates in short tons per year (see Section 6.a for assistance). Include GHG emissions during Startup, Shutdown, and Scheduled Maintenance in this table. For minor source facilities that are not power plants, are not Title V, or are not PSD, there are three options for reporting GHGs 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHG as a second separate unit; OR 3) check the following box ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

		CO_2 ton/yr	N_2O ton/yr	CH_4 ton/yr	SF_6 ton/yr	PFC/HFC ton/yr[2]									**Total GHG** Mass Basis ton/yr[4]	**Total CO_2e** ton/yr[5]
Unit No.	**GWPs [1]**	**1**	**298**	**25**	**22,800**	**footnote 3**										
SX/EW-1	mass GHG	-	-	-	-	-									-	
	CO_2e	-	-	-	-	-										-
SX/EW-2	mass GHG	-	-	-	-	-									-	
	CO_2e	-	-	-	-	-										-
SX/EW-3	mass GHG	-	-	-	-	-									-	
	CO_2e	-	-	-	-	-										-
SX/EW-4	mass GHG	-	-	-	-	-									-	
	CO_2e	-	-	-	-	-										-
B-748/B-951	mass GHG	1525.00	0.015	0.073	-	-									1525.1	
	CO_2e	1525.00	4.34	1.82	-	-										1531.2
ENV-101	mass GHG	587.05	3.26E-06	0.37	-	-									587.4	
	CO2e	587.05	0.00097	9.31	-	-										596.4
ENV-111	mass GHG	587.05	3.26E-06	0.37	-	-									587.4	
	CO_2e	587.05	0.00097	9.31	-	-										596.4
ENV-122	mass GHG	587.05	3.26E-06	0.37	-	-									587.4	
	CO2e	587.05	0.00097	9.31	-	-										596.4
ENV-123	mass GHG	1064.05	8.63E-03	0.043	-	-									1064.1	
	CO2e	1064.05	2.57	1.08	-	-										1067.7
Mine Fugitives (Blasting)	mass GHG	15700.71	0.13	0.64	-	-									15701.5	
	CO_2e	15,700.71	37.96	15.92	-	-										15754.6
Mine Fugitives (Handling)	mass GHG	-	-	-	-	-									-	
	CO2e	-	-	-	-	-										-
Mine Fugitives (Hauling)	mass GHG	-	-	-	-	-									-	
	CO_2e	-	-	-	-	-										-
Mine Fugitives (Stockpiles)	mass GHG	-	-	-	-	-									-	
	CO2e	-	-	-	-	-										-
SPCC-TYR-061 (GDF1)	mass GHG	-	-	-	-	-									-	
	CO_2e	-	-	-	-	-										-
SPCC-TYR-119 (GDF2)	mass GHG	-	-	-	-	-									-	
	CO2e	-	-	-	-	-										-
SP-7A Fugitives (Handling)	mass GHG	-	-	-	-	-									-	
	CO_2e	-	-	-	-	-										-
OP-2	mass GHG	95.63	0.00078	0.0039	-	-									95.6	
	CO2e	95.63	0.23	0.097	-	-										96.0
OP-8	mass GHG	1,214.81	0.0099	0.049	-	-									1214.9	
	CO_2e	1,214.81	2.94	1.23	-	-										1219.0
ENV-120	mass GHG	1113.58	0.0090	0.045	-	-									1113.6	
	CO2e	1113.58	2.69	1.13	-	-										1117.4

		CO_2 ton/yr	N_2O ton/yr	CH_4 ton/yr	SF_6 ton/yr	PFC/HFC ton/yr[2]									**Total GHG** Mass Basis ton/yr[4]	**Total CO_2e** ton/yr[5]
Unit No.	**GWPs [1]**	**1**	**298**	**25**	**22,800**	**footnote 3**										
OP-4	mass GHG	827.60	0.0067	0.034	-	-									827.6	
	CO_2e	827.60	2.00	0.84	-	-										830.4
OP-7	mass GHG	794.49	0.0064	0.032	-	-									794.5	
	CO_2e	794.49	1.92	0.81	-	-										797.2
EMP-1	mass GHG	898.53	0.0073	0.036	-	-									898.6	
	CO_2e	898.53	2.17	0.91	-	-										901.6
EMP-2	mass GHG	945.82	0.0077	0.038	-	-									945.9	
	CO_2e	945.82	2.29	0.96	-	-										949.1
ENV-117	mass GHG	1,655.19	0.013	0.067	-	-									1655.3	
	CO_2e	1,655.19	4.00	1.68	-	-										1660.9
SD-1	mass GHG	1,484.77	0.012	0.060	-	-									1484.8	
	CO_2e	1,484.77	3.59	1.51	-	-										1489.9
SD-2	mass GHG	1,484.77	0.012	0.060	-	-									1484.8	
	CO2e	1,484.77	3.59	1.51	-	-										1489.9
CE-1	mass GHG	882.37	0.0072	0.036	-	-									882.4	
	CO2e	882.37	2.133	0.89	-	-										885.4
PPG-1,3,4,7,8,11-15	mass GHG	5,668.15	0.046	0.23	-	-									5668.4	
	CO_2e	5,668.15	13.70	5.75	-	-										5687.6
Total	mass GHG														37,119.5	
	CO_2e															37,266.8

[1] **GWP** (Global Warming Potential): Applicants must use the most current GWPs codified in Table A-1 of 40 CFR part 98. GWPs are subject to change, therefore, applicants need to check 40 CFR 98 to confirm GWP values.

[2] For **HFCs** or **PFCs** describe the specific HFC or PFC compound and use a separate column for each individual compound.

[3] For each new compound, enter the appropriate GWP for each HFC or PFC compound from Table A-1 in 40 CFR 98.

[4] Green house gas emissions on a **mass basis** is the ton per year green house gas emission before adjustment with its GWP.

[5] **CO_2e** means Carbon Dioxide Equivalent and is calculated by multiplying the TPY mass emissions of the green house gas by its GWP.

Section 3

Application Summary

The **Application Summary** shall include a brief description of the facility and its process, the type of permit application, the applicable regulation (i.e. 20.2.72.200.A.X, or 20.2.73 NMAC) under which the application is being submitted, and any air quality permit numbers associated with this site. If this facility is to be collocated with another facility, provide details of the other facility including permit number(s). In case of a revision or modification to a facility, provide the lowest level regulatory citation (i.e. 20.2.72.219.B.1.d NMAC) under which the revision or modification is being requested. Also describe the proposed changes from the original permit, how the proposed modification will affect the facility's operations and emissions, de-bottlenecking impacts, and changes to the facility's major/minor status (both PSD & Title V).

The **Process Summary** shall include a brief description of the facility and its processes.

Startup, Shutdown, and Maintenance (SSM) routine or predictable emissions: Provide an overview of how SSM emissions are accounted for in this application. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions.

Freeport-McMoRan Tyrone Inc. (Tyrone) operates the Tyrone Mine, which is located near Tyrone, New Mexico within Grant County. The Tyrone Mine's major product is copper cathode, which is produced using the solution extraction/electrowinning (SX/EW) process. Boilers are used to heat water at the SX/EW process to rinse the copper cathode product. In addition to the SX/EW plant and associated processes, the Tyrone Mine operations include blasting; hauling and dumping of ore and waste rock; the emergency operation of a power plant; and environmental pumping systems. Detailed descriptions of all facility operations are provided in Section 10 of this application.

Tyrone is preparing a significant permit revision application pursuant to 20.2.72.219.D.1.a NMAC for its Tyrone Mine currently permitted under NSR 2448-M4 and Title V P147-R2. The proposed action will allow for mining and hauling activities associated with Gettysburg and Mohawk pits to increase to 200,000 tons per day each (400,000 tpd total mining rate). However, mining in these areas will not increase the overall facility-wide mining rate as they will be offset by a decrease in mining in other areas. Tyrone will also be adding four (4) new non-emergency diesel-fired pump engines to Little Rock Pit (Units OP-4, OP-7, EMP-1, and EMP-2) and one (1) new non-emergency diesel-fired pump engine to South Rim Pit (Unit ENV-117). Only the two (2) worst-case scenario engines will be modeled for Little Rock Pit, as there will never be a scenario where more than two engines are running simultaneously. Tyrone is reducing the Indian Peak Generator (Unit IPG) to an emergency-use only generator (pursuant to 20.2.72.202.B(3) NMAC). Tyrone is adding a new diluent to the SX/EW tank (Escaid 110); however, this does not affect the emissions as the combination of chemicals which results in the highest emission rate is represented in the permit application. Tyrone is also modifying the emissions associated with the gasoline dispensing facilities (Units GDF1 and GDF2). Finally, Tyrone is requesting to maintain the mining and reclamation activities from NSR Permit 2448-M4 along with the alternate mining rates from NSR 2448-M2. Thus, the scenarios listed in NSR 2448-M4 will become Alternative Operating Scenarios to this permit revision.

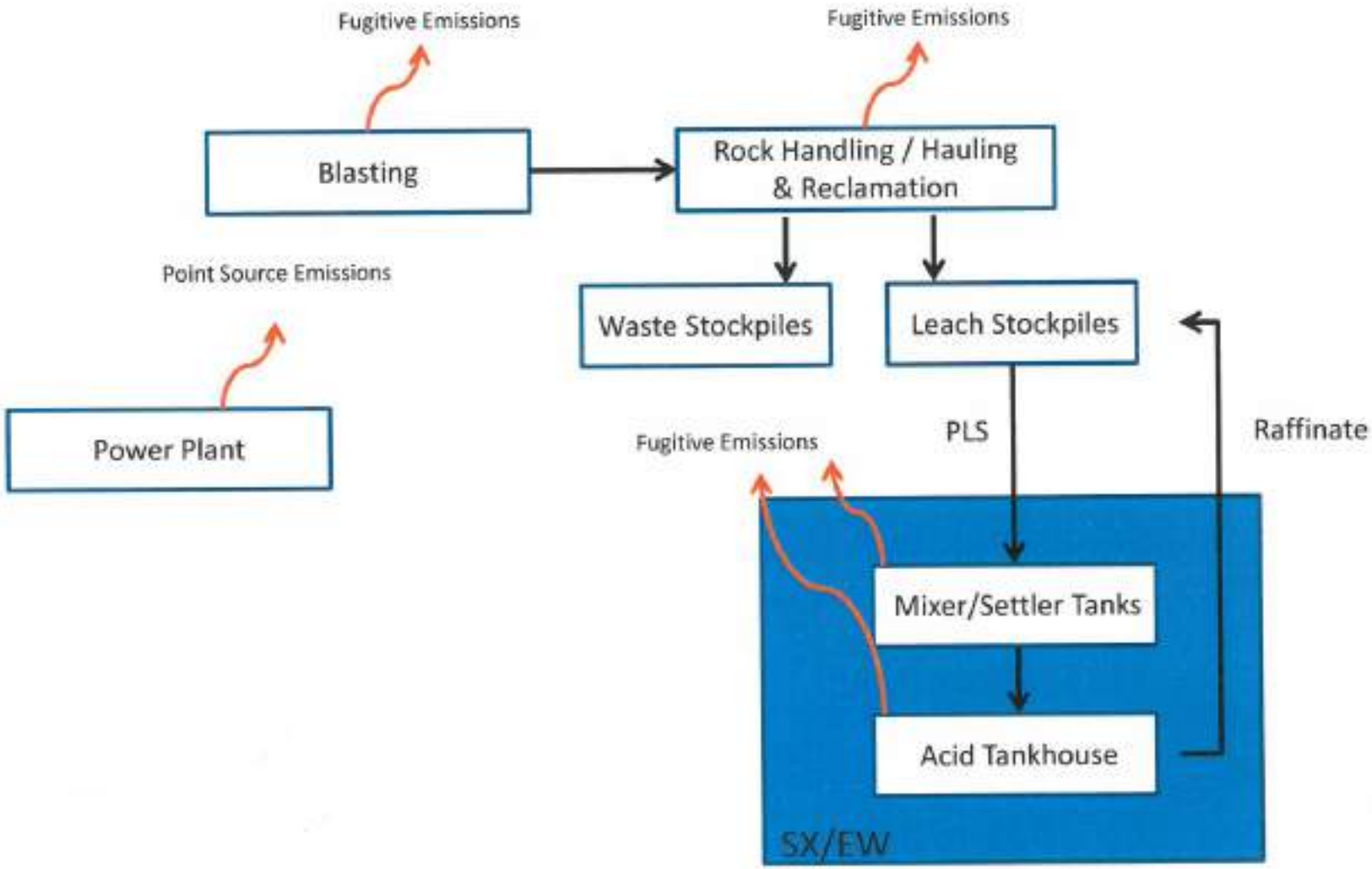
Tyrone's emissions during startup, shutdown, and maintenance (SSM) do not differ from normal operations and Tyrone is not requesting different limits during these times. The facility will remain a Title V major and PSD minor source with the proposed changes.

Section 4

Process Flow Sheet

A **process flow sheet** and/or block diagram indicating the individual equipment, all emission points and types of control applied to those points. The unit numbering system should be consistent throughout this application.

A process flow sheet is attached.



FREEPORT-MCMORAN Freeport-McMoRan Tyrone Inc. NSR Revision	**Figure 1: Tyrone Mine Process Flow Diagram**

Section 5

Plot Plan Drawn To Scale

A **plot plan drawn to scale** showing emissions points, roads, structures, tanks, and fences of property owned, leased, or under direct control of the applicant. This plot plan must clearly designate the restricted area as defined in UA1, Section 1-D.12. The unit numbering system should be consistent throughout this application.

A plot plan is attached.

No. 3
Tailing Pond

No. 3X
Tailing Pond

No. 2
Tailing Pond

No. 1X
Tailing Pond

No. 1
Tailing Pond

No. 1A
Tailing Pond

Mangas Valley Rd

SX/EW
Raffinate Tanks

3 A Leach
Stockpile

SX/EW
Sulfuric Acid Tank House

SX/EW
Mixer/Settlers

Power Plant
Units CE-1, PPG-1, PPG-3,
PPG-4, PPG-7, PPG-8, PPG-11,
PPG-12, PPG-13, PPG-14, PPG-15

9A Waste
Stockpile

3B Waste

LITTLE ROCK PIT

ENV-120
EMP-1
EMP-2
OP-4
OP-7
OP-8

GDF-2

Tyrone Mine Rd.

SX/EW
Boilers B-748, B-951

5 A Waste
Stockpile

2A Leach
Stockpile

8 A Waste
Stockpile

SD-2
OP-2

2B Waste
Stockpile

GDF-1

No. 1
Stockpile

ENV-111

ENV-101

2B Leach
Stockpile

VALENCIA
MAIN PIT

SAVANNA
PIT

1 B Leach
Stockpile

Burro
Mountain
Tailing
Pond

COPPER
MOUNTAIN PIT

2C Leach
Stockpile

6B Leach
Stockpile

GETTYSBURG
PIT

1A Leach
Stockpile

Copper Mtn.
Stockpile

4A Leach
Stockpile

7B Leach
Stockpile

6C Leach
Stockpile

1C
Stockpile

4B Leach
Stockpile

4C Leach
Stockpile

7A West
Stockpile

7A East
Stockpile

ENV-122

SOUTH
RIM PIT

SAN SALVADOR
PIT

SD-1

ENV-117

7A Far West
Stockpile

Legend

- Mobile De-Water Pump (ID)
- Gasoline Dispensing Facility (ID)
- Source Facility
- Tyrone Public Access Boundary
- Road

N E S W

1 ½ ¼ 0 ½ 1miles
Scale: Miles

FREEPORT-McMoRan

Tyrone Mine
Title V & NSR Permit Plot Plan

Scale: As Noted	Date: 4-2-2020	Notes:
Dept. Environmental Services		
Drawn By: SMG	Checked By: NDA	

Section 6

All Calculations

Show all calculations used to determine both the hourly and annual controlled and uncontrolled emission rates. All calculations shall be performed keeping a minimum of three significant figures. Document the source of each emission factor used (if an emission rate is carried forward and not revised, then a statement to that effect is required). If identical units are being permitted and will be subject to the same operating conditions, submit calculations for only one unit and a note specifying what other units to which the calculations apply. All formulas and calculations used to calculate emissions must be submitted. The "Calculations" tab in the UA2 has been provided to allow calculations to be linked to the emissions tables. Add additional "Calc" tabs as needed. If the UA2 or other spread sheets are used, all calculation spread sheet(s) shall be submitted electronically in Microsoft Excel compatible format so that formulas and input values can be checked. Format all spread sheets and calculations such that the reviewer can follow the logic and verify the input values. Define all variables. If calculation spread sheets are not used, provide the original formulas with defined variables. Additionally, provide subsequent formulas showing the input values for each variable in the formula. All calculations, including those calculations are imbedded in the Calc tab of the UA2 portion of the application, the printed Calc tab(s), should be submitted under this section.

Tank Flashing Calculations: The information provided to the AQB shall include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., NOI, permit, or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis. If Hysis is used, all relevant input parameters shall be reported, including separator pressure, gas throughput, and all other relevant parameters necessary for flashing calculation.

SSM Calculations: It is the applicant's responsibility to provide an estimate of SSM emissions or to provide justification for not doing so. In this Section, provide emissions calculations for Startup, Shutdown, and Routine Maintenance (SSM) emissions listed in the Section 2 SSM and/or Section 22 GHG Tables and the rational for why the others are reported as zero (or left blank in the SSM/GHG Tables). Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on calculating SSM emissions. If SSM emissions are greater than those reported in the Section 2, Requested Allowables Table, modeling may be required to ensure compliance with the standards whether the application is NSR or Title V. Refer to the Modeling Section of this application for more guidance on modeling requirements.

Glycol Dehydrator Calculations: The information provided to the AQB shall include the manufacturer's maximum design recirculation rate for the glycol pump. If GRI-Glycalc is used, the full input summary report shall be included as well as a copy of the gas analysis that was used.

Road Calculations: Calculate fugitive particulate emissions and enter haul road fugitives in Tables 2-A, 2-D and 2-E for:

1. If you transport raw material, process material and/or product into or out of or within the facility and have PER emissions greater than 0.5 tpy.
2. If you transport raw material, process material and/or product into or out of the facility more frequently than one round trip per day.

Significant Figures:

A. All emissions standards are deemed to have at least two significant figures, but not more than three significant figures.

B. At least 5 significant figures shall be retained in all intermediate calculations.

C. In calculating emissions to determine compliance with an emission standard, the following rounding off procedures shall be used:

(1) If the first digit to be discarded is less than the number 5, the last digit retained shall not be changed;

(2) If the first digit discarded is greater than the number 5, or if it is the number 5 followed by at least one digit other than the number zero, the last figure retained shall be increased by one unit; **and**

(3) If the first digit discarded is exactly the number 5, followed only by zeros, the last digit retained shall be rounded upward if it is an odd number, but no adjustment shall be made if it is an even number.

(4) The final result of the calculation shall be expressed in the units of the standard.

Control Devices: In accordance with 20.2.72.203.A(3) and (8) NMAC, 20.2.70.300.D(5)(b) and (e) NMAC, and 20.2.73.200.B(7) NMAC, the permittee shall report all control devices and list each pollutant controlled by the control device

regardless if the applicant takes credit for the reduction in emissions. The applicant can indicate in this section of the application if they chose to not take credit for the reduction in emission rates. For notices of intent submitted under 20.2.73 NMAC, only uncontrolled emission rates can be considered to determine applicability unless the state or federal Acts require the control. This information is necessary to determine if federally enforceable conditions are necessary for the control device, and/or if the control device produces its own regulated pollutants or increases emission rates of other pollutants.

This section describes the emissions calculations for units which were updated as part of this permit application. Calculations for all other emission sources are included in this section for informational purposes. These calculations have remained the same since permit NSR 2448-M4 was issued.

Mine Fugitives (Blasting)
Emissions from blasting are calculated based on a maximum of 400,000 lbs of blasting agent used per day for the whole facility. Both Gettysburg and Mohawk pits are maximized to 160,000 lbs of blasting agent per blast with the option of two (2) blasts per day. The NOx emission factor is the average of measurements from "NOx Emissions from Blasting Operations in Open-Cut Coal Mining" by Moetaz I. Attalla, Stuart J. Day, Tony Lange, William Lilley, and Scott Morgan (2008). The CO emission factor is the average of the measurements in "Factors Affecting Anfo Fumes Production" by James H. Rowland III and Richard Mainiero (2001). The SO_2 emissions are based on a diesel sulfur content of 15 ppm assuming complete conversion to SO_2. Particulate blasting emissions are based on emission factors from AP-42 Table 11.9-1. Both Gettysburg and Mohawk will be increasing their horizontal blast area in this revision. Greenhouse gases associated with blasting are calculated using emission factors from 40 CFR 98 Subpart C, Tables C-1 and C-2.

Mine Fugitives (Handling)
Material handling emissions are calculated based on emission factors from AP-42 Chapter 11.19.2 and the maximum mining material throughput of 400,000 tpd.

Mine Fugitives (Hauling)
Emissions from unpaved haul road truck traffic are calculated using the methodology from AP-42 Section 13.2.2. A control efficiency of 88.8% was applied to the uncontrolled emissions based on the combination of the following controls:

Base course and watering – 80%[1]
Average speed limit of 25 mph – 44%[2]
Combined efficiency = 0.8 + (1-0.8) * 0.44 = 0.888 = 88.8%

The maximum truck speed will not exceed the facility-wide speed limit of 35 mph.

The fleet capacity used for haul road truck traffic emissions calculations includes a large safety factor which allows for fluctuation in the number of haul trucks and round-trip duration. A conservative average truck weight of eleven (11) tons was assumed for light duty traffic.

[1]NMED memo: “Department Accepted Values for: Aggregate Handling, Storage Pile, and Haul Road Emissions”
[2]Western Regional Air Partnership (WRAP) Fugitive Dust Handbook, September 7, 2006

Mine Fugitives (Stockpiles)
Emissions from stockpile material handling are calculated using methodology from AP-42 Section 13.2.4 and a maximum rate of 400,000 tpd.

Diesel-Fired Pump Engines (Units OP-4, OP-7, EMP-1, EMP-2, and ENV-117)
Emissions of NO_X, CO, VOC, and particulates are based on EPA Tier emissions standards for units OP-4, OP-7, EMP-2, and ENV-117. NO_X, CO, PM, SO_2, and VOC emissions are based on AP-42 Table 3.3-1 for unit EMP-1. SO_2 and HAP emissions are based on factors from AP-42 Tables 3.3-1 and 3.3-2. Greenhouse gas emissions are calculated using factors from 40 CFR 98 Subpart C.

Gasoline Dispensing Facilities (Units GDF1 and GDF2)
Emissions from GDF1 and GDF2 were calculated using methodology from AP-42 Section 5.2. Mass fraction of HAP is based on typical material MSDS for gasoline. Emissions associated with the tanks were calculated using Tanks 4.09d.

Section 6.a

Green House Gas Emissions

(Submitting under 20.2.70, 20.2.72 20.2.74 NMAC)

Title V (20.2.70 NMAC), Minor NSR (20.2.72 NMAC), and PSD (20.2.74 NMAC) applicants must estimate and report greenhouse gas (GHG) emissions to verify the emission rates reported in the public notice, determine applicability to 40 CFR 60 Subparts, and to evaluate Prevention of Significant Deterioration (PSD) applicability. GHG emissions that are subject to air permit regulations consist of the sum of an aggregate group of these six greenhouse gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

Calculating GHG Emissions:

1. Calculate the ton per year (tpy) GHG mass emissions and GHG CO_2e emissions from your facility.
2. GHG mass emissions are the sum of the total annual tons of greenhouse gases without adjusting with the global warming potentials (GWPs). GHG CO_2e emissions are the sum of the mass emissions of each individual GHG multiplied by its GWP found in Table A-1 in 40 CFR 98 Mandatory Greenhouse Gas Reporting.
3. Emissions from routine or predictable start up, shut down, and maintenance must be included.
4. Report GHG mass and GHG CO_2e emissions in Table 2-P of this application. Emissions are reported in **short** tons per year and represent each emission unit's Potential to Emit (PTE).
5. All Title V major sources, PSD major sources, and all power plants, whether major or not, must calculate and report GHG mass and CO2e emissions for each unit in Table 2-P.
6. For minor source facilities that are not power plants, are not Title V, and are not PSD there are three options for reporting GHGs in Table 2-P: 1) report GHGs for each individual piece of equipment; 2) report all GHGs from a group of unit types, for example report all combustion source GHGs as a single unit and all venting GHGs as a second separate unit; 3) or check the following ☐ By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

Sources for Calculating GHG Emissions:

- Manufacturer's Data
- AP-42 Compilation of Air Pollutant Emission Factors at http://www.epa.gov/ttn/chief/ap42/index.html
- EPA's Internet emission factor database WebFIRE at http://cfpub.epa.gov/webfire/
- 40 CFR 98 Mandatory Green House Gas Reporting except that tons should be reported in short tons rather than in metric tons for the purpose of PSD applicability.
- API Compendium of Greenhouse Gas Emissions Methodologies for the Oil and Natural Gas Industry. August 2009 or most recent version.
- Sources listed on EPA's NSR Resources for Estimating GHG Emissions at http://www.epa.gov/nsr/clean-air-act-permitting-greenhouse-gases:

Global Warming Potentials (GWP):
Applicants must use the Global Warming Potentials codified in Table A-1 of the most recent version of 40 CFR 98 Mandatory Greenhouse Gas Reporting. The GWP for a particular GHG is the ratio of heat trapped by one unit mass of the GHG to that of one unit mass of CO_2 over a specified time period.

"Greenhouse gas" for the purpose of air permit regulations is defined as the aggregate group of the following six gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. **(20.2.70.7 NMAC, 20.2.74.7 NMAC).** You may also find GHGs defined in 40 CFR 86.1818-12(a).

Metric to Short Ton Conversion:
Short tons for GHGs and other regulated pollutants are the standard unit of measure for PSD and title V permitting programs. 40 CFR 98 Mandatory Greenhouse Reporting requires metric tons.
1 metric ton = 1.10231 short tons (per Table A-2 to Subpart A of Part 98 – Units of Measure Conversions)

Freeport-McMoRan Tyrone Inc.
Facility-wide Emissions Summary

Uncontrolled Emissions

	NOX		CO		VOC		SO2		TSP		PM10		PM2.5		Total HAP		Ethylbenzene		Toluene		Xylenes		CO_2e	CO_2	CH_4	N_2O
Unit	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**lb/hr**	**tpy**	**tpy**	**tpy**	**tpy**	**tpy**
SX/EW-1	-	-	-	-	5.15	22.54	-	-	-	-	-	-	-	-	1.65	7.23	0.65	2.87	0.14	0.60	0.85	3.74	-	-	-	-
SX/EW-2	-	-	-	-	-	-	-	-	1.82	7.98	1.82	7.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SX/EW-3	-	-	-	-	0.95	4.15	-	-	-	-	-	-	-	-	0.30	1.33	0.12	0.53	2.51E-02	0.11	0.16	0.69	-	-	-	-
SX/EW-4	-	-	-	-	0.32	1.39	-	-	-	-	-	-	-	-	0.097	0.42	0.038	0.17	7.69E-03	0.034	0.050	0.22	-	-	-	-
B-748[1]	0.36	1.56	0.21	0.90	0.027	0.12	4.94E-04	2.16E-03	0.019	0.084	0.019	0.084	0.019	0.084	4.63E-03	0.020	-	-	8.37E-06	3.67E-05	-	-	1,531.16	1525.0	0.073	0.015
B-951[1]																	-	-			-	-				
ENV-101	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	3.46E-03	0.015	-	-	3.58E-04	1.57E-03	2.49E-04	1.09E-03	596.36	587.05	0.37	3.26E-06
ENV-111	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	3.46E-03	0.015	-	-	3.58E-04	1.57E-03	2.49E-04	1.09E-03	596.36	587.05	0.37	3.26E-06
ENV-122	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	3.46E-03	0.015	-	-	3.58E-04	1.57E-03	2.49E-04	1.09E-03	596.36	587.05	0.37	3.26E-06
ENV-123	0.14	0.61	1.22	5.36	0.066	0.29	0.44	1.91	7.00E-03	0.031	7.00E-03	0.031	7.00E-03	0.031	5.10E-03	0.022	-	-	6.09E-05	2.67E-04	4.25E-04	1.86E-03	1067.70	1064.05	0.043	8.63E-03
Mine Fugitives (Blasting)	144.0	67.50	3,251.2	1,524.00	-	-	0.29	0.14	482.83	125.54	251.07	65.28	14.48	3.77	-	-	-	-	-	-	-	-	15,754.6	15,700.71	0.64	0.13
Mine Fugitives (Handling)	-	-	-	-	-	-	-	-	1.39	6.10	0.53	2.34	0.08	0.35	-	-	-	-	-	-	-	-	-	-	-	-
Mine Fugitives (Hauling)	-	-	-	-	-	-	-	-	15,699.69	63,423.50	4,001.27	16,164.32	400.13	1,306.43	-	-	-	-	-	-	-	-	-	-	-	-
Mine Fugitives (Stockpiles)	-	-	-	-	-	-	-	-	46.43	203.34	21.96	96.18	3.33	14.56	-	-	-	-	-	-	-	-	-	-	-	-
SPCC-TYR-061 (GDF1)	-	-	-	-	1.82	7.96	-	-	-	-	-	-	-	-	0.94	4.13	0.055	0.24	0.45	1.99	0.27	1.19	-	-	-	-
SPCC-TYR-119 (GDF2)	-	-	-	-	0.33	1.46	-	-	-	-	-	-	-	-	0.17	0.76	0.010	0.044	0.083	0.36	0.050	0.22	-	-	-	-
SP-7A Fugitives	-	-	-	-	-	-	-	-	31.00	67.90	9.20	20.20	1.00	2.20	-	-	-	-	-	-	-	-	-	-	-	-
OP-2	0.36	1.58	0.28	1.22	0.019	0.083	0.063	0.28	0.031	0.13	0.031	0.13	0.031	0.13	4.58E-04	2.01E-03	-	-	5.48E-06	2.40E-05	3.82E-05	1.67E-04	95.96	95.63	3.88E-03	7.76E-04
OP-8	1.34	5.86	1.22	5.34	0.074	0.33	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	5.82E-03	0.025	-	-	6.96E-05	3.05E-04	4.85E-04	2.12E-03	1218.98	1214.81	0.049	9.86E-03
ENV-120	1.49	6.51	1.36	5.94	0.078	0.34	0.48	2.12	0.078	0.34	0.078	0.34	0.078	0.34	5.34E-03	0.023	-	-	6.38E-05	2.79E-04	4.44E-04	1.95E-03	1117.40	1113.58	0.045	9.03E-03
OP-4	1.03	4.53	0.95	4.17	0.054	0.24	0.34	1.49	0.082	0.36	0.082	0.36	0.082	0.36	3.97E-03	0.017	-	-	4.74E-05	2.08E-04	3.30E-04	1.45E-03	830.44	827.60	0.034	6.71E-03
OP-7	0.99	4.35	0.91	4.01	0.052	0.23	0.33	1.43	0.052	0.23	0.052	0.23	0.052	0.23	3.81E-03	0.017	-	-	4.55E-05	1.99E-04	3.17E-04	1.39E-03	797.22	794.49	0.032	6.45E-03
EMP-1	5.57	24.40	1.20	5.26	0.45	1.98	0.37	1.61	0.40	1.73	0.40	1.73	0.40	1.73	4.31E-03	0.019	-	-	5.15E-05	2.25E-04	3.59E-04	1.57E-03	901.62	898.53	0.036	7.29E-03
EMP-2	1.95	8.54	1.09	4.77	0.10	0.45	0.39	1.70	0.062	0.27	0.062	0.27	0.062	0.27	4.53E-03	0.020	-	-	5.42E-05	2.37E-04	3.77E-04	1.65E-03	949.07	945.82	0.038	7.67E-03
ENV-117	3.97	17.40	0.49	2.15	0.22	0.95	0.68	2.97	0.15	0.67	0.15	0.67	0.15	0.67	7.93E-03	0.035	-	-	9.48E-05	4.15E-04	6.61E-04	2.89E-03	1660.87	1655.19	0.067	0.013
SD-1	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	7.11E-03	0.031	-	-	8.50E-05	3.72E-04	5.93E-04	2.60E-03	1489.87	1484.77	0.060	0.012
SD-2	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	7.11E-03	0.031	-	-	8.50E-05	3.72E-04	5.93E-04	2.60E-03	1489.87	1484.77	0.060	0.012
CE-1	3.10	0.80	0.70	0.20	0.30	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.20	0.10	2.77E-03	6.93E-04	-	-	-	-	-	-	885.39	882.37	0.036	7.16E-03
PPG-1, 3, 4, 7, 8, 11-15	499.70	56.20	257.10	37.40	29.00	2.10	12.50	0.49	15.10	0.71	12.40	0.64	10.40	0.58	0.37	0.011	-	-	0.060	1.82E-03	0.040	1.25E-03	5,687.60	5,668.15	0.23	0.046
Total	**678.30**	**262.48**	**3,522.88**	**1,622.41**	**40.09**	**49.44**	**18.15**	**23.34**	**16,280.38**	**63,843.56**	**4,300.37**	**16,365.42**	**431.53**	**1336.38**	**3.61**	**14.20**	**0.88**	**3.85**	**0.77**	**3.11**	**1.43**	**6.08**	**37,266.8**	**37,116.65**	**2.56**	**0.29**
Total w/o Fugitives[2]	**534.30**	**194.98**	**271.68**	**98.41**	**40.09**	**49.44**	**17.86**	**23.20**	**19.04**	**17.18**	**16.34**	**17.11**	**12.52**	**9.07**	**3.61**	**14.20**	**0.88**	**3.85**	**0.77**	**3.11**	**1.43**	**6.08**	**21,512.2**	**21,415.94**	**1.93**	**0.16**

[1] These two boilers share a common stack.

[2] Fugitive emissions do not count towards the TV and PSD applicability of the facility; therefore, they are not included in the permittable limit.

Freeport-McMoRan Tyrone Inc.
Facility-wide Emissions Summary

Controlled Emissions

Unit	NOX		CO		VOC		SO2		TSP		PM10		PM2.5		Total HAP		Ethylbenzene		Toluene		Xylenes		CO_2e	CO_2	CH_4	N_2O
	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	tpy	tpy	tpy	tpy
SX/EW-1	-	-	-	-	5.15	22.54	-	-	-	-	-	-	-	-	1.65	7.23	0.65	2.87	0.14	0.60	0.85	3.74	-	-	-	-
SX/EW-2	-	-	-	-	-	-	-	-	1.82	7.98	1.82	7.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SX/EW-3	-	-	-	-	0.95	4.15	-	-	-	-	-	-	-	-	0.30	1.33	0.12	0.53	0.025	0.11	0.16	0.69	-	-	-	-
SX/EW-4	-	-	-	-	0.32	1.39	-	-	-	-	-	-	-	-	0.097	0.42	0.038	0.17	7.69E-03	0.034	0.050	0.22	-	-	-	-
B-748[1]	0.36	1.56	0.21	0.90	0.027	0.12	4.94E-04	2.16E-03	0.019	0.084	0.019	0.084	0.019	0.084	4.63E-03	0.020	-	-	8.37E-06	3.67E-05	-	-	1,531.2	1525.0	0.073	0.015
B-951[1]																	-	-			-	-				
ENV-101	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	3.46E-03	0.015	-	-	3.58E-04	1.57E-03	2.49E-04	1.09E-03	596.3631	587.05	0.37	3.26E-06
ENV-111	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	3.46E-03	0.015	-	-	3.58E-04	1.57E-03	2.49E-04	1.09E-03	596.3631	587.05	0.37	3.26E-06
ENV-122	3.88	16.97	0.84	3.67	0.31	1.37	0.26	1.12	0.28	1.20	0.28	1.20	0.28	1.20	3.46E-03	0.015	-	-	3.58E-04	1.57E-03	2.49E-04	1.09E-03	596.3631	587.05	0.37	3.26E-06
ENV-123	0.14	0.61	1.22	5.36	0.066	0.29	0.44	1.91	7.00E-03	0.031	7.00E-03	0.031	7.00E-03	0.031	5.10E-03	0.022	-	-	6.09E-05	2.67E-04	4.25E-04	1.86E-03	1067.70	1064.05	0.043	8.63E-03
Mine Fugitives (Blasting)	144.0	67.50	3,251.2	1,524.00	-	-	0.29	0.14	482.83	125.54	251.07	65.28	14.48	3.77	-	-	-	-	-	-	-	-	15,754.58	15,700.71	0.64	0.13
Mine Fugitives (Handling)	-	-	-	-	-	-	-	-	1.39	6.10	0.53	2.34	0.08	0.35	-	-	-	-	-	-	-	-	-	-	-	-
Mine Fugitives (Hauling)	-	-	-	-	-	-	-	-	1,758.37	7,103.43	448.14	1,810.40	44.81	146.32	-	-	-	-	-	-	-	-	-	-	-	-
Mine Fugitives (Stockpiles)	-	-	-	-	-	-	-	-	46.43	203.34	21.96	96.18	3.33	14.56	-	-	-	-	-	-	-	-	-	-	-	-
SPCC-TYR-061 (GDF1)	-	-	-	-	1.82	7.96	-	-	-	-	-	-	-	-	0.94	4.13	0.055	0.24	0.45	1.99	0.27	1.19	-	-	-	-
SPCC-TYR-119 (GDF2)	-	-	-	-	0.33	1.46	-	-	-	-	-	-	-	-	0.17	0.76	0.010	0.044	0.083	0.36	0.050	0.22	-	-	-	-
SP-7A Fugitives	-	-	-	-	-	-	-	-	31.00	67.90	9.20	20.20	1.00	2.20	-	-	-	-	-	-	-	-	-	-	-	-
OP-2	0.36	1.58	0.28	1.22	0.019	0.083	0.063	0.28	0.031	0.13	0.031	0.13	0.031	0.13	4.58E-04	2.01E-03	-	-	5.48E-06	2.40E-05	3.82E-05	1.67E-04	96.0	95.63	3.88E-03	7.76E-04
OP-8	1.34	5.86	1.22	5.34	0.074	0.33	0.44	1.91	0.070	0.31		0.31	0.070	0.31		0.025	-	-	6.96E-05	3.05E-04	4.85E-04	2.12E-03	1219.0	1214.81	0.049	9.86E-03
ENV-120	1.49	6.51	1.36	5.94	0.078	0.34	0.48	2.12	0.078	0.34	0.078	0.34	0.078	0.34	5.34E-03	0.023	-	-	6.38E-05	2.79E-04	4.44E-04	1.95E-03	1117.4	1113.58	0.045	9.03E-03
OP-4	1.03	4.53	0.95	4.17	0.054	0.24	0.34	1.49	0.08	0.36	0.08	0.36	0.08	0.36	3.97E-03	0.017	-	-	4.74E-05	2.08E-04	3.30E-04	1.45E-03	830.44	827.60	0.034	6.71E-03
OP-7	0.99	4.35	0.91	4.01	0.052	0.23	0.33	1.43	0.05	0.23	0.05	0.23	0.05	0.23	3.81E-03	0.017	-	-	4.55E-05	1.99E-04	3.17E-04	1.39E-03	797.22	794.49	0.032	6.45E-03
EMP-1	5.57	24.40	1.20	5.26	0.45	1.98	0.37	1.61	0.40	1.73	0.40	1.73	0.40	1.73	4.31E-03	0.019	-	-	5.15E-05	2.25E-04	3.59E-04	1.57E-03	901.62	898.53	0.036	7.29E-03
EMP-2	1.95	8.54	1.09	4.77	0.10	0.45	0.39	1.70	0.06	0.27	0.06	0.27	0.06	0.27	4.53E-03	0.020	-	-	5.42E-05	2.37E-04	3.77E-04	1.65E-03	949.07	945.82	0.038	7.67E-03
ENV-117	3.97	17.40	0.49	2.15	0.22	0.95	0.68	2.97	0.15	0.67	0.15	0.67	0.15	0.67	7.93E-03	0.035	-	-	9.48E-05	4.15E-04	6.61E-04	2.89E-03	1660.87	1655.19	0.067	0.013
SD-1	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	7.11E-03	0.031	-	-	8.50E-05	3.72E-04	5.93E-04	2.60E-03	1489.9	1484.77	0.060	0.012
SD-2	1.34	5.86	1.22	5.34	0.070	0.31	0.44	1.91	0.070	0.31	0.070	0.31	0.070	0.31	7.11E-03	0.031	-	-	8.50E-05	3.72E-04	5.93E-04	2.60E-03	1489.9	1484.77	0.060	0.012
CE-1	3.10	0.80	0.70	0.20	0.30	0.10	0.20	0.10	0.20	0.10	0.20	0.10	0.20	0.10	2.77E-03	6.93E-04	-	-	-	-	-	-	885.39	882.37	0.036	7.16E-03
PPG-1, 3, 4, 7, 8, 11-15	499.70	56.20	257.10	37.40	29.00	2.10	12.50	0.49	15.10	0.71	12.40	0.64	10.40	0.58	0.37	0.011	-	-	0.060	1.82E-03	0.040	1.25E-03	5,687.60	5,668.15	0.23	0.046
Total	**678.30**	**262.48**	**3,522.88**	**1,622.41**	**40.09**	**49.44**	**18.15**	**23.34**	**2,339.05**	**7,523.50**	**747.17**	**2011.51**	**76.22**	**176.27**	**3.61**	**14.20**	**0.88**	**3.85**	**0.77**	**3.11**	**1.43**	**6.08**	**37,266.8**	**37,116.65**	**2.56**	**0.29**
Total w/o Fugitives[2]	**534.30**	**194.98**	**271.68**	**98.41**	**40.09**	**49.44**	**17.86**	**23.20**	**19.04**	**17.18**	**16.27**	**17.11**	**12.52**	**9.07**	**3.61**	**14.20**	**0.88**	**3.85**	**0.77**	**3.11**	**1.43**	**6.08**	**21512.25**	**21415.94**	**1.93**	**0.16**

[1] These two boilers share a common stack.

[2] Fugitive emissions do not count towards the TV and PSD applicability of the facility; therefore, they are not included in the permittable limit.

Freeport-McMoRan Tyrone Inc.
Feb-20

Haul Road Emission Summary
Units: Mine Fugitives (Hauling)

Uncontrolled Emissions													
Road Number	Road Name	Total Emissions						Emissions per Volume Source					
		PM2.5		PM10		TSP		PM2.5		PM10		TSP	
		tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr
1	3A Stockpile	73.19	20.67	905.56	206.75	3553.11	811.21	3.66	1.03	45.28	10.34	177.66	40.56
2	3B Stockpile	62.31	17.60	770.95	176.02	3024.95	690.63	3.89	1.10	48.18	11.00	189.06	43.16
3	3B to Mohawk1	52.42	14.81	648.58	148.08	2544.80	581.00	4.03	1.14	49.89	11.39	195.75	44.69
4	Wagner	52.42	14.81	648.58	148.08	2544.80	581.00	3.74	1.06	46.33	10.58	181.77	41.50
5	Mohawk	73.81	20.85	913.21	208.49	3583.12	818.06	1.45	0.41	17.91	4.09	70.26	16.04
6	5A Stockpile	20.77	5.87	256.98	58.67	1008.32	230.21	1.38	0.39	17.13	3.91	67.22	15.35
7	8C Stockpile	67.25	19.00	832.13	189.98	3265.02	745.44	3.74	1.06	46.23	10.55	181.39	41.41
8	6A Stockpile	22.75	6.43	281.46	64.26	1104.35	252.13	3.79	1.07	46.91	10.71	184.06	42.02
9	6D Stockpile	74.18	20.95	917.80	209.54	3601.13	822.18	3.90	1.10	48.31	11.03	189.53	43.27
10	Copper Mountain Waste	133.52	37.72	1652.03	377.18	6482.03	1479.92	3.81	1.08	47.20	10.78	185.20	42.28
11	Main Pit/Mohawk 2	252.21	71.24	3120.50	712.44	12243.83	2795.40	3.76	1.06	46.57	10.63	182.74	41.72
12	Valencia	18.79	5.31	232.51	53.08	912.29	208.28	0.54	0.15	6.64	1.52	26.07	5.95
13	4AE and 7A/7B	109.78	31.01	1358.34	310.12	5329.67	1216.82	3.79	1.07	46.84	10.69	183.78	41.96
14	West 6D Stockpile	9.89	2.79	122.37	27.94	480.15	109.62	3.30	0.93	40.79	9.31	160.05	36.54
15	4AW Stockpile	52.42	14.81	648.58	148.08	2544.80	581.00	4.03	1.14	49.89	11.39	195.75	44.69
16	4D Stockpile	120.66	34.09	1492.95	340.86	5857.83	1337.41	3.09	0.87	38.28	8.74	150.20	34.29
17	2A Stockpile	0.00	0.00	0.05	0.01	0.18	0.04	0.00	0.00	0.00	0.00	0.01	0.00
18	West Main Road	0.02	0.01	0.26	0.06	1.01	0.23	0.00	0.00	0.00	0.00	0.01	0.00
19	2B Stockpile	0.00	0.00	0.04	0.01	0.17	0.04	0.00	0.00	0.00	0.00	0.01	0.00
20	Copper Mountain	0.01	0.00	0.08	0.02	0.31	0.07	0.00	0.00	0.00	0.00	0.01	0.00
21	9A Stockpile	0.01	0.00	0.08	0.02	0.32	0.07	0.00	0.00	0.00	0.00	0.01	0.00
22	9AX Stockpile	0.00	0.00	0.04	0.01	0.16	0.04	0.00	0.00	0.00	0.00	0.01	0.00
R1	STP	15.13	8.55	187.24	85.50	734.67	335.47	0.15	0.09	1.89	0.86	7.42	3.39
R2	1A/1B	28.26	15.96	349.63	159.65	1371.85	626.41	0.57	0.32	6.99	3.19	27.44	12.53
R3	Tailings	1.36	0.77	16.86	7.70	66.16	30.21	0.17	0.10	2.11	0.96	8.27	3.78
R4	P Plant	2.96	1.67	36.60	16.71	143.63	65.58	0.37	0.21	4.58	2.09	17.95	8.20
R5	Large Reclamation	30.21	17.07	373.81	170.69	1466.73	669.74	0.34	0.19	4.25	1.94	16.67	7.61
R6	2C4A7BS	17.93	10.13	221.85	101.30	870.46	397.47	0.66	0.38	8.22	3.75	32.24	14.72
R7	2B Reclamation	14.16	8.00	175.26	80.03	687.66	314.00	0.67	0.38	8.35	3.81	32.75	14.95
Total		**1306.43**	**400.13**	**16164.32**	**4001.27**	**63423.50**	**15699.69**	**54.86**	**16.33**	**678.78**	**163.28**	**2663.29**	**640.65**

Controlled Emissions													
Road Number	Road Name	Total Emissions						Emissions per Volume Source					
		PM2.5		PM10		TSP		PM2.5		PM10		TSP	
		tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr
1	3A Stockpile	8.20	2.32	101.42	23.16	397.95	90.86	0.41	0.12	5.07	1.16	19.90	4.54
2	3B Stockpile	6.98	1.97	86.35	19.71	338.79	77.35	0.44	0.12	5.40	1.23	21.17	4.83
3	3B to Mohawk1	5.87	1.66	72.64	16.58	285.02	65.07	0.45	0.13	5.59	1.28	21.92	5.01
4	Wagner	5.87	1.66	72.64	16.58	285.02	65.07	0.42	0.12	5.19	1.18	20.36	4.65
5	Mohawk	8.27	2.34	102.28	23.35	401.31	91.62	0.16	0.05	2.01	0.46	7.87	1.80
6	5A Stockpile	2.33	0.66	28.78	6.57	112.93	25.78	0.16	0.04	1.92	0.44	7.53	1.72
7	8C Stockpile	7.53	2.13	93.20	21.28	365.68	83.49	0.42	0.12	5.18	1.18	20.32	4.64
8	6A Stockpile	2.55	0.72	31.52	7.20	123.69	28.24	0.42	0.12	5.25	1.20	20.61	4.71
9	6D Stockpile	8.31	2.35	102.79	23.47	403.33	92.08	0.44	0.12	5.41	1.24	21.23	4.85
10	Copper Mountain Waste	14.95	4.22	185.03	42.24	725.99	165.75	0.43	0.12	5.29	1.21	20.74	4.74
11	Main Pit/Mohawk 2	28.25	7.98	349.50	79.79	1371.31	313.08	0.42	0.12	5.22	1.19	20.47	4.67
12	Valencia	2.10	0.59	26.04	5.95	102.18	23.33	0.06	0.02	0.74	0.17	2.92	0.67
13	4AE and 7A/7B	12.30	3.47	152.13	34.73	596.92	136.28	0.42	0.12	5.25	1.20	20.58	4.70
14	West 6D Stockpile	1.11	0.31	13.71	3.13	53.78	12.28	0.37	0.10	4.57	1.04	17.93	4.09
15	4AW Stockpile	5.87	1.66	72.64	16.58	285.02	65.07	0.45	0.13	5.59	1.28	21.92	5.01
16	4D Stockpile	13.51	3.82	167.21	38.18	656.08	149.79	0.35	0.10	4.29	0.98	16.82	3.84
17	2A Stockpile	0.00	0.00	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
18	West Main Road	0.00	0.00	0.03	0.01	0.11	0.03	0.00	0.00	0.00	0.00	0.00	0.00
19	2B Stockpile	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
20	Copper Mountain	0.00	0.00	0.01	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00
21	9A Stockpile	0.00	0.00	0.01	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00
22	9AX Stockpile	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R1	STP	1.69	0.96	20.97	9.58	82.28	37.57	0.02	0.01	0.21	0.10	0.83	0.38
R2	1A/1B	3.16	1.79	39.16	17.88	153.65	70.16	0.06	0.04	0.78	0.36	3.07	1.40
R3	Tailings	0.15	0.09	1.89	0.86	7.41	3.38	0.02	0.01	0.24	0.11	0.93	0.42
R4	P Plant	0.33	0.19	4.10	1.87	16.09	7.35	0.04	0.02	0.51	0.23	2.01	0.92
R5	Large Reclamation	3.38	1.91	41.87	19.12	164.27	75.01	0.04	0.02	0.48	0.22	1.87	0.85
R6	2C4A7BS	2.01	1.13	24.85	11.35	97.49	44.52	0.07	0.04	0.92	0.42	3.61	1.65
R7	2B Reclamation	1.59	0.90	19.63	8.96	77.02	35.17	0.08	0.04	0.93	0.43	3.67	1.67
Total		**146.32**	**44.81**	**1810.40**	**448.14**	**7103.43**	**1758.37**	**6.14**	**1.83**	**76.02**	**18.29**	**298.29**	**71.75**

Freeport-McMoRan Tyrone Inc.
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New Haul Road Inputs

Proposed Haul Roads (See Google Earth Image)																					
Road Name	Road No.	Road Throughput (tons/day)	Road Length (miles)	Truck Type	No. of Trucks	Truck Throughput Rate (tons/day per truck)	Production Rate (tons/year)	Operating Schedule (day/year)	Length of Shift (hr/day)	Maximum Operating Schedule (hours/year)	Truck Empty Weight (tons)	Weight of Truck Load (tons)	Average Truck Weight (tons)	d (trips/hour)	Trips per Segment	L (mile/trip)	Hourly VMT (miles/hr)	Annual VMT (miles/year)	Control Efficiency	Silt Control	number of volume sources
3A Stockpile	1	200,000.00	0.74	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	1.48	45.51	398671.6	88.8%	4.8	20
3B Stockpile	2	200,000.00	0.63	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	1.26	38.75	339409.6	88.8%	4.8	16
3B to Mohawk1	3	200,000.00	0.53	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	1.06	32.60	285535.1	88.8%	4.8	13
Wagner	4	200,000.00	0.53	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	1.06	32.60	285535.1	88.8%	4.8	14
Mohawk	5	75,000.00	1.99	Cat 793	7	10714.29	27375000	365	24	8760	169	271	220	11.53	2	3.98	45.89	402038.7	88.8%	4.8	51
5A Stockpile	6	75,000.00	0.56	Cat 793	7	10714.29	27375000	365	24	8760	169	271	220	11.53	2	1.12	12.92	113136.5	88.8%	4.8	15
8C Stockpile	7	200,000.00	0.68	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	1.36	41.82	366346.9	88.8%	4.8	18
6A Stockpile	8	200,000.00	0.23	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	0.46	14.15	123911.4	88.8%	4.8	6
6D Stockpile	9	200,000.00	0.75	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	1.50	46.13	404059.0	88.8%	4.8	19
Copper Mountain Waste	10	200,000.00	1.35	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	2.70	83.03	727306.3	88.8%	4.8	35
Main Pit/Mohawk 2	11	200,000.00	2.55	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	5.10	156.83	1373800.7	88.8%	4.8	67
Valencia	12	200,000.00	0.19	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	0.38	11.69	102361.6	88.8%	4.8	35
4AE and 7A/7B	13	200,000.00	1.11	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	2.22	68.27	598007.4	88.8%	4.8	29
West 6D Stockpile	14	200,000.00	0.1	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	0.20	6.15	53874.5	88.8%	4.8	3
4AW Stockpile	15	200,000.00	0.53	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	1.06	32.60	285535.1	88.8%	4.8	13
4D Stockpile	16	200,000.00	1.22	Cat 793	7	28571.43	73000000	365	24	8760	169	271	220	30.75	2	2.44	75.03	657269.4	88.8%	4.8	39
2A Stockpile	17	2	0.63	F650	24	0.08	730	365	24	8760	10	12	11	0.007	2	1.26	0.009	76.7	88.8%	4.8	17
West Main Road	18	2	3.58	F650	24	0.08	730	365	24	8760	10	12	11	0.007	2	7.16	0.050	435.6	88.8%	4.8	94
2B Stockpile	19	2	0.62	F650	24	0.08	730	365	24	8760	10	12	11	0.007	2	1.24	0.009	75.4	88.8%	4.8	16
Copper Mountain	20	2	1.1	F650	24	0.08	730	365	24	8760	10	12	11	0.007	2	2.20	0.015	133.8	88.8%	4.8	29
9A Stockpile	21	2	1.15	F650	24	0.08	730	365	24	8760	10	12	11	0.007	2	2.30	0.016	139.9	88.8%	4.8	29
9AX Stockpile	22	2	0.58	F650	24	0.08	730	365	24	8760	10	12	11	0.007	2	1.16	0.008	70.6	88.8%	4.8	15
STP	R1	2000	4.22	Cat 730	7	285.71	730000	365	12	4380	-	30.9	30.9	5.39	2	8.44	45.52	199391.6	88.8%	4.8	99
				Cat 769	7	285.71	730000	365	12	4380	-	39.5	39.5	4.22	2	8.44	35.61	155979.7			
1A/1B	R2	8000	1.97	Cat 730	7	1142.86	2920000	365	12	4380	-	30.9	30.9	21.57	2	3.94	85.01	372323.6	88.8%	4.8	50
				Cat 769	7	1142.86	2920000	365	12	4380	-	39.5	39.5	16.88	2	3.94	66.50	291260.8			
Tailings	R3	2000	0.38	Cat 730	7	285.71	730000	365	12	4380	-	30.9	30.9	5.39	2	0.76	4.10	17954.7	88.8%	4.8	8
				Cat 769	7	285.71	730000	365	12	4380	-	39.5	39.5	4.22	2	0.76	3.21	14045.6			
P Plant	R4	5000	0.33	Cat 730	7	714.29	1825000	365	12	4380	-	30.9	30.9	13.48	2	0.66	8.90	38980.6	88.8%	4.8	8
				Cat 769	7	714.29	1825000	365	12	4380	-	39.5	39.5	10.55	2	0.66	6.96	30493.7			
Large Reclamation	R5	5000	3.37	Cat 730	7	714.29	1825000	365	12	4380	-	30.9	30.9	13.48	2	6.74	90.88	398074.4	88.8%	4.8	88
				Cat 769	7	714.29	1825000	365	12	4380	-	39.5	39.5	10.55	2	6.74	71.10	311405.1			
2C4A7B5	R6	10000	1	Cat 730	7	1428.57	3650000	365	12	4380	-	30.9	30.9	26.97	2	2.00	53.94	236246.0	88.8%	4.8	27
				Cat 769	7	1428.57	3650000	365	12	4380	-	39.5	39.5	21.10	2	2.00	42.19	184810.1			
2B Reclamation	R7	10000	0.79	Cat 730	7	1428.57	3650000	365	12	4380	-	30.9	30.9	26.97	2	1.58	42.61	186634.3	88.8%	4.8	21
				Cat 769	7	1428.57	3650000	365	12	4380	-	39.5	39.5	21.10	2	1.58	33.33	146000.0			

Freeport-McMoRan Tyrone Inc.
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Road Name **3A Stockpile**
Road Number **1**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	45.51					
Annual VMT [miles/year][2]	398671.59					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4] [lb/VMT]**	**Hourly Controlled Emission Factor[4] [lb/VMT]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
			Uncontrolled	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	73.19	8.20	20.67	2.32
Particulate Matter (PM 10)	4.54	4.54	905.56	101.42	206.75	23.16
Particulate Matter (TSP)	17.82	17.82	3553.11	397.95	811.21	90.86

Emission Factor Constants	**3A Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	8.20	2.32	73.19	20.67	20	0.41	0.12	3.66	1.03
Particulate Matter (PM 10)	101.42	23.16	905.56	206.75	20	5.07	1.16	45.28	10.34
Particulate Matter (TSP)	397.95	90.86	3553.11	811.21	20	19.90	4.54	177.66	40.56

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20

Road Name	**3B Stockpile**
Road Number	**2**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	38.75					
Annual VMT [miles/year][2]	339409.59					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4] [lb/VMT]**	**Hourly Controlled Emission Factor[4] [lb/VMT]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
			Uncontrolled	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	62.31	6.98	17.60	1.97
Particulate Matter (PM 10)	4.54	4.54	770.95	86.35	176.02	19.71
Particulate Matter (TSP)	17.82	17.82	3024.95	338.79	690.63	77.35

Emission Factor Constants	**3B Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	6.98	1.97	62.31	17.60	16	0.44	0.12	3.89	1.10
Particulate Matter (PM 10)	86.35	19.71	770.95	176.02	16	5.40	1.23	48.18	11.00
Particulate Matter (TSP)	338.79	77.35	3024.95	690.63	16	21.17	4.83	189.06	43.16

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:

[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **3B to Mohawk1**
Road Number **3**

Truck type	Cat 793
Average Truck Weight [tons]	220
Hourly VMT [miles/hour][1]	32.60
Annual VMT [miles/year][2]	285535.06
Control Efficiency [%][3]	88.80%

Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	52.42	5.87	14.81	1.66
Particulate Matter (PM 10)	4.54	4.54	648.58	72.64	148.08	16.58
Particulate Matter (TSP)	17.82	17.82	2544.80	285.02	581.00	65.07

Emission Factor Constants	**3B to Mohawk1**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	5.87	1.66	52.42	14.81	13	0.45	0.13	4.03	1.14
Particulate Matter (PM 10)	72.64	16.58	648.58	148.08	13	5.59	1.28	49.89	11.39
Particulate Matter (TSP)	285.02	65.07	2544.80	581.00	13	21.92	5.01	195.75	44.69

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **Wagner**
Road Number **4**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	32.60					
Annual VMT [miles/year][2]	285535.06					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	52.42	5.87	14.81	1.66
Particulate Matter (PM 10)	4.54	4.54	648.58	72.64	148.08	16.58
Particulate Matter (TSP)	17.82	17.82	2544.80	285.02	581.00	65.07

Emission Factor Constants	**Wagner**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	5.87	1.66	52.42	14.81	14	0.42	0.12	3.74	1.06
Particulate Matter (PM 10)	72.64	16.58	648.58	148.08	14	5.19	1.18	46.33	10.58
Particulate Matter (TSP)	285.02	65.07	2544.80	581.00	14	20.36	4.65	181.77	41.50

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **Mohawk**
Road Number **5**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	45.89					
Annual VMT [miles/year][2]	402038.75					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	73.81	8.27	20.85	2.34
Particulate Matter (PM 10)	4.54	4.54	913.21	102.28	208.49	23.35
Particulate Matter (TSP)	17.82	17.82	3583.12	401.31	818.06	91.62

Emission Factor Constants	**Mohawk**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	8.27	2.34	73.81	20.85	51	0.16	0.05	1.45	0.41
Particulate Matter (PM 10)	102.28	23.35	913.21	208.49	51	2.01	0.46	17.91	4.09
Particulate Matter (TSP)	401.31	91.62	3583.12	818.06	51	7.87	1.80	70.26	16.04

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **5A Stockpile**
Road Number **6**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	12.92					
Annual VMT [miles/year][2]	113136.53					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	20.77	2.33	5.87	0.66
Particulate Matter (PM 10)	4.54	4.54	256.98	28.78	58.67	6.57
Particulate Matter (TSP)	17.82	17.82	1008.32	112.93	230.21	25.78

Emission Factor Constants	**5A Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	2.33	0.66	20.77	5.87	15	0.16	0.04	1.38	0.39
Particulate Matter (PM 10)	28.78	6.57	256.98	58.67	15	1.92	0.44	17.13	3.91
Particulate Matter (TSP)	112.93	25.78	1008.32	230.21	15	7.53	1.72	67.22	15.35

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **8C Stockpile**
Road Number **7**

Truck type	Cat 793
Average Truck Weight [tons]	220
Hourly VMT [miles/hour][1]	41.82
Annual VMT [miles/year][2]	366346.86
Control Efficiency [%][3]	88.80%

Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	67.25	7.53	19.00	2.13
Particulate Matter (PM 10)	4.54	4.54	832.13	93.20	189.98	21.28
Particulate Matter (TSP)	17.82	17.82	3265.02	365.68	745.44	83.49

Emission Factor Constants	**8C Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	7.53	2.13	67.25	19.00	18	0.42	0.12	3.74	1.06
Particulate Matter (PM 10)	93.20	21.28	832.13	189.98	18	5.18	1.18	46.23	10.55
Particulate Matter (TSP)	365.68	83.49	3265.02	745.44	18	20.32	4.64	181.39	41.41

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **6A Stockpile**
Road Number **8**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	14.15					
Annual VMT [miles/year][2]	123911.44					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	22.75	2.55	6.43	0.72
Particulate Matter (PM 10)	4.54	4.54	281.46	31.52	64.26	7.20
Particulate Matter (TSP)	17.82	17.82	1104.35	123.69	252.13	28.24

Emission Factor Constants	**6A Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	2.55	0.72	22.75	6.43	6	0.42	0.12	3.79	1.07
Particulate Matter (PM 10)	31.52	7.20	281.46	64.26	6	5.25	1.20	46.91	10.71
Particulate Matter (TSP)	123.69	28.24	1104.35	252.13	6	20.61	4.71	184.06	42.02

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **6D Stockpile**
Road Number **9**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	46.13					
Annual VMT [miles/year][2]	404059.04					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	74.18	8.31	20.95	2.35
Particulate Matter (PM 10)	4.54	4.54	917.80	102.79	209.54	23.47
Particulate Matter (TSP)	17.82	17.82	3601.13	403.33	822.18	92.08

Emission Factor Constants	**6D Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	8.31	2.35	74.18	20.95	19	0.44	0.12	3.90	1.10
Particulate Matter (PM 10)	102.79	23.47	917.80	209.54	19	5.41	1.24	48.31	11.03
Particulate Matter (TSP)	403.33	92.08	3601.13	822.18	19	21.23	4.85	189.53	43.27

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

$$E = k(s/12)^{a}(W/3)^{b}$$

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

$$E_h = E \times d / L$$

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

$$E_{ext} = E \times (365 - P)/365$$

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **Copper Mountain Waste**
Road Number **10**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	83.03					
Annual VMT [miles/year][2]	727306.27					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	133.52	14.95	37.72	4.22
Particulate Matter (PM 10)	4.54	4.54	1652.03	185.03	377.18	42.24
Particulate Matter (TSP)	17.82	17.82	6482.03	725.99	1479.92	165.75

Emission Factor Constants	**Copper Mountain Waste**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	14.95	4.22	133.52	37.72	35	0.43	0.12	3.81	1.08
Particulate Matter (PM 10)	185.03	42.24	1652.03	377.18	35	5.29	1.21	47.20	10.78
Particulate Matter (TSP)	725.99	165.75	6482.03	1479.92	35	20.74	4.74	185.20	42.28

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:

[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **Main Pit/Mohawk 2**
Road Number **11**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	156.83					
Annual VMT [miles/year][2]	1373800.74					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	252.21	28.25	71.24	7.98
Particulate Matter (PM 10)	4.54	4.54	3120.50	349.50	712.44	79.79
Particulate Matter (TSP)	17.82	17.82	12243.83	1371.31	2795.40	313.08

Emission Factor Constants	**Main Pit/Mohawk 2**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	28.25	7.98	252.21	71.24	67	0.42	0.12	3.76	1.06
Particulate Matter (PM 10)	349.50	79.79	3120.50	712.44	67	5.22	1.19	46.57	10.63
Particulate Matter (TSP)	1371.31	313.08	12243.83	2795.40	67	20.47	4.67	182.74	41.72

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:

[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name Valencia
Road Number 12

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	11.69					
Annual VMT [miles/year][2]	102361.62					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	18.79	2.10	5.31	0.59
Particulate Matter (PM 10)	4.54	4.54	232.51	26.04	53.08	5.95
Particulate Matter (TSP)	17.82	17.82	912.29	102.18	208.28	23.33

Emission Factor Constants	**Valencia**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	2.10	0.59	18.79	5.31	35	0.06	0.02	0.54	0.15
Particulate Matter (PM 10)	26.04	5.95	232.51	53.08	35	0.74	0.17	6.64	1.52
Particulate Matter (TSP)	102.18	23.33	912.29	208.28	35	2.92	0.67	26.07	5.95

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **4AE and 7A/7B**
Road Number **13**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	68.27					
Annual VMT [miles/year][2]	598007.38					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	109.78	12.30	31.01	3.47
Particulate Matter (PM 10)	4.54	4.54	1358.34	152.13	310.12	34.73
Particulate Matter (TSP)	17.82	17.82	5329.67	596.92	1216.82	136.28

Emission Factor Constants	**4AE and 7A/7B**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	12.30	3.47	109.78	31.01	29	0.42	0.12	3.79	1.07
Particulate Matter (PM 10)	152.13	34.73	1358.34	310.12	29	5.25	1.20	46.84	10.69
Particulate Matter (TSP)	596.92	136.28	5329.67	1216.82	29	20.58	4.70	183.78	41.96

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

$$E = k(s/12)^{a}(W/3)^{b}$$

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

$$E_h = E \times d / L$$

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

$$E_{ext} = E \times (365 - P)/365$$

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **West 6D Stockpile**
Road Number **14**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	6.15					
Annual VMT [miles/year][2]	53874.54					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	9.89	1.11	2.79	0.31
Particulate Matter (PM 10)	4.54	4.54	122.37	13.71	27.94	3.13
Particulate Matter (TSP)	17.82	17.82	480.15	53.78	109.62	12.28

Emission Factor Constants	**West 6D Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	1.11	0.31	9.89	2.79	3	0.37	0.10	3.30	0.93
Particulate Matter (PM 10)	13.71	3.13	122.37	27.94	3	4.57	1.04	40.79	9.31
Particulate Matter (TSP)	53.78	12.28	480.15	109.62	3	17.93	4.09	160.05	36.54

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **4AW Stockpile**
Road Number **15**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	32.60					
Annual VMT [miles/year][2]	285535.06					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	52.42	5.87	14.81	1.66
Particulate Matter (PM 10)	4.54	4.54	648.58	72.64	148.08	16.58
Particulate Matter (TSP)	17.82	17.82	2544.80	285.02	581.00	65.07

Emission Factor Constants	**4AW Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	5.87	1.66	52.42	14.81	13	0.45	0.13	4.03	1.14
Particulate Matter (PM 10)	72.64	16.58	648.58	148.08	13	5.59	1.28	49.89	11.39
Particulate Matter (TSP)	285.02	65.07	2544.80	581.00	13	21.92	5.01	195.75	44.69

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **4D Stockpile**
Road Number **16**

Truck type	Cat 793					
Average Truck Weight [tons]	220					
Hourly VMT [miles/hour][1]	75.03					
Annual VMT [miles/year][2]	657269.37					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4] [lb/VMT]**	**Hourly Controlled Emission Factor[4] [lb/VMT]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
			Uncontrolled	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.37	0.45	120.66	13.51	34.09	3.82
Particulate Matter (PM 10)	4.54	4.54	1492.95	167.21	340.86	38.18
Particulate Matter (TSP)	17.82	17.82	5857.83	656.08	1337.41	149.79

Emission Factor Constants	**4D Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	13.51	3.82	120.66	34.09	39	0.35	0.10	3.09	0.87
Particulate Matter (PM 10)	167.21	38.18	1492.95	340.86	39	4.29	0.98	38.28	8.74
Particulate Matter (TSP)	656.08	149.79	5857.83	1337.41	39	16.82	3.84	150.20	34.29

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **2A Stockpile**
Road Number **17**

Truck type	F650					
Average Truck Weight [tons]	11					
Hourly VMT [miles/hour][1]	0.01					
Annual VMT [miles/year][2]	76.65					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4] [lb/VMT]**	**Hourly Controlled Emission Factor[4] [lb/VMT]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
			Uncontrolled	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.10	0.12	0.00	0.00	0.00	0.00
Particulate Matter (PM 10)	1.18	1.18	0.05	0.01	0.01	0.00
Particulate Matter (TSP)	4.63	4.63	0.18	0.02	0.04	0.00

Emission Factor Constants	**2A Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	4.09E-04	1.16E-04	3.65E-03	1.03E-03	17	2.41E-05	6.80E-06	2.15E-04	6.07E-05
Particulate Matter (PM 10)	0.005	0.001	0.045	0.010	17	2.98E-04	6.80E-05	2.66E-03	6.07E-04
Particulate Matter (TSP)	0.020	0.005	0.177	0.041	17	1.17E-03	2.67E-04	1.04E-02	2.38E-03

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **West Main Road**
Road Number **18**

Truck type	F650					
Average Truck Weight [tons]	11					
Hourly VMT [miles/hour][1]	0.05					
Annual VMT [miles/year][2]	435.57					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4] [lb/VMT]**	**Hourly Controlled Emission Factor[4] [lb/VMT]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
			Uncontrolled	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.10	0.12	0.02	0.00	0.01	0.00
Particulate Matter (PM 10)	1.18	1.18	0.26	0.03	0.06	0.01
Particulate Matter (TSP)	4.63	4.63	1.01	0.11	0.23	0.03

Emission Factor Constants	**West Main Road**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	2.33E-03	6.57E-04	2.08E-02	5.87E-03	94	2.47E-05	6.99E-06	2.21E-04	6.24E-05
Particulate Matter (PM 10)	0.029	0.007	0.257	0.059	94	3.06E-04	6.99E-05	2.73E-03	6.24E-04
Particulate Matter (TSP)	0.113	0.026	1.008	0.230	94	1.20E-03	2.74E-04	1.07E-02	2.45E-03

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **2B Stockpile**
Road Number **19**

Truck type	F650
Average Truck Weight [tons]	11
Hourly VMT [miles/hour][1]	0.01
Annual VMT [miles/year][2]	75.43
Control Efficiency [%][3]	88.80%

Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.10	0.12	0.00	0.00	0.00	0.00
Particulate Matter (PM 10)	1.18	1.18	0.04	0.00	0.01	0.00
Particulate Matter (TSP)	4.63	4.63	0.17	0.02	0.04	0.00

Emission Factor Constants	**2B Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	4.03E-04	1.14E-04	3.60E-03	1.02E-03	16	2.52E-05	7.11E-06	2.25E-04	6.35E-05
Particulate Matter (PM 10)	0.005	0.001	0.045	0.010	16	3.12E-04	7.11E-05	2.78E-03	6.35E-04
Particulate Matter (TSP)	0.020	0.004	0.175	0.040	16	1.22E-03	2.79E-04	1.09E-02	2.49E-03

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **Copper Mountain**
Road Number **20**

Truck type	F650					
Average Truck Weight [tons]	11					
Hourly VMT [miles/hour][1]	0.02					
Annual VMT [miles/year][2]	133.83					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.10	0.12	0.01	0.00	0.00	0.00
Particulate Matter (PM 10)	1.18	1.18	0.08	0.01	0.02	0.00
Particulate Matter (TSP)	4.63	4.63	0.31	0.03	0.07	0.01

Emission Factor Constants	**Copper Mountain**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	7.15E-04	2.02E-04	6.38E-03	1.80E-03	29	2.46E-05	6.96E-06	2.20E-04	6.22E-05
Particulate Matter (PM 10)	0.009	0.002	0.079	0.018	29	3.05E-04	6.96E-05	2.72E-03	6.22E-04
Particulate Matter (TSP)	0.035	0.008	0.310	0.071	29	1.20E-03	2.73E-04	1.07E-02	2.44E-03

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **9A Stockpile**
Road Number **21**

Truck type	F650					
Average Truck Weight [tons]	11					
Hourly VMT [miles/hour][1]	0.02					
Annual VMT [miles/year][2]	139.92					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4] [lb/VMT]**	**Hourly Controlled Emission Factor[4] [lb/VMT]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
			Uncontrolled	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.10	0.12	0.01	0.00	0.00	0.00
Particulate Matter (PM 10)	1.18	1.18	0.08	0.01	0.02	0.00
Particulate Matter (TSP)	4.63	4.63	0.32	0.04	0.07	0.01

Emission Factor Constants	**9A Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	7.47E-04	2.11E-04	6.67E-03	1.88E-03	29	2.58E-05	7.28E-06	2.30E-04	6.50E-05
Particulate Matter (PM 10)	0.009	0.002	0.083	0.019	29	3.19E-04	7.28E-05	2.85E-03	6.50E-04
Particulate Matter (TSP)	0.036	0.008	0.324	0.074	29	1.25E-03	2.86E-04	1.12E-02	2.55E-03

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **9AX Stockpile**
Road Number **22**

Truck type	F650					
Average Truck Weight [tons]	11					
Hourly VMT [miles/hour][1]	0.01					
Annual VMT [miles/year][2]	70.57					
Control Efficiency [%][3]	88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4] [lb/VMT]**	**Hourly Controlled Emission Factor[4] [lb/VMT]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
			Uncontrolled	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.10	0.12	0.00	0.00	0.00	0.00
Particulate Matter (PM 10)	1.18	1.18	0.04	0.00	0.01	0.00
Particulate Matter (TSP)	4.63	4.63	0.16	0.02	0.04	0.00

Emission Factor Constants	**9AX Stockpile**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	3.77E-04	1.06E-04	3.36E-03	9.51E-04	15	2.51E-05	7.10E-06	2.24E-04	6.34E-05
Particulate Matter (PM 10)	0.005	0.001	0.042	0.010	15	3.11E-04	7.10E-05	2.78E-03	6.34E-04
Particulate Matter (TSP)	0.018	0.004	0.163	0.037	15	1.22E-03	2.78E-04	1.09E-02	2.49E-03

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **STP**
Road Number **R1**

Truck type	Cat 730						Cat 769					
Average Truck Weight [tons]	30.9						39.5					
Hourly VMT [miles/hour][1]	45.52						35.61					
Annual VMT [miles/year][2]	199391.59						155979.75					
Control Efficiency [%][3]	88.80%						88.80%					
Criteria Pollutant	Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]		Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]	
	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled
Particulate Matter (PM 2.5)	0.15	0.19	15.13	1.69	8.55	0.96	0.17	0.21	13.22	1.48	7.47	0.84
Particulate Matter (PM 10)	1.88	1.88	187.24	20.97	85.50	9.58	1.70	2.10	132.21	14.81	74.70	8.37
Particulate Matter (TSP)	7.37	7.37	734.67	82.28	335.47	37.57	6.65	8.23	518.76	58.10	293.09	32.83

Emission Factor Constants	STP		
Parameter	$PM_{2.5}$	PM_{10}	TSP
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				Number of volume sources	Emissions per Volume Source[7]			
	Controlled		Uncontrolled			Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]		[tons/year]	[lb/hr]	[tons/year]	[lb/hr]
Particulate Matter (PM 2.5)	1.69	0.96	15.13	8.55	99	0.02	0.01	0.15	0.09
Particulate Matter (PM 10)	20.971	9.576	187.240	85.498	99	0.21	0.10	1.89	0.86
Particulate Matter (TSP)	82.283	37.572	734.669	335.465	99	0.83	0.38	7.42	3.39

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **1A/1B**
Road Number **R2**

Truck type	Cat 730						Cat 769					
Average Truck Weight [tons]	30.9						39.5					
Hourly VMT [miles/hour][1]	85.01						66.50					
Annual VMT [miles/year][2]	372323.62						291260.76					
Control Efficiency [%][3]	88.80%						88.80%					
Criteria Pollutant	Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]		Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]	
	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled
Particulate Matter (PM 2.5)	0.15	0.19	28.26	3.16	15.96	1.79	0.17	0.21	24.69	2.77	13.95	1.56
Particulate Matter (PM 10)	1.88	1.88	349.63	39.16	159.65	17.88	1.70	2.10	246.88	27.65	139.48	15.62
Particulate Matter (TSP)	7.37	7.37	1371.85	153.65	626.41	70.16	6.65	8.23	968.69	108.49	547.28	61.30

Emission Factor Constants	1A/1B		
Parameter	$PM_{2.5}$	PM_{10}	TSP
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				Number of volume sources	Emissions per Volume Source[7]			
	Controlled		Uncontrolled			Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]		[tons/year]	[lb/hr]	[tons/year]	[lb/hr]
Particulate Matter (PM 2.5)	3.16	1.79	28.26	15.96	50	0.06	0.04	0.57	0.32
Particulate Matter (PM 10)	39.159	17.881	349.633	159.650	50	0.78	0.36	6.99	3.19
Particulate Matter (TSP)	153.647	70.158	1371.846	626.414	50	3.07	1.40	27.44	12.53

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20

Road Name	**Tailings**
Road Number	**R3**

Truck type	Cat 730						Cat 769					
Average Truck Weight [tons]	30.9						39.5					
Hourly VMT [miles/hour][1]	4.10						3.21					
Annual VMT [miles/year][2]	17954.69						14045.57					
Control Efficiency [%][3]	88.80%						88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**		**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**	**[lb/VMT]**	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.15	0.19	1.36	0.15	0.77	0.09	0.17	0.21	1.19	0.13	0.67	0.08
Particulate Matter (PM 10)	1.88	1.88	16.86	1.89	7.70	0.86	1.70	2.10	11.91	1.33	6.73	0.75
Particulate Matter (TSP)	7.37	7.37	66.16	7.41	30.21	3.38	6.65	8.23	46.71	5.23	26.39	2.96

Emission Factor Constants	**Tailings**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	0.15	0.09	1.36	0.77	8	0.02	0.01	0.17	0.10
Particulate Matter (PM 10)	1.888	0.862	16.860	7.699	8	0.24	0.11	2.11	0.96
Particulate Matter (TSP)	7.409	3.383	66.155	30.208	8	0.93	0.42	8.27	3.78

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:

[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **P Plant**
Road Number **R4**

Truck type	Cat 730						Cat 769					
Average Truck Weight [tons]	30.9						39.5					
Hourly VMT [miles/hour][1]	8.90						6.96					
Annual VMT [miles/year][2]	38980.58						30493.67					
Control Efficiency [%][3]	88.80%						88.80%					
Criteria Pollutant	Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]		Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]	
	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled
Particulate Matter (PM 2.5)	0.15	0.19	2.96	0.33	1.67	0.19	0.17	0.21	2.58	0.29	1.46	0.16
Particulate Matter (PM 10)	1.88	1.88	36.60	4.10	16.71	1.87	1.70	2.10	25.85	2.89	14.60	1.64
Particulate Matter (TSP)	7.37	7.37	143.63	16.09	65.58	7.35	6.65	8.23	101.42	11.36	57.30	6.42

Emission Factor Constants	P Plant		
Parameter	$PM_{2.5}$	PM_{10}	TSP
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				Number of volume sources	Emissions per Volume Source[7]			
	Controlled		Uncontrolled			Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]		[tons/year]	[lb/hr]	[tons/year]	[lb/hr]
Particulate Matter (PM 2.5)	0.33	0.19	2.96	1.67	8	0.04	0.02	0.37	0.21
Particulate Matter (PM 10)	4.100	1.872	36.605	16.715	8	0.51	0.23	4.58	2.09
Particulate Matter (TSP)	16.086	7.345	143.626	65.583	8	2.01	0.92	17.95	8.20

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **Large Reclamation**
Road Number **R5**

Truck type	Cat 730						Cat 769					
Average Truck Weight [tons]	30.9						39.5					
Hourly VMT [miles/hour][1]	90.88						71.10					
Annual VMT [miles/year][2]	398074.43						311405.06					
Control Efficiency [%][3]	88.80%						88.80%					
Criteria Pollutant	**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**		**Annual Uncontrolled Emission Factor[4]**	**Hourly Controlled Emission Factor[4]**	**Annual Emission Rate[5] [tons/year]**		**Hourly Emission Rate[5] [lb/yr]**	
	[lb/VMT]	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**	**[lb/VMT]**	**[lb/VMT]**	**Uncontrolled**	**Controlled**	**Uncontrolled**	**Controlled**
Particulate Matter (PM 2.5)	0.15	0.19	30.21	3.38	17.07	1.91	0.17	0.21	26.40	2.96	14.91	1.67
Particulate Matter (PM 10)	1.88	1.88	373.81	41.87	170.69	19.12	1.70	2.10	263.96	29.56	149.13	16.70
Particulate Matter (TSP)	7.37	7.37	1466.73	164.27	669.74	75.01	6.65	8.23	1035.68	116.00	585.13	65.53

Emission Factor Constants	**Large Reclamation**		
Parameter	**$PM_{2.5}$**	**PM_{10}**	**TSP**
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				**Number of volume sources**	**Emissions per Volume Source[7]**			
	Controlled		**Uncontrolled**			**Controlled**		**Uncontrolled**	
	[tons/year]	**[lb/hr]**	**[tons/year]**	**[lb/hr]**		**[tons/year]**	**[lb/hr]**	**[tons/year]**	**[lb/hr]**
Particulate Matter (PM 2.5)	3.38	1.91	30.21	17.07	88	0.04	0.02	0.34	0.19
Particulate Matter (PM 10)	41.867	19.117	373.815	170.692	88	0.48	0.22	4.25	1.94
Particulate Matter (TSP)	164.273	75.011	1466.726	669.738	88	1.87	0.85	16.67	7.61

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **2C4A7BS**
Road Number **R6**

Truck type	Cat 730						Cat 769					
Average Truck Weight [tons]	30.9						39.5					
Hourly VMT [miles/hour][1]	53.94						42.19					
Annual VMT [miles/year][2]	236245.95						184810.13					
Control Efficiency [%][3]	88.80%						88.80%					
Criteria Pollutant	Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]		Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]	
	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled
Particulate Matter (PM 2.5)	0.15	0.19	17.93	2.01	10.13	1.13	0.17	0.21	15.67	1.75	8.85	0.99
Particulate Matter (PM 10)	1.88	1.88	221.85	24.85	101.30	11.35	1.70	2.10	156.65	17.54	88.50	9.91
Particulate Matter (TSP)	7.37	7.37	870.46	97.49	397.47	44.52	6.65	8.23	614.65	68.84	347.26	38.89

Emission Factor Constants	2C4A7BS		
Parameter	$PM_{2.5}$	PM_{10}	TSP
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				Number of volume sources	Emissions per Volume Source[7]			
	Controlled		Uncontrolled			Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]		[tons/year]	[lb/hr]	[tons/year]	[lb/hr]
Particulate Matter (PM 2.5)	2.01	1.13	17.93	10.13	27	0.07	0.04	0.66	0.38
Particulate Matter (PM 10)	24.847	11.346	221.848	101.301	27	0.92	0.42	8.22	3.75
Particulate Matter (TSP)	97.492	44.517	870.461	397.471	27	3.61	1.65	32.24	14.72

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.
Feb-20
Road Name **2B Reclamation**
Road Number **R7**

Truck type	Cat 730						Cat 769					
Average Truck Weight [tons]	30.9						39.5					
Hourly VMT [miles/hour][1]	42.61						33.33					
Annual VMT [miles/year][2]	186634.30						146000.00					
Control Efficiency [%][3]	88.80%						88.80%					
Criteria Pollutant	Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]		Annual Uncontrolled Emission Factor[4]	Hourly Controlled Emission Factor[4]	Annual Emission Rate[5] [tons/year]		Hourly Emission Rate[5] [lb/yr]	
	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled
Particulate Matter (PM 2.5)	0.15	0.19	14.16	1.59	8.00	0.90	0.17	0.21	12.38	1.39	6.99	0.78
Particulate Matter (PM 10)	1.88	1.88	175.26	19.63	80.03	8.96	1.70	2.10	123.75	13.86	69.92	7.83
Particulate Matter (TSP)	7.37	7.37	687.66	77.02	314.00	35.17	6.65	8.23	485.57	54.38	274.33	30.73

Emission Factor Constants	2B Reclamation		
Parameter	$PM_{2.5}$	PM_{10}	TSP
k*	0.15	1.50	4.90
a*	0.90	0.90	0.70
b*	0.45	0.45	0.45
silt content	4.8		
P [days]	70		

	Total Maximum Fugitive Emissions[6]				Number of volume sources	Emissions per Volume Source[7]			
	Controlled		Uncontrolled			Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]		[tons/year]	[lb/hr]	[tons/year]	[lb/hr]
Particulate Matter (PM 2.5)	1.59	0.90	14.16	8.00	21	0.08	0.04	0.67	0.38
Particulate Matter (PM 10)	19.629	8.963	175.260	80.028	21	0.93	0.43	8.35	3.81
Particulate Matter (TSP)	77.018	35.168	687.664	314.002	21	3.67	1.67	32.75	14.95

Fugitive emissions from traffic on unpaved surfaces by vehicles such as haul trucks and maintenance vehicles were estimated using EPA AP-42 emission factors, Section 13.2.2, Unpaved Roads (November 2006). The following equations are recommended for industrial sites:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multiplier (lb/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (%)
W = mean vehicle weight, full vs. empty (tons)

Hourly Emission Factor:

Where: E_h = hourly emission factor (lb/hr)
E = emission factor (lb/VMT)
d = average hourly daytime traffic rate, roundtrips per hour (h^{-1})
L = longest haul road length in miles (roundtrip)

By considering annual natural mitigation from rainfall, the annual emission factor is affected:

(AP-42, Chapter 13.2.2, Equation 1a)

Where: E_{ext} = annual emission factor extrapolated for annual natural mitigation (lb/VMT)
E = hourly emission factor (lb/VMT)
P = number of days in a year with at least 0.01 inches of precipitation

Notes:
[1] Hourly Vehicle Miles Traveled = d (trips/hour) * L (mile/trip)
[2] Annual Vehicle Miles Traveled = Hourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)
[3] Control Efficiency is set at 88.8%; see control efficiency page for more info.
[4] Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, vehicles traveling on unpaved surfaces at industrial sites.
[5] Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ÷ 2000
[5] Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly VMT
6 Total Emission are the sum of all truck emissions operating on that road
7 Emission per Volume source = Total Emissions ÷ Number of Volume Sources
* Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc.

Apr-20

Gettysburg Blasting Calculations

Inputs

Basis					
Maximum amount of blasting agent/day:	200,000	lbs	As permitted		
Maximum number of blasts/day:	2	blasts/day			
Maximum amount of blasting agent/event:	160,000	lbs			
Maximum amount of blasting agent/year:	75,000	tons	As permitted		
Maximum horizontal area per blast:	85,000	ft^2	Based on typical blast hole pattern		
Diesel fuel usage:	1,846	gal/day	Diesel fuel oil to ammonium nitrate blasting products ratio:		6%
Diesel fuel usage:	1,384,615	gal/yr	Diesel Fuel Density =	6.5	lb/gal

Criteria Pollutant	Emission Factor (lb/ton blasting agent)[1]	Emission Rate [2]			
		(lb/event)	(lb/day)	(ton/yr)	(lb/hr)[3]
Nitrogen Oxides (NO_x)	1.8	144.00	288.00	67.50	144.00
Carbon Monoxide (CO)	40.64	3,251.20	6,502.40	1,524.00	3,251.20
Sulfur Dioxide (SO_2)	0.0036	0.29	0.58	0.14	0.29

Criteria Pollutant	Emission Rate [4]			
	(lb/event)	(lb/day)	(ton/yr)	(lb/hr)[3]
PM (TSP)	346.9	693.88	90.20	346.94
PM_{10}	180.4	360.82	46.91	180.41
$PM_{2.5}$	10.4	20.82	2.71	10.41

Pollutant	Emission Factor (lb/MMBtu)[5]	Emission Rate [6]	
		(lb/day)	(ton/yr)
CO_2	162.712	**41454.0**	**15545.3**
N_2O	0.00132	**0.34**	**0.13**
CH_4	0.0066	**1.68**	**0.63**
CO_2e			**15598.60**

Notes:

1. NOx emission factor is the average of measurements from "NOx Emissions from Blasting Operations in Open-Cut Coal Mining" by Moetaz I. Attalla, Stuart J. Day, Tony Lange, William Lilley, and Scott Morgan (2008).
CO emission factor is the average of the measurements in "Factors Affecting Anfo Fumes Production" by James H. Rowland III and Richard Mainiero (2001).
SO_2 emissions are based on a diesel sulfur content of 15 ppm assuming complete conversion to SO_2.

2. Pound per event emission rates are based on a maximum use of blasting agent per event. Annual emission rates are based on a maximum annual use of blasting agent.

$$E\left(\frac{lb}{year}\right) = EF\left(\frac{lb}{ton\,of\ blasting\ agent}\right) \times \left(blasting\ agent\ \frac{ton}{year}\right)$$

3. Pound per hour modeling rate is based the daily emission rates (lb/day) which is converted to a pound per hour rate.

4. Particulate blasting emissions are based on emission factors from AP-42 Table 11.9-1.

5. CO_2, N_2O, and CH_4 emission factor per 40 CFR 98 Subpart C, Table C–1, and Table C–2.

6. CO_2, N_2O, and CH_4 emissions calculated based on emission factors, diesel fuel usage, and diesel fuel HHV of
0.138 MMBtu/gal per 40 CFR 98 Subpart C Table C–1

Freeport-McMoRan Tyrone Inc.

Apr-20

Mohawk Blasting Calculations

Inputs

Basis					
Maximum amount of blasting agent/day:	200,000	lbs	As permitted		
Maximum number of blasts/day:	2	blasts/day			
Maximum amount of blasting agent/event:	160,000	lbs			
Maximum amount of blasting agent/year:	75,000	tons	As permitted		
Maximum horizontal area per blast:	125,000	ft^2	Based on typical blast hole pattern		
Diesel fuel usage:	1,846	gal/day	Diesel fuel oil to ammonium nitrate blasting products ratio:		6%
Diesel fuel usage:	1,384,615	gal/yr	Diesel Fuel Density =	6.5	lb/gal

Criteria Pollutant	Emission Factor (lb/ton blasting agent)[1]	Emission Rate [2]			
		(lb/event)	(lb/day)	(ton/yr)	(lb/hr)[3]
Nitrogen Oxides (NO_x)	1.8	144.00	288.00	67.50	144.00
Carbon Monoxide (CO)	40.64	3,251.20	6,502.40	1,524.00	3,251.20
Sulfur Dioxide (SO_2)	0.0036	0.29	0.58	0.14	0.29

Criteria Pollutant	Emission Rate [4]			
	(lb/event)	(lb/day)	(ton/yr)	(lb/hr)[3]
PM (TSP)	618.7	1237.44	160.87	618.72
PM_{10}	321.7	643.47	83.65	321.73
$PM_{2.5}$	18.6	37.12	4.83	18.56

Pollutant	Emission Factor (lb/MMBtu)[5]	Emission Rate [6]	
		(lb/day)	(ton/yr)
CO_2	162.712	**41454.0**	**15545.3**
N_2O	0.00132	**0.34**	**0.13**
CH_4	0.0066	**1.68**	**0.63**
CO_2e			**15598.60**

Notes:

1. NOx emission factor is the average of measurements from "NOx Emissions from Blasting Operations in Open-Cut Coal Mining" by Moetaz I. Attalla, Stuart J. Day, Tony Lange, William Lilley, and Scott Morgan (2008).
CO emission factor is the average of the measurements in "Factors Affecting Anfo Fumes Production" by James H. Rowland III and Richard Mainiero (2001).
SO_2 emissions are based on a diesel sulfur content of 15 ppm assuming complete conversion to SO_2.

2. Pound per event emission rates are based on a maximum use of blasting agent per event. Annual emission rates are based on a maximum annual use of blasting agent.

3. Pound p $$E\left(\frac{lb}{year}\right) = EF\left(\frac{lb}{ton of\ blasting\ agent}\right) \times \left(blasting\ agent \frac{ton}{year}\right)$$ converted to a pound per hour rate.

4. Particula[illegible] 1.9-1.

5. CO_2, N_2O, and CH_4 emission factor per 40 CFR 98 Subpart C, Table C–1, and Table C–2.

6. CO_2, N_2O, and CH_4 emissions calculated based on emission factors, diesel fuel usage, and diesel fuel HHV of 0.138 MMBtu/gal per 40 CFR 98 Subpart C Table C–1

Freeport-McMoRan Tyrone Inc.
Feb-20
Material Handling

Material Handling Emission Factors

The emission factors for material handling are based on AP-42, Chapter 11.19.2, Table 11.19.2-2 Crushed Stone Processing and Pulverized Mineral Processing (August 2004) for Truck Unloading - Fragmented Stone.

The basis for these emission factors is the PM_{10} emission factor for truck unloading of fragmented stone in Table 11.19.2-2. This table provides a PM_{10} emission factor, but does not provide $PM_{2.5}$ or TSP emission factors. Therefore, $PM_{2.5}$ and TSP emission factors were estimated as explained in the footnotes below.

The following equation and emission factors were used for the emission calculations:

$$E\left(\frac{lb}{year}\right) = EF\left(\frac{lb}{ton}\right) \times \left(material\ \frac{ton}{year}\right)$$

Emission Factors for Mine Materials Handling: Truck Unloading - Fragmented Stone

Pollutant	Emission Factor	
$PM^{1}_{2.5}$	2.40E-06	lb / ton material
PM_{10}	1.60E-05	lb / ton material
TSP[2]	4.18E-05	lb / ton material

$PM_{2.5}/PM_{10}$ Emission Factor ratio[1]	0.15
TSP/PM_{10} Emission Factor average ratio (of AP-42 values)[2]	2.61

Maximum Mine Material Throughput

Little Rock	0	[tons/day]
Copper Mountain	0	[tons/day]
Valencia	0	[tons/day]
Mohawk	200,000	[tons/day]
Gettysburg	200,000	[tons/day]
Annual Operating Hours	8,760	[hrs/year]
Handling Instances[3]	3	
Handling Instances (Gettysburg) [4]	1	

The following table summarizes particulate emissions for material handling from mining activities. Daily emissions are based on the maximum daily throughput above. Annual emissions are based on the maximum daily throughput occurring 365 days a year. Hourly emissions are based on the maximum annual emissions divided by 8,760 hours per year.

Parameter	Mining Area	Emission Rates [lb/day]	Emission Rates [ton/year]	Emission Rates [lb/hr]
$PM_{2.5}$	Copper Leach	0.00	0.00	0.000
PM_{10}		0.00	0.00	0.00
TSP		0.00	0.00	0.00
$PM_{2.5}$	Little Rock	0.00	0.00	0.000
PM_{10}		0.00	0.00	0.00
TSP		0.00	0.00	0.00
$PM_{2.5}$	Copper Mountain	0.00	0.00	0.000
PM_{10}		0.00	0.00	0.00
TSP		0.00	0.00	0.00
$PM_{2.5}$	Valencia	0.00	0.00	0.000
PM_{10}		0.00	0.00	0.00
TSP		0.00	0.00	0.00
$PM_{2.5}$	Mohawk	1.44	0.26	0.060
PM_{10}		9.60	1.75	0.40
TSP		25.08	4.58	1.05
$PM_{2.5}$	Gettysburg	0.48	0.088	0.020
PM_{10}		3.20	0.58	0.13
TSP		8.36	1.53	0.35
$PM_{2.5}$	**Total**	1.92	0.35	0.08
PM_{10}		12.80	2.34	0.53
TSP		33.44	6.10	1.39

[1] AP-42, Chapter 11.19.2 does not have an emission factor for $PM_{2.5}$. A PM_{10} emission factor is provided in Table 11.19.2-2. A $PM_{2.5}$ emission factor was calculated from the available PM_{10} emission factor using the ratio of 0.15 PM2.5 / PM10 as recommended in the Background Document for AP-42, Chapter 13.2.4, *Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors* - November 2006.

[2] AP-42, Chapter 11.19.2 does not have an emission factor for TSP. An uncontrolled PM_{10} emission factor is provided in Table 11.19.2-2. An uncontrolled TSP emission factor was calculated from the available uncontrolled PM_{10} emission factor using the TSP/PM_{10} ratio calculated from the following uncontrolled TSP and PM_{10} emission factors in Table 11.19.2-2: Tertiary Crushing (0.0054/0.0024 = 2.25); Fines Crushing (0.0390/0.0150 = 2.60); Screening (0.025/0.0087 = 2.87; and Conveyor Transfer Point (0.0030/0.00110 = 2.73). The average of these ratios ([2.25+2.60+2.87+2.73]/4 =

[3] Handling Instances, also known as material drops, consist of ore shovel loading, haul truck loading, and haul truck unloading, totaling 3 steps.

[4] Unlike the other mining areas, Gettysburg will not have material loaded and hauled from the pit. Instead, the material will be blasted and pushed in the pit using bulldozers. Therefore, material handling is limited to bulldozer pushing, which corresponds to 1 handling instance.

Freeport-McMoRan Tyrone Inc.
Apr-20
Stockpile Material Handling

Pollutant	Uncontrolled Emission Factor[1] lb/ton	Equation 1 Parameters[2] k[(2)]	U[2,3] mph	M[4] %	Handling Steps	Maximum Mine Throughput tons/day
TSP	1.39E-03	0.74	7.58	4.30		
PM_{10}	6.59E-04	0.35	7.58	4.30	2	400,000
$PM_{2.5}$	9.98E-05	0.053	7.58	4.30		

Production Rate	Maximum ktpd	Weighted ktpd	TSP lb/hr	TSP tpy	PM10 lb/hr	PM10 tpy	PM2.5 lb/hr	PM2.5 tpy
Pitlet	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Copper Leach	0	0	0.00	0.00	0.00	0.00	0.00	0.00
9AX	0	0	0.00	0.00	0.00	0.00	0.00	0.00
9A	0	0	0.00	0.00	0.00	0.00	0.00	0.00
2B	10	2	0.24	1.06	0.11	0.50	0.02	0.08
Copper Mountain	10	2	0.24	1.06	0.11	0.50	0.02	0.08
Valencia	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Savannah	0	0	0.00	0.00	0.00	0.00	0.00	0.00
Gettysburg	200	42	4.83	21.15	2.28	10.00	0.35	1.51
7A/7B	20	4	0.48	2.11	0.23	1.00	0.03	0.15
1A/1B	8	2	0.19	0.85	0.09	0.40	0.01	0.06
5A	75	16	1.81	7.93	0.86	3.75	0.13	0.57
3B	200	42	4.83	21.15	2.28	10.00	0.35	1.51
Main Pit	200	42	4.83	21.15	2.28	10.00	0.35	1.51
2A	0	0	0.00	0.00	0.00	0.00	0.00	0.00
4D	200	42	4.83	21.15	2.28	10.00	0.35	1.51
6D	200	42	4.83	21.15	2.28	10.00	0.35	1.51
4AE	200	42	4.83	21.15	2.28	10.00	0.35	1.51
6A	200	42	4.83	21.15	2.28	10.00	0.35	1.51
4AW	200	42	4.83	21.15	2.28	10.00	0.35	1.51
3A	200	42	4.83	21.15	2.28	10.00	0.35	1.51
Valencia	0	0	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL	1,923	400	46.4	203.3	22.0	96.2	3.3	14.6

[1] Emission factors from AP-42, Section 13.2.4, Equation 1 (11/06), unless otherwise noted. Controlled factors are not available.

[2] **AP-42, Chapter 13.2.4, Aggregate Handling and Storage Piles, Equation 1**
Aggregate Handling Emission Factor Equation

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

E = Emission factor in lb/ton
k = Particle size multiplier (see AP-42 Section 13.2.4, Equation 1)
U = Mean wind speed, miles per hour (mph)
M = Material moisture content, %

[3] Average wind speed of 3.39 meters/second (7.58 mph) per 1995 Hidalgo AERMET meteorological data.

[4] Email from C. Nummerdor to M. Suel dated Jan 16 2014.

Freeport-McMoRan Tyrone Inc.

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GASOLINE DISPENSING FACILITY VOC EMISSIONS

Emission Unit	Actual Usage Rate			Emission Factor ($lbs/10^3 gal$)	Tank Working Losses (lb/yr)	Tank Breathing Losses (lb/yr)	Total Tank Losses (lb/hr)	Total Tank Losses (tons/yr)	Total VOC Emissions Loading + Tanks		
	gals/day (ave.)	gals/month	gals/yr[(1)]						lb/hr	lb/day	tons/yr
GDF1	174	5,279	63,353	11.3	701.8	14502.6	1.74	7.60	1.82	43.61	7.96
GDF2	170	5,169	62,024	11.3	637.7	1579.8	0.25	1.11	0.33	7.99	1.46
				Total	1339.41	16082.31	1.99	8.71	2.15	51.60	9.42

Notes:

(1) Based on weekly Gasoline Usage

(2) Emission factor for gasoline is based on petroleum loading loss equation in USEPA publication AP-42, Table 5.2-7, Evaporative Emissions from Gasoline Service Station Operations (7/08). The loading loss equation is :

Loading Loss (lb/1000 gal) = 12.46 x SPM/T

where,

S= saturation factor (assume 1.00 for submerged loading),

P = true vapor pressure of liquid loaded, pounds per square inch absolute (assume 7.4 psia for Gasoline RVP 10 @ 80°F),

M = molecular weight of vapors, pounds per pound-mole (assume 66 lb/lb-mole),

T = temperature of bulk liquid loaded, °R (80°F + 460 = 540°R),

(Note that average annual liquid surface temperature for El Paso, TX as estimated by the USEPA TANKS software is 74 ° F, therefore the emission factor is conservatively determined based on 80 ° F).

GASOLINE DISPENSING FACILITY HAP EMISSIONS

Unit	VOC Emissions[(1)]		HAP Emissions											
			Benzene		Hexane		Toluene		Xylene		Ethylbenzene		Total HAP	
	lbs/hr	ton/yr	lbs/hr	TPY	lbs/hr	TPY	lbs/hr	TPY	lbs/hr	TPY	lbs/hr	TPY	lb/hr	TPY
GDF1	1.82	7.96	0.0890	0.3900	0.0727	0.3184	0.4543	1.9898	0.2726	1.1939	0.0545	0.2388	**0.94**	**4.13**
GDF2	0.33	1.46	0.0163	0.0715	0.0133	0.0583	0.0832	0.3645	0.0499	0.2187	0.0100	0.0437	**0.17**	**0.76**

Storage Tank Content	HAP Mass fraction [(2)]				
	Benzene	Hexane	Toluene	Xylene	Ethylbenzene
Gasoline	0.049	0.040	0.25	0.15	0.030

Notes:

(1) Based on emission calculations in Table "GASOLINE DISPENSING FACILITY (GDF) POTENTIAL VOC EMISSIONS"

(2) Mass fraction is based on the average percent content of the HAP constituent in gasoline. Data obtained from typical material MSDS for gasoline

Freeport-McMoRan Tyrone Inc.

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SX/EW Plant - Chemical Constituent Concentrations for SX/EW Extractants and Diluents

Please note that the information provided in the table below is considered CONFIDENTIAL BUSINESS INFORMATION by the chemical suppliers that provided the information.

	Chemical Concentration [ppm]						
Reagent Name	Benzene	Toluene	Ethylbenzene	Total Xylene	1,2,4 - TMB	1,3,5 - TMB	Other VOC
Extractants							
ACORGA M5640	5	17.9	23.3	34.8			
ACORGA M5774	5	17.9	23.3	34.8			
ACORGA M5850	5	17.9	23.3	34.8			
ACORGA M5910	3.35	7.25	3.4	8.6	6.35	3.35	13.9
Diluents							
Conosol 170ES	50	50	50	50			
SX-80	5.4	110	530	690	2100	830	
Escaid 110		169					

Data for ACORGA extractants provided by Cytec.
Data for Conosol 170ES provided by Calumet Specialty Products.
Data for SX-80 provided by Chevron Phillips.
Blank cells indicate that data for this chemical was not available from the chemical supplier.
1,2,4 - TMB = 1,2,4-trimethylbenzene
1,3,5 - TMB = 1,3,5-trimethylbenzene
Other VOCs represented by octane, heptane, hexane, and pentane.

Freeport-McMoRan Tyrone Inc.
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SX/EW-1 - Plant Mixer/Settler Tank Emissions
The combination of chemicals which results in the highest emission rate is represented in the permit application.
The following calculations are based on the BHP Copper VOC study conducted in 1997.

Emissions from the use of ACORGA M5774 also represent emissions from the use of ACORGA M5640 and ACORGA M5850 since the chemical constituents are the same for all three extractants.

number of tanks	10	area of each tank	6,137	ft^2	total area	61,366	ft^2

Chemical Product	Percent
SX-80	90%
ACORGA M5774	10%

Component	D cm^2/sec	MW g/gmole	Ci ppm	Ci g/m^3	Ch ppm	Ch g/m^3	Diff F g/m^2-s	Emission Rate ton/yr-ft^2	Emission Rate lb/hr	Emission Rate tons/year
Benzene	0.090	78.11	5.360	0.017	0.0018	5.71E-06	1.53E-07	4.94E-07	0.007	0.030
Toluene	0.080	92.14	100.790	0.377	0.0668	2.50E-04	3.02E-06	9.74E-06	0.14	0.60
Ethylbenzene	0.070	106.2	479.330	2.067	0.0568	2.45E-04	1.45E-05	4.67E-05	0.65	2.87
Total Xylene	0.070	106.2	624.480	2.693	0.0371	1.60E-04	1.89E-05	6.09E-05	0.85	3.74
Total HAPs									**1.65**	**7.23**
1,2,4 - trimethylbenzene	0.060	120.2	1890.00	9.23	0.023	1.12E-04	5.54E-05	1.79E-04	2.51	10.97
1,3,5 - trimethylbenzene	0.060	120.2	747.00	3.65	0.010	4.93E-05	2.19E-05	7.07E-05	0.99	4.34
Other VOCs	0.000	0.0	0.00	0.0	0.00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00
Total VOCs									**5.15**	**22.54**

$$\text{DiffF} = (Ci - Ch) \times D/H$$

Where: D = constituent diffusivity (from EPA Reference Link for Estimated Diffusion Coefficients in Air and Water; Assumed Pressure of 1 atm, and Temperature of 25.84 deg. C per 1995 met. data)

MW = constituent molecular weight

Ci = constituent concentration at liquid surface, ppm. (from manufacturer data)

Ci, g/m^3, calculated from ideal gas law. Conservative temperature of 25.84 deg. C used based on 1995 meteorological data (Average plus Standard Deviation).

Ch = constituent concentration at 1 meter, ppm. Assumed same as BHP's measured concentrations at H=1 m

H = distance above liquid surface = 1 m from BHP study

	Concentration in ppm							
Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
SX-80	5.4	110	530	690	2100	830	0	confidential information supplied by Chevron Phillips
ACORGA M5774	5.00	17.90	23.30	34.80	0.00	0.00	0.00	confidential information supplied by Cytec
Organic in ppm	5.36	100.79	479.33	624.48	1890.00	747.00	0.00	composite concentration, Ci

Freeport-McMoRan Tyrone Inc.

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SX/EW-1 - Plant Mixer/Settler Tank Emissions

The combination of chemicals which results in the highest emission rate is represented in the permit application.

Chemical Product	Percent
Conosol 170ES	90%
ACORGA M5774	10%

Component	D cm^2/sec	MW g/gmole	Ci ppm	Ci g/m^3	Ch ppm	Ch g/m^3	Diff F g/m^2-s	Emission Rate ton/yr-ft^2	Emission Rate lb/hr	Emission Rate tons/year
Benzene	0.090	78.11	45.500	0.145	0.0018	5.73E-06	1.30E-06	4.21E-06	0.059	0.258
Toluene	0.080	92.14	46.790	0.176	0.0668	2.51E-04	1.40E-06	4.53E-06	0.06	0.278
Ethylbenzene	0.070	106.2	47.330	0.205	0.0568	2.46E-04	1.43E-06	4.62E-06	0.06	0.284
Total Xylene	0.070	106.2	48.480	0.210	0.0371	1.61E-04	1.47E-06	4.74E-06	0.07	0.291
Total HAPs									**0.25**	**1.11**
1,2,4 - trimethylbenzene	0.060	120.2	0.00	0.00	0.00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00
1,3,5 - trimethylbenzene	0.060	120.2	0.00	0.00	0.000	0.00E+00	0.00E+00	0.00E+00	0.00	0.00
Other VOCs	0.000	0.0	0.00	0.0	0.00	0.00E+00	0.00E+00	0.00E+00	0.00	0.00
Total VOCs									**0.25**	**1.11**

$$\text{DiffF} = (Ci - Ch) \times D / H$$

Where: D = constituent diffusivity (from EPA Reference Link for Estimated Diffusion Coefficients in Air and Water; Assumed Pressure of 1 atm, and Temperature of 25.84 deg. C per 1995 met. data)

MW = constituent molecular weight

Ci = constituent concentration at liquid surface, ppm. (from manufacturer data)

Ci, g/m^3, calculated from ideal gas law. Conservative temperature of 25.84 deg. C used based on 1995 meteorological data (Average plus Standard Deviation).

Ch = constituent concentration at 1 meter, ppm. Assumed same as BHP's measured concentrations at H=1 m

H = distance above liquid surface = 1 m from BHP study

	Concentration in ppm							
Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
Conosol 170ES	50	50	50	50	0	0	0	confidential information supplied by Calumet Specialty Products
ACORGA M5774	5.00	17.90	23.30	34.80	0.00	0.00	0.00	confidential information supplied by Cytec
Organic in ppm	45.50	46.79	47.33	48.48	0.00	0.00	0.00	composite concentration, Ci

Freeport-McMoRan Tyrone Inc.

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SX/EW-1 - Plant Mixer/Settler Tank Emissions

The combination of chemicals which results in the highest emission rate is represented in the permit application.

Chemical Product	Percent
Conosol 170ES	95%
ACORGA M5910	5%

Component	D cm^2/sec	MW g/gmole	Ci ppm	Ci g/m^3	Ch ppm	Ch g/m^3	Diff F g/m^2-s	Emission Rate ton/yr-ft^2	Emission Rate lb/hr	Emission Rate tons/year
Benzene	0.090	78.11	47.714	0.152	0.0018	5.73E-06	1.37E-06	4.42E-06	0.062	0.271
Toluene	0.080	92.14	47.905	0.180	0.0668	2.51E-04	1.44E-06	4.64E-06	0.07	0.285
Ethylbenzene	0.070	106.2	47.717	0.206	0.0568	2.46E-04	1.44E-06	4.66E-06	0.07	0.286
Total Xylene	0.070	106.2	47.971	0.208	0.0371	1.61E-04	1.45E-06	4.69E-06	0.07	0.288
Total HAPs									**0.26**	**1.13**
1,2,4 - trimethylbenzene	0.060	120.2	0.31	0.00	0.02	1.13E-04	8.47E-09	2.74E-08	3.83E-04	1.68E-03
1,3,5 - trimethylbenzene	0.060	120.2	0.16	0.00	0.010	4.95E-05	4.53E-09	1.46E-08	2.05E-04	8.97E-04
Other VOCs	0.070	112.1	0.68	0.0	0.00	0.00E+00	2.18E-08	7.03E-08	9.85E-04	4.32E-03
Total VOCs									**0.26**	**1.14**

$$\text{DiffF} = (Ci - Ch) \times D/H$$

Where: D = constituent diffusivity (from EPA Reference Link for Estimated Diffusion Coefficients in Air and Water; Assumed Pressure of 1 atm, and Temperature of 25.84 deg. C per 1995 met. data)

MW = constituent molecular weight

Ci = constituent concentration at liquid surface, ppm. (from manufacturer data)

Ci, g/m^3, calculated from ideal gas law. Conservative temperature of 25.84 deg. C used based on 1995 meteorological data (Average plus Standard Deviation).

Ch = constituent concentration at 1 meter, ppm. Assumed same as BHP's measured concentrations at H=1 m

H = distance above liquid surface = 1 m from BHP study

	Concentration in ppm							
Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
Conosol 170ES	50	50	50	50	0	0	0	confidential information supplied by Calumet Specialty Products
ACORGA M5910	3.35	7.25	3.40	8.60	6.35	3.35	13.90	confidential information supplied by Cytec
Organic in ppm	47.71	47.91	47.72	47.97	0.31	0.16	0.68	composite concentration, Ci

Freeport-McMoRan Tyrone Inc.

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SX/EW-1 - Plant Mixer/Settler Tank Emissions

The combination of chemicals which results in the highest emission rate is represented in the permit application.

Chemical Product	Percent
SX-80	90%
ACORGA M5910	10%

Component	D cm^2/sec	MW g/gmole	Ci ppm	Ci g/m^3	Ch ppm	Ch g/m^3	Diff F g/m^2-s	Emission Rate ton/yr-ft^2	Emission Rate lb/hr	Emission Rate tons/year
Benzene	0.090	78.11	5.195	0.016	0.0018	5.71E-06	1.48E-07	4.79E-07	0.007	0.029
Toluene	0.080	92.14	99.725	0.373	0.0668	2.50E-04	2.98E-06	9.64E-06	0.14	0.591
Ethylbenzene	0.070	106.2	477.340	2.059	0.0568	2.45E-04	1.44E-05	4.65E-05	0.65	2.856
Total Xylene	0.070	106.2	621.860	2.682	0.0371	1.60E-04	1.88E-05	6.06E-05	0.85	3.720
Total HAPs									**1.64**	**7.20**
1,2,4 - trimethylbenzene	0.060	120.2	1890.64	9.23	0.023	1.12E-04	5.54E-05	1.79E-04	2.51	10.98
1,3,5 - trimethylbenzene	0.060	120.2	747.34	3.65	0.010	4.93E-05	2.19E-05	7.07E-05	0.99	4.34
Other VOCs	0.070	112.1	1.39	0.01	1.69E+01	0.00E+00	4.43E-08	1.43E-07	0.00	0.01
Total VOCs									**5.14**	**22.52**

$$\text{DiffF} = (Ci - Ch) \times D / H$$

Where: D = constituent diffusivity (from EPA Reference Link for Estimated Diffusion Coefficients in Air and Water; Assumed Pressure of 1 atm, and Temperature of 25.84 deg. C per 1995 met. data)

MW = constituent molecular weight

Ci = constituent concentration at liquid surface, ppm. (from manufacturer data)

Ci, g/m^3, calculated from ideal gas law. Conservative temperature of 25.84 deg. C used based on 1995 meteorological data (Average plus Standard Deviation).

Ch = constituent concentration at 1 meter, ppm. Assumed same as BHP's measured concentrations at H=1 m

H = distance above liquid surface = 1 m from BHP study

	Concentration in ppm							
Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
SX-80	5.4	110	530	690	2100	830	0	confidential information supplied by Chevron Phillips
ACORGA M5910	3.35	7.25	3.40	8.60	6.35	3.35	13.90	confidential information supplied by Cytec
Organic in ppm	5.20	99.73	477.34	621.86	1890.64	747.34	1.39	composite concentration, Ci

Freeport-McMoRan Tyrone Inc.

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SX/EW-1 - Plant Mixer/Settler Tank Emissions

The combination of chemicals which results in the highest emission rate is represented in the permit application.

Chemical Product	Percent
Escaid 110	95%
ACORGA M5910	5%

Component	D cm^2/sec	MW g/gmole	Ci ppm	Ci g/m^3	Ch ppm	Ch g/m^3	Diff F g/m^2-s	Emission Rate ton/yr-ft^2	Emission Rate tons/year	Emission Rate lb/hr
Benzene	0.093	78.11	0.175	0.001	0.0018	5.73E-06	5.14E-09	1.66E-08	0.001	0.000
Toluene	0.083	92.14	160.557	0.603	0.0668	2.51E-04	5.02E-06	1.62E-05	0.995	0.23
Ethylbenzene	0.076	106.2	0.177	0.001	0.0568	2.46E-04	3.97E-09	1.28E-08	0.001	0.00
Total Xylene	0.076	106.2	0.449	0.002	0.0371	1.61E-04	1.35E-08	4.37E-08	0.003	0.00
Total HAPs									**1.00**	**0.23**
1,2,4 - trimethylbenzene	0.070	120.2	0.33	0.00	0.02	1.13E-04	1.06E-08	3.42E-08	0.00	0.00
1,3,5 - trimethylbenzene	0.070	120.2	0.17	0.00	0.010	4.95E-05	5.67E-09	1.83E-08	0.00	0.00
Other VOCs	0.070	112.1	0.73	0.00	16.92	0.00E+00	2.32E-08	7.49E-08	0.00	0.00
Total VOCs									**1.01**	**0.23**

$$DiffF = (Ci - Ch) \times D / H$$

Where: D = constituent diffusivity (from EPA Reference Link for Estimated Diffusion Coefficients in Air and Water; Assumed Pressure of 1 atm, and Temperature of 25.84 deg. C per 1995 met. data)

MW = constituent molecular weight

Ci = constituent concentration at liquid surface, ppm. (from manufacturer data)

Ci, g/m^3, calculated from ideal gas law. Conservative temperature of 25.84 deg. C used based on 1995 meteorological data (Average plus Standard Deviation).

Ch = constituent concentration at 0.61 meter, ppm. Assumed same as BHP's measured concentrations at H=1 m

H = distance above liquid surface = 1 m per BHP Study

	Concentration in ppm							
Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
Escaid 110	0	169	0	0	0	0	0	confidential information supplied
ACORGA M5910	3.35	7.25	3.40	8.60	6.35	3.35	13.90	confidential information supplied
Organic in ppm	0.17	160.56	0.18	0.45	0.33	0.17	0.73	composite concentration, Ci

Freeport-McMoRan Tyrone Inc.

Feb-20

SX/EW-2 - Sulfuric Acid Emissions Estimates for the Tyrone SX/EW Tank House

Parameter	Value	Units	
A1 (Inlet Area)	1647	sqft	
A2 (Outlet Area)	2625	sqft	
H (Height separating inlet from outlet)	38.9	ft	
Ti (Inside Temperature)	523	deg R	
To (Outside Temperature)	515	deg R	
h (Natural plane calculation)	**27.79**	ft	
Cw (Orifice Constant)	0.55	-	
Aw (Area of windward openings)	730	sqft	
V (Wind speed)	10	MPH	
Qw (Wind effect calc.)	**353,320**	cfm	
A (Area)	1647	sqft	
Cs (Coefficient of Openings)	0.55	-	
h (Natural plane calculation)	27.79	ft	
Ti (Inside Temperature)	523	deg R	
dT (Temperature difference)	8	deg R	
Fc (Correction Factor)	1.18	-	
Qs (Thermal effect calc.)	**335,353**	cfm	
Qtotal (combined wind & thermal)	**487,131**	**cfm**	
H2SO4 Concentration	1	mg/cm	
H2SO4 Concentration	6.237E-08	lb/cf	
ACID MIST EMISSIONS (as PM10)	**15,969**	**lb/yr**	1.82 lb/hr based on 8,760 hr/yr
	7.98	**TPY**	

Conversions:

1 lb = 454 grams
1 ft = 0.3048 m
cf = cubic foot
cm = cubic meter
cfm = cubic feet per minute

Freeport-McMoRan Tyrone Inc.
Feb-20

SX/EW-3 - 2,000,000 Gallon Raffinate Tank Emissions

The following calculations are based on the BHP Copper VOC study conducted in 1997.
Emissions from the use of ACORGA M5774 also represent emissions from the use of ACORGA M5640 and ACORGA M5850 since the chemical constituents are the same for all three extractants. SX-80 and ACORGA M5774 were used as the reagent mix in calculating emissions due to yielding the highest representative emissions.

Number of tanks	1	area of each tank	11,304	ft^2	total area	11,304	ft^2

Chemical Product	Percent
SX-80	90%
ACORGA M5774	10%

Component	D cm^2/sec	MW g/gmole	Ci ppm	Ci g/m^3	Ch ppm	Ch g/m^3	Diff F g/m^2-s	Emission Rate ton/yr-ft^2	Emission Rate lb/hr	Emission Rate tons/yr
Benzene	0.090	78.11	5.360	0.017	0.0018	5.71E-06	1.53E-07	4.94E-07	1.28E-03	5.59E-03
Toluene	0.080	92.14	100.790	0.377	0.0668	2.50E-04	3.02E-06	9.74E-06	2.51E-02	1.10E-01
Ethylbenzene	0.070	106.2	479.330	2.067	0.0568	2.45E-04	1.45E-05	4.67E-05	1.21E-01	5.28E-01
Total Xylene	0.070	106.2	624.480	2.693	0.0371	1.60E-04	1.89E-05	6.09E-05	1.57E-01	6.88E-01
Total HAPs									**0.30**	**1.33**
1,2,4 - trimethylbenzene	0.060	120.2	1890.00	9.23	0.023	1.12E-04	5.54E-05	1.79E-04	4.62E-01	2.02E+00
1,3,5 - trimethylbenzene	0.060	120.2	747.00	3.65	0.010	4.93E-05	2.19E-05	7.07E-05	1.82E-01	7.99E-01
Other VOCs	0.000	0.0	0.00	0.0	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total VOCs									**0.95**	**4.15**

$$\text{DiffF} = (Ci - Ch) \times D / H$$

Where: D = constituent diffusivity (from EPA Reference Link for Estimated Diffusion Coefficients in Air and Water; Assumed Pressure of 1 atm, and Temperature of 25.84 deg. C per 1995 met. data)
MW = constituent molecular weight
Ci = constituent concentration at liquid surface, ppm. (from manufacturer data)
Ci, g/m^3, calculated from ideal gas law. Conservative temperature of 25.84 deg. C used based on 1995 meteorological data (Average plus Standard Deviation).
Ch = constituent concentration at 1 meter, ppm. Assumed same as BHP's measured concentrations at H=1 m
H = distance above liquid surface = 1 m per BHP Study

	Concentration in ppm							
Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
SX-80	5.4	110	530	690	2100	830	0.00	confidential information supplied by Chevron Phillips
ACORGA M5774	5.00	17.90	23.30	34.80	0.00	0.00	0.00	confidential information supplied by Cytec
Organic in ppm	5.36	100.79	479.33	624.48	1890.00	747.00	0.00	composite concentration, Ci

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SX/EW 4 - 400,000 Gallon Raffinate Tank Emissions

The following calculations are based on the BHP Copper VOC study conducted in 1997.
Emissions from the use of ACORGA M5774 also represent emissions from the use of ACORGA M5640 and ACORGA M5850 since the chemical constituents are the same for all three extractants. SX-80 and ACORGA M5774 were used as the reagent mix in calculating emissions due to yielding the highest representative emissions.

Number of tanks	1	area of each tank	3,320.0	ft^2	total area	3,320.0	ft^2

Chemical Product	Percent
SX-80	90%
ACORGA M5774	10%

Component	D cm^2/sec	MW g/gmole	Ci ppm	Ci g/m^3	Ch ppm	Ch g/m^3	Diff F g/m^2-s	Emission Rate ton/yr-ft^2	Emission Rate lb/hr	Emission Rate tons/year
Benzene	0.093	78.11	5.360	0.017	0.0011	3.49E-06	1.59E-07	5.12E-07	3.88E-04	1.70E-03
Toluene	0.083	92.14	100.790	0.377	0.0065	2.41E-05	3.14E-06	1.01E-05	7.69E-03	3.37E-02
Ethylbenzene	0.076	106.2	479.330	2.067	0.0010	4.31E-06	1.57E-05	5.07E-05	3.85E-02	1.68E-01
Total Xylene	0.076	106.2	624.480	2.693	0.0020	8.54E-06	2.05E-05	6.61E-05	5.01E-02	2.19E-01
Total HAPs									**0.10**	**0.42**
1,2,4 - trimethylbenzene	0.070	120.2	1890.00	9.23	0.0022	1.07E-05	6.47E-05	2.09E-04	1.58E-01	6.94E-01
1,3,5 - trimethylbenzene	0.070	120.2	747.00	3.65	0.001	5.03E-06	2.56E-05	8.27E-05	6.27E-02	2.75E-01
Other VOCs	0.000	0.0	0.00	0.0	3.98	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total VOCs									**0.32**	**1.39**

$$\mathrm{DiffF} = (Ci - Ch) \times D / H$$

Where: D = constituent diffusivity (from EPA Reference Link for Estimated Diffusion Coefficients in Air and Water; Assumed Pressure of 1 atm, and Temperature of 25.84 deg. C per 1995 met. data)
MW = constituent molecular weight
Ci = constituent concentration at liquid surface, ppm. (from manufacturer data)
Ci, g/m^3, calculated from ideal gas law. Conservative temperature of 25.84 deg. C used based on 1995 meteorological data (Average plus Standard Deviation).
Ch = constituent concentration at 1 meter, ppm. Assumed same as BHP's measured concentrations at H=1 m
H = distance above liquid surface = 1 m per BHP Study

	Concentration in ppm							
Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
SX-80	5.4	110	530	690	2100	830	0	confidential information supplied by Chevron Phillips
ACORGA M5774	5.00	17.90	23.30	34.80	0.00	0.00	0.00	confidential information supplied by Cytec
Organic in ppm	5.36	100.79	479.33	624.48	1890.00	747.00	0.00	composite concentration, Ci

Freeport-McMoRan Tyrone Inc.

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ENV-101: Stormwater Pump Engine Emissions

Emission Factors

NOx: Source: 2014 Title V Permit Renewal Application
NOx = **0.0310 (lb/hp-hr)**

CO: Source: 2014 Title V Permit Renewal Application
CO = **0.0067 (lb/hp-hr)**

***PM:** Source: 2014 Title V Permit Renewal Application
PM = **0.0022 (lb/hp-hr)**

HC: Source: 2014 Title V Permit Renewal Application
HC = **0.0025 (lb/hp-hr)**

SO_2: Source: 2014 Title V Permit Renewal Application
SO_2 = **0.0021 (lb/hp-hr)**

* Tyrone uses the same emission factor for PM, PM_{10}, and $PM_{2.5}$

HAPs Emission factors:

Source: AP-42 Chapter 3.3 Gasoline and Diesel Industrial Engines, Table 3.3-2.

Pollutant	Emission Factors		To convert from lb/MMBTU to lb/hp-hr: (Emission Factor/1E06 BTU) * (7,000 BTU/ hp-hr)	
Benzene	9.33E-04	lb/MMBTU	6.53E-06	lb/hp-hr
Toluene	4.09E-04	lb/MMBTU	2.86E-06	lb/hp-hr
Xylenes	2.85E-04	lb/MMBTU	2.00E-06	lb/hp-hr
1,3-Butadiene	3.91E-05	lb/MMBTU	2.74E-07	lb/hp-hr
Formaldehyde	1.18E-03	lb/MMBTU	8.26E-06	lb/hp-hr
Acetaldehyde	7.67E-04	lb/MMBTU	5.37E-06	lb/hp-hr
Acrolein	9.25E-05	lb/MMBTU	6.48E-07	lb/hp-hr
Naphthalene	8.48E-05	lb/MMBTU	5.94E-07	lb/hp-hr
Total Polycyclic Aromatic Hydrocarbons (PAHs)	1.68E-04	lb/MMBTU	1.18E-06	lb/hp-hr
Total Hazardous Air Pollutants (HAPs)	3.96E-03	lb/MMBTU	2.77E-05	lb/hp-hr

Greenhouse Gas Emissions:

CO_2	73.96	kg/MMBtu	40 CFR 98 Subpart C
CH_4	0.003	kg/MMBtu	40 CFR 98 Subpart C
N_2O	0.0006	kg/MMBtu	40 CFR 98 Subpart C

Fuel	Diesel		
Equipment	Stationary Stormwater Pump Engine (Caterpillar)		
Number of Units	1		
Hours of Operation [hr/year][1]	8,760		
Fuel Heat Value (Btu/gal) (AP-42)	137,000		
Fuel Usage Rate (gal/hr)	6		
Heat Rate (MMBtu/hr)	0.82		
Capacity [hp]	125		
Criteria Pollutants	**Diesel Combustion**		
	Emission Factor [lb/hr]	**Emission Rate [lb/yr]**	**Emission Rate [ton/yr]**
Nitrogen Oxides (NO_x)	3.875	33,945	16.973
Carbon Monoxide (CO)	0.838	7,337	3.6683
Particulate Matter (PM)	0.275	2,409	1.205
Hydrocarbons (HC)	0.313	2,738	1.369
Sulfur Dioxide (SO_2)	0.256	2,245	1.122
HAPs			
Benzene	8.16E-04	7.15	3.58E-03
Toluene	3.58E-04	3.13	1.57E-03
Xylenes	2.49E-04	2.18	1.09E-03
1,3-Butadiene	3.42E-05	0.30	1.50E-04
Formaldehyde	1.03E-03	9.04	4.52E-03
Acetaldehyde	6.71E-04	5.88	2.94E-03
Acrolein	8.09E-05	0.71	3.55E-04
Naphthalene	7.42E-05	0.65	3.25E-04
Total Polycyclic Aromatic Hydrocarbons (PAHs)	1.47E-04	1.29	6.44E-04
Total Hazardous Air Pollutants (HAPs)	3.46E-03	30.34	1.52E-02
Greenhouse Gases			
CO_2	134.03	1174104.00	587.05
CH_4	0.0054	744.81	0.37
N_2O	0.0011	0.007	3.26E-06

Notes:

1. Actual annual hours of operation.

Freeport-McMoRan Tyrone Inc.

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ENV-111: Stormwater Pump Engine Emissions

Emission Factors

NOx: Source: 2014 Title V Permit Renewal Application
NOx = **0.0310 (lb/hp-hr)**

CO: Source: 2014 Title V Permit Renewal Application
CO = **0.0067 (lb/hp-hr)**

***PM:** Source: 2014 Title V Permit Renewal Application
PM = **0.0022 (lb/hp-hr)**

HC: Source: 2014 Title V Permit Renewal Application
HC = **0.0025 (lb/hp-hr)**

SO_2: Source: 2014 Title V Permit Renewal Application
SO_2 = **0.0021 (lb/hp-hr)**

* Tyrone uses the same emission factor for PM, PM_{10}, and $PM_{2.5}$

HAPs Emission factors:
Source: AP-42 Chapter 3.3 Gasoline and Diesel Industrial Engines, Table 3.3-2.

Pollutant	Emission Factors	To convert from lb/MMBTU to lb/hp-hr: (Emission Factor/1E06 BTU) * (7,000 BTU/ hp-hr)
Benzene	9.33E-04 lb/MMBTU	6.53E-06 lb/hp-hr
Toluene	4.09E-04 lb/MMBTU	2.86E-06 lb/hp-hr
Xylenes	2.85E-04 lb/MMBTU	2.00E-06 lb/hp-hr
1,3-Butadiene	3.91E-05 lb/MMBTU	2.74E-07 lb/hp-hr
Formaldehyde	1.18E-03 lb/MMBTU	8.26E-06 lb/hp-hr
Acetaldehyde	7.67E-04 lb/MMBTU	5.37E-06 lb/hp-hr
Acrolein	9.25E-05 lb/MMBTU	6.48E-07 lb/hp-hr
Naphthalene	8.48E-05 lb/MMBTU	5.94E-07 lb/hp-hr
Total Polycyclic Aromatic Hydrocarbons (PAHs)	1.68E-04 lb/MMBTU	1.18E-06 lb/hp-hr
Total Hazardous Air Pollutants (HAPs)	3.96E-03 lb/MMBTU	2.77E-05 lb/hp-hr

Greenhouse Gas Emissions:

CO_2	73.96	kg/MMBtu	40 CFR 98 Subpart C
CH_4	0.003	kg/MMBtu	40 CFR 98 Subpart C
N_2O	0.0006	kg/MMBtu	40 CFR 98 Subpart C

Fuel	Diesel		
Equipment	Stationary Stormwater Pump Engine (Caterpillar)		
Number of Units	1		
Hours of Operation [hr/year][1]	8,760		
Fuel Heat Value (Btu/gal) (AP-42)	137,000		
Fuel Usage Rate (gal/hr)	6		
Heat Rate (MMBtu/hr)	0.82		
Capacity [hp]	125		
Criteria Pollutants	**Diesel Combustion**		
	Emission Factor [lb/hr]	**Emission Rate [lb/yr]**	**Emission Rate [ton/yr]**
Nitrogen Oxides (NO_x)	3.875	33,945	16.973
Carbon Monoxide (CO)	0.838	7,337	3.668
Particulate Matter (PM)	0.275	2,409	1.205
Hydrocarbons (HC)	0.313	2,738	1.369
Sulfur Dioxide (SO_2)	0.256	2,245	1.122
HAPs			
Benzene	8.16E-04	7.15	3.58E-03
Toluene	3.58E-04	3.13	1.57E-03
Xylenes	2.49E-04	2.18	1.09E-03
1,3-Butadiene	3.42E-05	0.30	1.50E-04
Formaldehyde	1.03E-03	9.04	4.52E-03
Acetaldehyde	6.71E-04	5.88	2.94E-03
Acrolein	8.09E-05	0.71	3.55E-04
Naphthalene	7.42E-05	0.65	3.25E-04
Total Polycyclic Aromatic Hydrocarbons (PAHs)	1.47E-04	1.29	6.44E-04
Total Hazardous Air Pollutants (HAPs)	3.46E-03	30.34	1.52E-02
Greenhouse Gases			
CO_2	134.03	1174104.00	587.05
CH_4	0.0054	744.81	0.37
N_2O	0.0011	0.0065	3.26E-06

Notes:
1. Actual annual hours of operation.

Freeport-McMoRan Tyrone Inc.

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ENV-122: Stormwater Pump Engine Emissions

Emission Factors

NOx: Source: 2014 Title V Permit Renewal Application
NOx = **0.0310 (lb/hp-hr)**

CO: Source: 2014 Title V Permit Renewal Application
CO = **0.0067 (lb/hp-hr)**

***PM:** Source: 2014 Title V Permit Renewal Application
PM = **0.0022 (lb/hp-hr)**

HC: Source: 2014 Title V Permit Renewal Application
HC = **0.0025 (lb/hp-hr)**

SO_2: Source: 2014 Title V Permit Renewal Application
SO_2 = **0.0021 (lb/hp-hr)**

* Tyrone uses the same emission factor for PM, PM_{10}, and $PM_{2.5}$

HAPs Emission factors:

Source: AP-42 Chapter 3.3 Gasoline and Diesel Industrial Engines, Table 3.3-2.

Pollutant	Emission Factors	To convert from lb/MMBTU to lb/hp-hr: (Emission Factor/1E06 BTU) * (7,000 BTU/ hp-hr)
Benzene	9.33E-04 lb/MMBTU	6.53E-06 lb/hp-hr
Toluene	4.09E-04 lb/MMBTU	2.86E-06 lb/hp-hr
Xylenes	2.85E-04 lb/MMBTU	2.00E-06 lb/hp-hr
1,3-Butadiene	3.91E-05 lb/MMBTU	2.74E-07 lb/hp-hr
Formaldehyde	1.18E-03 lb/MMBTU	8.26E-06 lb/hp-hr
Acetaldehyde	7.67E-04 lb/MMBTU	5.37E-06 lb/hp-hr
Acrolein	9.25E-05 lb/MMBTU	6.48E-07 lb/hp-hr
Naphthalene	8.48E-05 lb/MMBTU	5.94E-07 lb/hp-hr
Total Polycyclic Aromatic Hydrocarbons (PAHs)	1.68E-04 lb/MMBTU	1.18E-06 lb/hp-hr
Total Hazardous Air Pollutants (HAPs)	3.96E-03 lb/MMBTU	2.77E-05 lb/hp-hr
Greenhouse Gas Emissions:		
CO_2	73.96 kg/MMBtu	40 CFR 98 Subpart C
CH_4	0.003 kg/MMBtu	40 CFR 98 Subpart C
N_2O	0.0006 kg/MMBtu	40 CFR 98 Subpart C

Fuel	Diesel		
Equipment	Stationary Stormwater Pump Engine (Caterpillar)		
Number of Units	1		
Hours of Operation [hr/year][1]	8,760		
Fuel Heat Value (Btu/gal) (AP-42)	137,000		
Fuel Usage Rate (gal/hr)	6		
Heat Rate (MMBtu/hr)	0.82		
Capacity [hp]	125		
Criteria Pollutants	**Diesel Combustion**		
	Emission Factor [lb/hr]	**Emission Rate [lb/yr]**	**Emission Rate [ton/yr]**
Nitrogen Oxides (NO_x)	3.875	33,945	16.973
Carbon Monoxide (CO)	0.838	7,337	3.6683
Particulate Matter (PM)	0.275	2,409	1.205
Hydrocarbons (HC)	0.313	2,738	1.369
Sulfur Dioxide (SO_2)	0.256	2,245	1.122
HAPs			
Benzene	8.16E-04	7.15	3.58E-03
Toluene	3.58E-04	3.13	1.57E-03
Xylenes	2.49E-04	2.18	1.09E-03
1,3-Butadiene	3.42E-05	0.30	1.50E-04
Formaldehyde	1.03E-03	9.04	4.52E-03
Acetaldehyde	6.71E-04	5.88	2.94E-03
Acrolein	8.09E-05	0.71	3.55E-04
Naphthalene	7.42E-05	0.65	3.25E-04
Total Polycyclic Aromatic Hydrocarbons (PAHs)	1.47E-04	1.29	6.44E-04
Total Hazardous Air Pollutants (HAPs)	3.46E-03	30.34	1.52E-02
Greenhouse Gases			
CO_2	134.03	1174104.00	587.05
CH_4	0.0054	744.81	0.37
N_2O	0.0011	0.007	3.26E-06

Notes:

1. Actual annual hours of operation.

Freeport-McMoRan Tyrone Inc.

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ENV-123 Diesel Pump

Unit Numbers:	ENV-123
Source description:	Diesel Powered Pump

Engine Horsepower and RPM

Sea level hp:	225	hp	Mfg data
	3	%	Per 1,000 ft above 4,000 ft
Elevation	5801	ft	
Derated hp:	212.84	hp	
Derated kW:	158.72	kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2000	lb/ton	
Conversion Factor	1.34	hp/kW	
Annual Hours of Operation	8760	hr	
Brake Specific Fuel Consumption	7000	Btu/hp-hr	AP-42 Section 3.3
Fuel Consumption			
Heat Rate	1.49	MMBtu/hr	Calculated
Diesel Heating Value	137,000	Btu/gal	From AP-42
Fuel Usage	10.88	gal/hr	Calculated
Fuel Usage	95,267	gal/yr	Calculated

Emission Calculations

NO_x[1]	CO[1]	$PM^{1,2}$	SO_2[3]		
0.30	2.61	0.015		g/hp-hr	Tier 4 Final Standards
			0.00205	lb/hp-hr	AP-42 Table 3.3-1
0.14	**1.22**	**0.0070**	**0.44**	lb/hr	Hourly emission rate
0.61	**5.36**	**0.031**	**1.91**	tpy	Annual emission rate

VOC[1]	Total HAPs[4]	Formaldehyde			
0.14			g/hp-hr	Tier 4 Final Standards	
	3.42E-03	1.18E-03	lb/MMBtu	AP-42	
0.066	**0.0051**	**0.0018**	lb/hr	Hourly emission rate	
0.29	**0.022**	**0.0077**	tpy	Annual emission rate	

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Tables C-1 and C-2
163.1	0.0066	0.00132		lb/MMBtu	
1	25	298		Global Warming Potential	40 CFR 98 Table A-1
242.93	0.010	0.0020	243.77	lb/hr	
1064.05	**4.32E-02**	**8.63E-03**	**1067.70**	**tpy**	

[1] Emission factors for NO_X, CO, PM and VOC are based on Tier 4 Final Emission Standards.

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on the heat rate.

Freeport-McMoRan Tyrone Inc.
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Water Boilers B-951 and B-748

Fuel: Propane
Maximum heat capacity = 1.256 MMBtu/ hr each.
Annual hours = 8760

Emission factors for pollutants are required to be converted to an energy basis. In order to do so, the emission factor from AP-42 is divided by 91.5 MMBtu/ 1,000 gal for propane (pg 1.5-1 of AP-42. The resulting emission factor is in lb/MMBtu. The emission factor for HAPs is obtained by multiplying the units of lb/MMcf by MMcf nat gas/ 1020 MMBtu. The final emission factor is in lb/ MMBtu. Total emissions shown are for two boilers.

Pollutant	Emission Factor, EF	Units	EF Source	Conversion Factor (CF)[1]	Units	Emission Factor, EF_{cf} (EF/CF)	Units	PTE (lbs/hr)	Emissions (lbs/yr) (1 boiler)	Emissions (tpy) (1 boiler)
NOx	13	lb/1,000 gallons	AP-42, Table 1.5-1 (7/08)	91.5	MMBtu/1,000 gal	0.1421	lb/MMBtu	0.178	1563.2	0.78
CO	7.5	lb/1,000 gallons	AP-42, Table 1.5-1 (7/08)	91.5	MMBtu/1,000 gal	0.0820	lb/MMBtu	0.103	901.8	0.45
[2]SO_2	0.018	lb/1,000 gallons	AP-42, Table 1.5-1 (7/08)	91.5	MMBtu/1,000 gal	0.0002	lb/MMBtu	0.000	2.2	0.0011
TOC	1	lb/1,000 gallons	AP-42, Table 1.5-1 (7/08)	91.5	MMBtu/1,000 gal	0.0109	lb/MMBtu	0.014	120.2	0.060
PM, total	0.7	lb/1,000 gallons	AP-42, Table 1.5-1 (7/08)	91.5	MMBtu/1,000 gal	0.0077	lb/MMBtu	0.010	84.2	0.042
CO_2	62.87	kg/MMBtu	40 CFR 98 Subpart C	2.20462	lb/kg	138.6045	lb/MMBtu	174.087	1525003.9	762.5
CH_4	0.003	kg/MMBtu	40 CFR 98 Subpart C	2.20462	lb/kg	0.0066	lb/MMBtu	0.0083	72.8	0.036
N_2O	0.0006	kg/MMBtu	40 CFR 98 Subpart C	2.20462	lb/kg	0.0013	lb/MMBtu	0.002	14.6	0.007
HAPs	1.88	lb/MMcf nat gas	AP-42, Table 1.4-3	1020	MMcf /1020	0.0018	lb/MMBtu	0.0023	20.3	0.010
Toluene	3.40E-03	lb/MMcf nat gas	AP-42, Table 1.4-3	1020	MMcf /1020	3.33E-06	lb/MMBtu	4.19E-06	0.037	1.83E-05

[1]No data in AP-42 Chapter 1.5 for HAPs emissions from propane combustion. Emission factor for HAPs obtained from natural gas emission factor in AP-42 Chapter 1.4.

[2]Sulfur content = 0.18 grains/ $100ft^3$ gas vapor. (Sulfur content estimated from note e of Table 1.5-1 for butane. This was the only available reference to sulfur content in Ch 1.5 SO_2 = 0.1 sulfur content (AP-42 Table 1.5-1)

Freeport-McMoRan Tyrone Inc.

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OP-4 Diesel Pump

Unit Numbers:	OP-4		
Source description:	Diesel Powered Pump		

Engine Horsepower and RPM

Sea level hp:	175	hp	Mfg data
	3	%	Per 1,000 ft above 4,000 ft
Elevation	5801	ft	
Derated hp:	165.54	hp	
Derated kW:	123.45	kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2000	lb/ton	
Conversion Factor	1.34	hp/kW	
Annual Hours of Operation	8760	hr	
Brake Specific Fuel Consumption	7000	Btu/hp-hr	AP-42 Section 3.3
Fuel Consumption			
Heat Rate	1.16	MMBtu/hr	Calculated
Diesel Heating Value	137,000	Btu/gal	From AP-42
Fuel Usage	8.46	gal/hr	Calculated
Fuel Usage	74,096	gal/yr	Calculated

Emission Calculations

NOx[1]	CO[1]	PM[1,2]	SO_2[3]		
2.83	2.61	0.224		g/hp-hr	Tier III Standards
			0.00205	lb/hp-hr	AP-42 Table 3.3-1
1.03	**0.95**	**0.082**	**0.34**	lb/hr	Hourly emission rate
4.53	**4.17**	**0.36**	**1.49**	tpy	Annual emission rate

VOC[1]	Total HAPs[4]	Formaldehyde			
0.15			g/hp-hr	Tier III Standards	
	3.42E-03	1.18E-03	lb/MMBtu	AP-42	
0.054	**0.0040**	**0.0014**	lb/hr	Hourly emission rate	
0.24	**0.017**	**0.0060**	tpy	Annual emission rate	

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Tables C-1 and C-2
163.1	0.0066	0.00132		lb/MMBtu	
1	25	298		Global Warming Potential	40 CFR 98 Table A-1
188.95	0.008	0.0015	189.60	lb/hr	
827.60	**3.36E-02**	**6.71E-03**	**830.44**	**tpy**	

[1] Emission factors for NO_X, CO, PM and VOC are based on Tier III Final Emission Standards.

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on the heat rate.

Freeport-McMoRan Tyrone Inc.

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OP-7 Diesel Pump

Unit Numbers:	OP-7		
Source description:	Diesel Powered Pump		

Engine Horsepower and RPM

Sea level hp:	168	hp	Mfg data
	3	%	Per 1,000 ft above 4,000 ft
Elevation	5801	ft	
Derated hp:	158.92	hp	
Derated kW:	118.51	kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2000	lb/ton	
Conversion Factor	1.34	hp/kW	
Annual Hours of Operation	8760	hr	
Brake Specific Fuel Consumption	7000	Btu/hp-hr	AP-42 Section 3.3
Fuel Consumption			
Heat Rate	1.11	MMBtu/hr	Calculated
Diesel Heating Value	137,000	Btu/gal	From AP-42
Fuel Usage	8.12	gal/hr	Calculated
Fuel Usage	71,133	gal/yr	Calculated

Emission Calculations

NOx[1]	CO[1]	PM[1,2]	SO_2[3]		
2.83	2.61	0.149		g/hp-hr	Tier III Standards
			0.00205	lb/hp-hr	AP-42 Table 3.3-1
0.99	**0.91**	**0.0523**	**0.33**	lb/hr	Hourly emission rate
4.35	**4.01**	**0.229**	**1.43**	tpy	Annual emission rate

VOC[1]	Total HAPs[4]	Formaldehyde			
0.15			g/hp-hr	Tier III Standards	
	3.42E-03	1.18E-03	lb/MMBtu	AP-42	
0.052	**0.0038**	**0.0013**	lb/hr	Hourly emission rate	
0.23	**0.017**	**0.0057**	tpy	Annual emission rate	

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Tables C-1 and C-2
163.1	0.0066	0.00132		lb/MMBtu	
1	25	298		Global Warming Potential	40 CFR 98 Table A-1
181.39	0.007	0.0015	182.01	lb/hr	
794.49	**3.22E-02**	**6.45E-03**	**797.22**	**tpy**	

[1] Emission factors for NO_X, CO, PM and VOC are based on Tier III Final Emission Standards.

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on the heat rate.

Freeport-McMoRan Tyrone Inc.

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EMP-1 Diesel Pump

Unit Numbers:	EMP-1		
Source description:	Diesel Powered Pump		

Engine Horsepower and RPM

Sea level hp:	190	hp	Mfg data
	3	%	Per 1,000 ft above 4,000 ft
Elevation	5801	ft	
Derated hp:	179.73	hp	
Derated kW:	134.03	kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2000	lb/ton	
Conversion Factor	1.34	hp/kW	
Annual Hours of Operation	8760	hr	
Brake Specific Fuel Consumption	7000	Btu/hp-hr	AP-42 Section 3.3
Fuel Consumption			
Heat Rate	1.26	MMBtu/hr	Calculated
Diesel Heating Value	137,000	Btu/gal	From AP-42
Fuel Usage	9.18	gal/hr	Calculated
Fuel Usage	80,447	gal/yr	Calculated

Emission Calculations

NOx[1]	CO[1]	PM[1,2]	SO_2[3]		
0.0310	0.00668	0.00220	0.00205	lb/hp-hr	AP-42 Table 3.3-1
5.57	**1.20**	**0.3954**	**0.37**	lb/hr	Hourly emission rate
24.40	**5.26**	**1.732**	**1.61**	tpy	Annual emission rate

VOC[1]	Total HAPs[4]	Formaldehyde			
0.00251			lb/hp-hr	AP-42 Table 3.3-1	
	0.00342	0.00118	lb/MMBtu	AP-42 Table 3.3-2	
0.45	**0.0043**	**0.0015**	lb/hr	Hourly emission rate	
1.98	**0.019**	**0.0065**	tpy	Annual emission rate	

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Tables C-1 and C-2
163.1	0.0066	0.00132		lb/MMBtu	
1	25	298		Global Warming Potential	40 CFR 98 Table A-1
205.14	0.008	0.0017	205.85	lb/hr	
898.53	**3.64E-02**	**7.29E-03**	**901.62**	**tpy**	

[1] Emission factors for NO_X, CO, PM and VOC are based on AP-42 Table 3.3-1.

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on the heat rate.

Freeport-McMoRan Tyrone Inc.

Feb-20

EMP-2 Diesel Pump

Unit Numbers:	EMP-2		
Source description:	Diesel Powered Pump		

Engine Horsepower and RPM

Sea level hp:	200	hp	Mfg data
	3	%	Per 1,000 ft above 4,000 ft
Elevation	5801	ft	
Derated hp:	189.19	hp	
Derated kW:	141.08	kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2000	lb/ton	
Conversion Factor	1.34	hp/kW	
Annual Hours of Operation	8760	hr	
Brake Specific Fuel Consumption	7000	Btu/hp-hr	AP-42 Section 3.3
Fuel Consumption			
Heat Rate	1.32	MMBtu/hr	Calculated
Diesel Heating Value	137,000	Btu/gal	From AP-42
Fuel Usage	9.67	gal/hr	Calculated
Fuel Usage	84,682	gal/yr	Calculated

Emission Calculations

NOx[1]	CO[1]	PM[1,2]	SO_2[3]		
4.68	2.61	0.149		g/hp-hr	Tier II Standards
			0.00205	lb/hp-hr	AP-42 Table 3.3-1
1.95	**1.09**	**0.0622**	**0.39**	lb/hr	Hourly emission rate
8.54	**4.77**	**0.272**	**1.70**	tpy	Annual emission rate

VOC[1]	Total HAPs[4]	Formaldehyde			
0.25			g/hp-hr	Tier II Standards	
	3.42E-03	1.18E-03	lb/MMBtu	AP-42	
0.103	**0.0045**	**0.0016**	lb/hr	Hourly emission rate	
0.45	**0.020**	**0.0068**	tpy	Annual emission rate	

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Tables C-1 and C-2
163.1	0.0066	0.00132		lb/MMBtu	
1	25	298		Global Warming Potential	40 CFR 98 Table A-1
215.94	0.009	0.0018	216.68	lb/hr	
945.82	**3.84E-02**	**7.67E-03**	**949.07**	**tpy**	

[1] Emission factors for NO_X, CO, PM and VOC are based on Tier II Final Emission Standards.

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on the heat rate.

Freeport-McMoRan Tyrone Inc.

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ENV-117 Diesel Pump

Unit Numbers:	ENV-117
Source description:	Diesel Powered Pump

Engine Horsepower and RPM

Sea level hp:	350	hp	Mfg data
	3	%	Per 1,000 ft above 4,000 ft
Elevation	5801	ft	
Derated hp:	331.09	hp	
Derated kW:	246.89	kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2000	lb/ton	
Conversion Factor	1.34	hp/kW	
Annual Hours of Operation	8760	hr	
Brake Specific Fuel Consumption	7000	Btu/hp-hr	AP-42 Section 3.3
Fuel Consumption			
Heat Rate	2.32	MMBtu/hr	Calculated
Diesel Heating Value	137,000	Btu/gal	From AP-42
Fuel Usage	16.92	gal/hr	Calculated
Fuel Usage	148,193	gal/yr	Calculated

Emission Calculations

NOx[1]	CO[1]	PM[1,2]	SO_2[3]		
5.44	0.67	0.21		g/hp-hr	Tier I Standards
			0.00205	lb/hp-hr	AP-42 Table 3.3-1
3.97	**0.49**	**0.15**	**0.68**	lb/hr	Hourly emission rate
17.40	**2.15**	**0.67**	**2.97**	tpy	Annual emission rate

VOC[1]	Total HAPs[4]	Formaldehyde			
0.30			g/hp-hr	Tier I Standards	
	3.42E-03	1.18E-03	lb/MMBtu	AP-42	
0.218	**0.0079**	**0.0027**	lb/hr	Hourly emission rate	
0.95	**0.035**	**0.0120**	tpy	Annual emission rate	

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Tables C-1 and C-2
163.1	0.0066	0.00132		lb/MMBtu	
1	25	298		Global Warming Potential	40 CFR 98 Table A-1
377.90	0.015	0.0031	379.19	lb/hr	
1655.19	**6.71E-02**	**1.34E-02**	**1660.87**	**tpy**	

[1] Emission factors for NO_X, CO, PM and VOC are based on Tier I Final Emission Standards.

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on the heat rate.

Freeport-McMoRan Tyrone Inc.

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Perkins 403C-15 32.5hp - Valencia Pit

Unit Numbers: OP-2

Engine Horsepower and RPM

Engine speed:	3,000.0	rpm	Mfg data
Sea level hp:	32.5	hp	Mfg data
	3.0	%	Per 1,000 ft above 4,000 ft
Elevation	5,801.0	ft	Google Earth
Derated hp:	30.74	hp	Calculated
Conversion Factor	1.34	hp/kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2,000.00	lb/ton	
Annual Hours of Operation	8,760.00	hr	
Fuel Rate	3.70	L/hr	Manufacturer Spec
Fuel Rate	0.98	gal/hr	Conversion

Fuel Consumption

Fuel heat value:	137,000.0	Btu/gal	AP-42
Heat Rate	0.13	MMBtu/hr	Calculated

Emission Calculations

Uncontrolled Emissions

NOx[1]	CO	PM[2]	SO_2[3]		
5.3	4.10	0.45		g/hp-hr	EPA Tier 2 Emission Standards
			0.00205	lb/hp-hr	AP-42 Table 3.3-1
0.36	**0.28**	**0.031**	**0.0630**	lb/hr	Hourly emission rate
1.58	**1.22**	**0.13**	**0.28**	tpy	Annual emission rate

VOC[4]	Total HAPs[5]	Toluene	Xylenes		
0.28				g/hp-hr	EPA Tier 2 Emission Standards
	3.42E-03	4.09E-05	2.85E-04	lb/MMBtu	AP-42
0.019	**4.58E-04**	**5.48E-06**	**3.82E-05**	lb/hr	Hourly emission rate
0.083	**2.01E-03**	**2.40E-05**	**1.67E-04**	tpy	Annual emission rate

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98
163.1	0.0066	0.00132		lb/MMBtu	
21.83	0.00089	0.00018		lb/hr	
95.63	**0.0039**	**0.00078**	**96.0**	**tpy**	

[1] Emission factor for NOx is assumed to be 95% of the EPA Tier 2 emission factor for NOx + NMHC

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$. The emission factor used is filterable plus condensable PM.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Emission factor for VOC is assumed to be 5% of the EPA Tier 2 emission factor for NOx + NMHC

[5] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on fuel rate and fuel heating value.

Exhaust Parameters			
Parameters	Value	Unit	Notes:
Exhaust Temperature	833.00	°F	Manufacture Spec
Exhaust Flow	2.5	scfm	Manufacture Spec
Stack Diameter	0.167	ft	Manufacture Spec
Stack height	1.5	ft	Manufacture Spec
Exhaust velocity	114.59	ft/s	Exhaust flow ÷ stack area

Freeport-McMoRan Tyrone Inc.

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Caterpillar C7 225hp - Little Rock Sumps

Unit Numbers:	OP-8
Source description:	1-6, 4 Stroke
Manufacturer:	Caterpillar
Model:	C7 Acert
Aspiration:	Turbocharged/ATAAC

Engine Horsepower and RPM

Engine speed:	2,200.0	rpm	Manufacturer data
Sea level hp:	225.0	hp	Manufacturer data
	3.0	%	Per 1,000 ft above 4,000 ft
Elevation	5,801.0	ft	Google Earth
Derated hp:	212.84	hp	Calculated
Conversion Factor	1.34	hp/kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2,000.00	lb/ton	
Annual Hours of Operation	8,760.00	hr	
Fuel Rate	47.00	L/hr	Manufacturer data
Fuel Rate	12.42	gal/hr	Conversion

Fuel Consumption

BSFC:	234.8	g/kW-hr	Manufacturer data
BSFC:	175.1	g/hp-hr	Manufacturer data
Fuel heat value:	137,000.0	Btu/gal	AP-42
Heat Rate	1.70	MMBtu/hr	Calculated

Emission Calculations

Uncontrolled Emissions

NO_x[1]	CO	PM^2	SO_2[3]		
2.9	2.60	0.15		g/hp-hr	EPA Tier 3 Emission Standards
			0.0021	lb/hp-hr	AP-42 Table 3.3-1
1.34	**1.22**	**0.070**	**0.4363**	lb/hr	Hourly emission rate
5.86	**5.34**	**0.31**	**1.91**	tpy	Annual emission rate

VOC[4]	Total HAPs[5]	Toluene	Xylenes		
0.15				g/hp-hr	EPA Tier 3 Emission Standards
	3.42E-03	4.09E-05	2.85E-04	lb/MMBtu	AP-42
0.074	**0.0058**	**6.96E-05**	**4.85E-04**	lb/hr	Hourly emission rate
0.33	**0.025**	**3.05E-04**	**2.12E-03**	tpy	Annual emission rate

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98
163.1	0.0066	0.00132		lb/MMBtu	
277.35	0.011	0.0023		lb/hr	
1214.81	**0.0493**	**0.0099**	**1219.0**	**tpy**	

[1] Emission factor for NOx is assumed to be 95% of the EPA Tier 3 emission factor for NOx + NMHC

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$. The emission factor used is filterable plus condensable PM.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Emission factor for VOC is assumed to be 5% of the EPA Tier 3 emission factor for NOx + NMHC

[5] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on fuel rate and fuel heating value.

Exhaust Parameters (F-factor method)			
Parameters	Value	Unit	Notes:
Heat Rate	1.70	MMBtu/hr	
Exhaust Temp (Tstk)	833	°F	Engineering Estimate
Site Elevation	5,801	ft MSL	Google Earth®
Ambient Pressure (Pstk)	24.1	in. Hg	Calculated based on elevation
F factor	10610	wscf/MMBtu	40 CFR 60 Appx A Method 19
Exhaust Flow	300.8	scfm	Calculated from F factor and heat rate
Exfaust Flow	927.8	acfm	scfm * (Pstd/Pstk)*(Tstk/Tstd), Pstd = 29.92 "Hg, Tstd = 520 °R
Stack Diameter	0.479	ft	Engineering Estimate
Stack height	1.583	ft	Engineering Estimate
Exhaust velocity	85.75	ft/s	Exhaust flow ÷ stack area

Freeport-McMoRan Tyrone Inc.
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Caterpillar C6.6 250hp - Little Rock Lined Pond

Unit Numbers:	ENV-120
Source description:	1-6, 4 Stroke
Manufacturer:	Caterpillar
Model:	C6.6 Acert
Aspiration:	Turbocharged/ATAAC

Engine Horsepower and RPM

Engine speed:	2,200.0	rpm	Mfg data
Sea level hp:	250.0	hp	Mfg data
	3.0	%	Per 1,000 ft above 4,000 ft
Elevation	5,801.0	ft	
Derated hp:	236.49	hp	
Conversion Factor	1.34	hp/kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2,000.00	lb/ton	
Annual Hours of Operation	8,760.00	hr	
Fuel Rate	43.08	L/hr	Estimated
Fuel Rate	11.38	gal/hr	

Fuel Consumption

Fuel heat value:	137,000.0	Btu/gal	AP-42
Heat Rate	1.56	MMBtu/hr	Calculated

Emission Calculations

Uncontrolled Emissions

NOx[1]	CO	PM[2]	SO_2[3]		
2.9	2.60	0.15		g/hp-hr	EPA Tier 3 Emission Standards
			0.00205	lb/hp-hr	AP-42 Table 3.3-1
1.49	**1.36**	**0.08**	**0.485**	lb/hr	Hourly emission rate
6.51	**5.94**	**0.34**	**2.12**	tpy	Annual emission rate

VOC[4]	Total HAPs[5]	Toluene	Xylenes		
0.15				g/hp-hr	EPA Tier 3 Emission Standards
	3.42E-03	4.09E-05	2.85E-04	lb/MMBtu	AP-42
0.078	**0.0053**	**6.38E-05**	**4.44E-04**	lb/hr	Hourly emission rate
0.34	**0.023**	**2.79E-04**	**1.95E-03**	tpy	Annual emission rate

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98
163.1	0.0066	0.00132		lb/MMBtu	
254.24	0.010	0.0021		lb/hr	
1113.58	**0.0452**	**0.0090**	**1117.4**	**tpy**	

[1] Emission factor for NOx is assumed to be 95% of the EPA Tier 3 emission factor for NOx + NMHC

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$. The emission factor used is filterable plus condensable PM.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Emission factor for VOC is assumed to be 5% of the EPA Tier 3 emission factor for NOx + NMHC

[5] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on fuel rate and fuel heating value.

Exhaust Parameters (F-factor method)			
Parameters	Value	Unit	Notes:
Heat Rate	1.56	MMBtu/hr	
Exhaust Temp (Tstk)	833	°F	Engineering Estimate
Site Elevation	5,801	ft MSL	Google Earth®
Ambient Pressure (Pstk)	24.1	in. Hg	Calculated based on elevation
F factor	10610	wscf/MMBtu	40 CFR 60 Appx A Method 19
Exhaust Flow	275.7	scfm	Calculated from F factor and heat rate
Exfaust Flow	850.5	acfm	scfm * (Pstd/Pstk)*(Tstk/Tstd), Pstd = 29.92 "Hg, Tstd = 520 °R
Stack Diameter	0.333	ft	Engineering Estimate
Stack height	3.416	ft	Engineering Estimate
Exhaust velocity	162.42	ft/s	Exhaust flow ÷ stack area

Freeport-McMoRan Tyrone Inc.

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Caterpillar C9 225hp - 6P Pond

Unit Numbers:	SD-1
Source description:	1-6, 4 Stroke
Manufacturer:	Caterpillar
Model:	C9 Acert
Aspiration:	Turbocharged/ATAAC

Engine Horsepower and RPM

Engine speed:	2,200.0	rpm	Mfg data
Sea level hp:	225.0	hp	Mfg data
	3.0	%	Per 1,000 ft above 4,000 ft
Elevation	5,801.0	ft	Google Earth
Derated hp:	212.84	hp	Calculated
Conversion Factor	1.34	hp/kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2,000.00	lb/ton	
Annual Hours of Operation	8,760.00	hr	
Fuel Rate	57.44	L/hr	Estimated
Fuel Rate	15.18	gal/hr	

Fuel Consumption

Fuel heat value:	137,000.0	Btu/gal	AP-42
Heat Rate	2.08	MMBtu/hr	Calculated

Emission Calculations

Uncontrolled Emissions

NO_x[1]	CO	PM^2	SO_2[3]		
2.9	2.60	0.15		g/hp-hr	EPA Tier 3 Emission Standards
			0.0021	lb/hp-hr	AP-42 Table 3.3-1
1.34	**1.22**	**0.07**	**0.44**	lb/hr	Hourly emission rate
5.86	**5.34**	**0.31**	**1.91**	tpy	Annual emission rate

VOC[4]	Total HAPs[5]	Toluene	Xylenes		
0.15				g/hp-hr	EPA Tier 3 Emission Standards
	3.42E-03	4.09E-05	2.85E-04	lb/MMBtu	AP-42
0.070	**0.0071**	**8.50E-05**	**5.93E-04**	lb/hr	Hourly emission rate
0.31	**0.031**	**3.72E-04**	**2.60E-03**	tpy	Annual emission rate

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98
163.1	0.0066	0.00132		lb/MMBtu	
338.99	0.014	0.0028		lb/hr	
1484.77	**0.0602**	**0.0120**	**1489.9**	**tpy**	

[1] Emission factor for NOx is assumed to be 95% of the EPA Tier 2 emission factor for NOx + NMHC

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$. The emission factor used is filterable plus condensable PM.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Emission factor for VOC is assumed to be 5% of the EPA Tier 2 emission factor for NOx + NMHC

[5] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on fuel rate and fuel heating value.

Exhaust Parameters (F-factor method)			
Parameters	Value	Unit	Notes:
Heat Rate	2.08	MMBtu/hr	
Exhaust Temp (Tstk)	833	°F	Engineering Estimate
Site Elevation	5,801	ft MSL	Google Earth®
Ambient Pressure (Pstk)	24.1	in. Hg	Calculated based on elevation
F factor	10610	wscf/MMBtu	40 CFR 60 Appx A Method 19
Exhaust Flow	367.6	scfm	Calculated from F factor and heat rate
Exfaust Flow	1133.9	acfm	scfm * (Pstd/Pstk)*(Tstk/Tstd), Pstd = 29.92 "Hg, Tstd = 520 °R
Stack Diameter	0.417	ft	Engineering Estimate
Stack height	3.5	ft	Engineering Estimate
Exhaust velocity	138.60	ft/s	Exhaust flow ÷ stack area

Freeport-McMoRan Tyrone Inc.

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Caterpillar C9 225hp - San Salvador

Unit Numbers:	SD-2
Source description:	1-6, 4 Stroke
Manufacturer:	Caterpillar
Model:	C9 Acert
Aspiration:	Turbocharged/ATAAC

Engine Horsepower and RPM

Engine speed:	2,200.0	rpm	Mfg data
Sea level hp:	225.0	hp	Mfg data
	3.0	%	Per 1,000 ft above 4,000 ft
Elevation	5,801.0	ft	Google Earth
Derated hp:	212.84	hp	Calculated
Conversion Factor	1.34	hp/kW	
Conversion Factor	0.0022	g/lb	
Conversion Factor	2,000.00	lb/ton	
Annual Hours of Operation	8,760.00	hr	
Fuel Rate	57.44	L/hr	Estimated
Fuel Rate	15.18	gal/hr	

Fuel Consumption

Fuel heat value:	137,000.0	Btu/gal	AP-42
Heat Rate	2.08	MMBtu/hr	Calculated

Emission Calculations

Uncontrolled Emissions

NO_x[1]	CO	PM^2	SO_2[3]		
2.9	2.60	0.15		g/hp-hr	EPA Tier 3 Emission Standards
			0.0021	lb/hp-hr	AP-42 Table 3.3-1
1.34	**1.22**	**0.07**	**0.4363**	lb/hr	Hourly emission rate
5.86	**5.34**	**0.31**	**1.91**	tpy	Annual emission rate

VOC[4]	Total HAPs[5]	Toluene	Xylenes		
0.15				g/hp-hr	EPA Tier 3 Emission Standards
	3.42E-03	4.09E-05	2.85E-04	lb/MMBtu	AP-42
0.070	**0.0071**	**8.50E-05**	**5.93E-04**	lb/hr	Hourly emission rate
0.31	**0.031**	**3.72E-04**	**2.60E-03**	tpy	Annual emission rate

CO_2	**CH_4**	**N_2O**	**CO_2e**		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98
163.1	0.0066	0.00132		lb/MMBtu	
338.99	0.014	0.0028		lb/hr	
1484.77	**0.0602**	**0.012**	**1489.9**	**tpy**	

[1] Emission factor for NOx is assumed to be 95% of the EPA Tier 2 emission factor for NOx + NMHC

[2] It is assumed that TSP = PM_{10} = $PM_{2.5}$. The emission factor used is filterable plus condensable PM.

[3] Sulfur content is taken from AP-42 Table 3.3-1

[4] Emission factor for VOC is assumed to be 5% of the EPA Tier 2 emission factor for NOx + NMHC

[5] Total HAPs are based on EPA AP-42 Table 3.3.2 and are calculated based on fuel rate and fuel heating value.

Exhaust Parameters (F-factor method)			
Parameters	Value	Unit	Notes:
Heat Rate	2.08	MMBtu/hr	
Exhaust Temp (Tstk)	833	°F	Engineering Estimate
Site Elevation	5,801	ft MSL	Google Earth®
Ambient Pressure (Pstk)	24.1	in. Hg	Calculated based on elevation
F factor	10610	wscf/MMBtu	40 CFR 60 Appx A Method 19
Exhaust Flow	367.6	scfm	Calculated from F factor and heat rate
Exfaust Flow	1133.9	acfm	scfm * (Pstd/Pstk)*(Tstk/Tstd), Pstd = 29.92 "Hg, Tstd = 520 °R
Stack Diameter	0.417	ft	Engineering Estimate
Stack height	3.5	ft	Engineering Estimate
Exhaust velocity	138.60	ft/s	Exhaust flow ÷ stack area

Freeport-McMoRan Tyrone Inc.
Feb-20

Nordberg Engines and CE-1 Greenhouse Gas Calculations

Unit Numbers: PPG-1, 3, 4, 7, 8, 11-15; CE-1
Source description: Dual fire engines; Diesel cold-start engine

Nordberg Engines Units PPG-1, 3, 4, 7, 8, 11-15

Hours of Operation	3000	Maximum annual hours of operation for all engines	
Horsepower	3090	hp	
Fuel Usage	7,500	Btu/hp-hr	For dual fire scenario, from US Department of Interior
Heat Rate	23.2	MMBtu/hr	
Number of engines	10		

Total Emissions

Diesel

CO_2	CH_4	N_2O	CO_2e		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Subpart C
163.1	0.0066	0.00132		lb/MMBtu	
5668.15	**0.23**	**0.046**	**5687.60**	**tpy**	

Dual-Fired

CO_2	CH_4	N_2O	CO_2e		
53.06	0.001	0.0001		kg/MMBtu	40 CFR 98 Subpart C
117.0	0.0022	0.00022		lb/MMBtu	
4066.42	0.077	0.0077	4070.62	tpy	

Maximum

CO_2	CH_4	N_2O	CO_2e	
5668.15	**0.23**	**0.05**	**5687.60**	**tpy**

Diesel Cold-Start Engine Unit CE-1

Hours of Operation	500	Maximum annual hours of operation
Horsepower	1000	hp
Fuel Usage	158	gal/hr
Fuel Heating Value	137000	Btu/gal
Heat Rate	21.6	MMBtu/hr

CO_2	CH_4	N_2O	CO_2e		
73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Subpart C
163.1	0.0066	0.0013		lb/MMBtu	
882.37	**0.036**	**0.0072**	**885.39**	**tpy**	

	CO_2	CH_4	N_2O	
GWP	1	25	298	Table A-1 of 40 CFR 98 Subpart A

Section 7

Information Used To Determine Emissions

Information Used to Determine Emissions shall include the following:

- ☑ If manufacturer data are used, include specifications for emissions units and control equipment, including control efficiencies specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.
- ☐ If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.
- ☑ If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.
- ☐ If an older version of AP-42 is used, include a complete copy of the section.
- ☑ If an EPA document or other material is referenced, include a complete copy.
- ☐ Fuel specifications sheet.
- ☐ If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

This section describes the information used to determine emissions for the units which were updated as part of this permit application. Calculations for all other emission sources are included in this section for informational purposes. These calculations have remained the same since permit NSR 2448-M4 was issued.

Mine Fugitives (Blasting)

- "NOx Emissions from Blasting Operations in Open-Cut Coal Mining" by Moetaz I. Attalla, Stuart J. Day, Tony Lange, William Lilley, and Scott Morgan (2008).
- "Factors Affecting Anfo Fumes Production" by James H. Rowland III and Richard Mainiero (2001)
- AP-42 Table 11.9-1
- 40 CFR 98 Subpart C, Tables C-1 and C-2

Mine Fugitives (Handling)

- AP-42 Chapter 11.19.2

Mine Fugitives (Hauling)

- AP-42 Section 13.2.2
- NMED memo: “Department Accepted Values for: Aggregate Handling, Storage Pile, and Haul Road Emissions”
- Western Regional Air Partnership (WRAP) Fugitive Dust Handbook, September 7, 2006

Mine Fugitives (Stockpiles)

- AP-42 Section 13.2.4

Generator Engines (Units OP-4, OP-7, EMP-1, EMP-2, and ENV-117)

- AP-42 Tables 3.3-1 and 3.3-2
- Tier I, II, and III Final Emission Standards

Gasoline Dispensing Facilities (Units GDF1 and GDF2)

- Tanks 4.09d

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NO_x emissions from blasting operations in open-cut coal mining

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ABSTRACT

The Australian coal mining industry, as with other industries is coming under greater constraints with respect to their environmental impacts. Emissions of acid gases such as NO_x and SO_x to the atmosphere have been regulated for many years because of their adverse health effects. Although NO_x from blasting in open-cut coal mining may represent only a very small proportion of mining operations' total NO_x emissions, the rapid release and high concentration associated with such activities may pose a health risk. This paper presents the results of a new approach to measure these gas emissions by scanning the resulting plume from an open-cut mine blast with a miniaturised ultraviolet spectrometer. The work presented here was undertaken in the Hunter Valley, New South Wales, Australia during 2006. Overall this technique was found to be simpler, safer and more successful than other approaches that in the past have proved to be ineffective in monitoring these short lived plumes. The average emission flux of NO_x from the blasts studied was about 0.9 kt t^{-1} of explosive. Numerical modelling indicated that NO_x concentrations resulting from the blast would be indistinguishable from background levels at distances greater than about 5 km from the source.

1. Introduction

Open-cut coal mining is widespread in the upper Hunter Valley in New South Wales (NSW) with several large mines operating within close proximity to the towns of Muswellbrook and Singleton. Consequently, there is community concern about the potential environmental impacts of mining on nearby populations.

Blasting, in particular, has the potential to affect areas outside the mine boundary and accordingly, vibration and dust emission limits are set in each mine's environmental licence. However, gaseous emissions of environmental concern, such as nitrogen dioxide (NO_2) may also be released during blasting operations. Currently, there are very little quantitative data relating to the magnitude of these emissions and it is not yet possible to determine if they contribute significantly to ambient levels in the main population centres.

The explosive ammonium nitrate/fuel oil (ANFO) is used almost universally throughout the open-cut coal mining industry. Under ideal conditions, the only gaseous products from the explosion are carbon dioxide (CO_2), water (H_2O) and nitrogen (N_2).

$$3NH_4NO_3 + CH_2 \rightarrow 3N_2 + CO_2 + 7H_2O \quad (1)$$

However, even quite small changes in the stoichiometry (either in the bulk material or caused by localised conditions such as moisture in the blast hole, mineral matter or other factors) can lead to the formation of substantial amounts of the toxic gases carbon monoxide (CO) and nitric oxide (NO) as shown.

$$2NH_4NO_3 + CH_2 \rightarrow 2N_2 + CO + 5H_2O \quad (2)$$

$$5NH_4NO_3 + CH_2 \rightarrow 4N_2 + 2NO + CO_2 + 7H_2O \quad (3)$$

In addition, some of the NO formed may oxidise in the presence of oxygen (O_2) to produce NO_2.

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$$2NO + O_2 \rightarrow 2NO_2 \quad (4)$$

Often in practice, large quantities of NO_2 are released from blasts which are observed as intense orange plumes.

Although these gases are not considered in their environmental licences, each mine is required to estimate annual emissions of CO, NO_x and SO_2 for the National Pollutant Inventory (NPI), compiled each year by the Australian government. These estimates are made by multiplying the amount of explosive consumed by an emission factor which is currently 8 kg t^{-1} for NO_x, 34 kg t^{-1} for CO and 1 kg t^{-1} for SO_2 (National Pollutant Inventory, 1999). These emission factors, however, are based on limited overseas data and are subject to high uncertainty.

Most of the studies which have examined NO_x formation from blasting have used blast chambers. The results from these studies do not necessarily correlate with what is observed during actual blasts. Few studies have attempted to measure NO_x emissions under actual field conditions, presumably because of the practical difficulties involved. Plumes from blasting lack confinement, can be very large in size and are affected by prevailing weather conditions. There is also a large quantity of dust associated with the blast and these factors combine to make physical sampling of the plume very difficult. There are also the obvious safety implications which restrict access to blast sites. Consequently, quantitative measurements of plume characteristics are generally unavailable. Nevertheless, it is important for mine operators, particularly when their operations are close to residential areas, to have some method for assessing NO_x formation and more importantly, predicting the severity of the NO_x plume. At present predictions of NO_x formation are subjective and are based on the blast engineer's knowledge of the area to be blasted (e.g. rock type, area of the mine, presence of water in the holes, etc.) and the ratings obtained from blasts performed under similar conditions. Quantitative flux estimations of NO_x released from a blast require measurement of concentration through the plume in both the horizontal and vertical axes.

Some of the options available to make these measurements are given in the following sections.

1.1. Physical sampling

Sampling of blasting fumes involves taking a sample of gas from the plume for subsequent analysis, which could be either on site or in an off site laboratory. Although physical sampling could in principle provide sufficient information to characterise a plume, there are a number of serious logistical problems with this approach:

- The size of the plume means that a large number of sample points would be required to sample across the width and height of the plume.
- The force of the explosion and the resulting debris would restrict the proximity of any sampling packages to the initial gas release.
- The potential toxicity of the plume; personnel cannot move through it to take samples, hence sampling stations must be fixed prior to the blast. This means that the path of the plume must be anticipated before the blast.

1.2. Continuous analysis

Another option is to use portable analysers to measure NO_x concentrations in real time. There are, however, disadvantages with this approach since a sample of the plume must be presented to the instrument for analysis. Usually a pump draws air through a small diameter tube into the instrument, but to achieve the necessary spatial characterisation of the plume, sample tubes would need to be positioned at various points throughout the plume. Thus many of the problems identified for the physical sampling would also apply to the use of continuous analysers.

1.3. Optical methods

There are several optical methods of analysis currently available that may be applicable to field measurements of NO_x. These include open-path Fourier Transform Infra-Red Spectroscopy (FT-IR), Correlation Spectroscopy (COSPEC) and Differential Optical Absorption Spectroscopy (DOAS). FT-IR has often been used in air pollution studies (e.g. Levine and Russwurm, 1994). It has also been used in mine situations to measure fugitive methane emissions. Kirchgessner et al. (1993) used open-path FT-IR (op-FT-IR) to estimate methane emissions from open-cut coal mines in the United States. The technique relies on passing a collimated infrared beam through ambient air over a path length of up to several hundred metres. In the Kirchgessner et al. (1993) study, the concentration of methane across the plume was measured then wind speed data and a Gaussian plume dispersion model were used to estimate the methane emission rate from the mine. These authors subsequently developed a modification of their method which improved its accuracy (Piccot et al., 1994, 1996). The improved method was essentially the same as described above except that methane concentrations were measured at several elevations to better characterise the plume.

In principle, open-path FT-IR could be used to measure NO_x in blast plumes since it is sensitive to NO, NO_2, and CO along with other gases. Infrared radiation is also strongly absorbed in many parts of the spectrum by both CO_2 and water which are very likely to be present in high concentrations in blast plumes and this may tend to obscure the NO_x signal. High resolution instruments may resolve at least some of the NO_x absorption lines, however, a more serious drawback with op-FT-IR is that the infrared beam would be substantially attenuated by the dust thrown up by the blast. In the period immediately after the blast when the dust level is very high it is likely that the IR beam would be completely blocked thus making measurements impossible.

Another well established optical method is Correlation Spectroscopy (COSPEC). The system was first described by Moffat and Milan (1971) and was designed to measure point source emissions of SO_2 and NO_2 from industrial plants but found a niche application in the measurement of SO_2 fluxes from volcanoes (Galle et al., 2002). The COSPEC system utilises a "mask correlation" spectrometer and was designed to measure vertical or slant columns using

sky-scattered sunlight. By traversing beneath plumes with the mobile instrument, the concentration of the column is calculated and, once multiplied by the plume velocity, produces a source emission rate. These instruments are limited to detecting only those species where masks are available. They also suffer from interferences from other atmospheric gases and light scattering from clouds or aerosols that can produce errors in column densities (Chalmers Radio and Space Science, website).

The DOAS technique is a relatively new technique that is gaining widespread acceptance as an air pollution monitoring method. Like the open-path FT-IR method, the DOAS can simultaneously measure concentrations of a number of species over path lengths which typically range from hundreds of metres to kilometres.

A DOAS, configured as an 'active system', Fig. 1, has three main parts – a light emitter, a light receiver and a spectrometer. The emitter sends a beam of light to the receiver (in some cases the emitter and receiver are contained in the same unit and the light beam is reflected off a remotely located passive reflector). The light beam contains a range of wavelengths, from ultraviolet to visible, although instruments are now available with an infrared source, which extends the range of compounds that can be detected. Different pollutant molecules absorb light at different wavelengths along the path between the emitter and receiver. The receiver is connected to the spectrometer which measures the intensity of the different wavelengths over the entire light path and through the data system converts this signal into concentrations for each of the species being monitored.

DOAS instruments are routinely used to measure SO_2, NO_2 and O_3.

More recently, advances in miniaturising UV–vis spectrometers has lead to the development of much more compact DOAS units, configured as a passive system (Fig. 1), which have come to be known as "mini-DOAS". The mini-DOAS system has so far been used mainly in the study of SO_2 fluxes in volcanic emissions (McGonigle et al., 2003).

2. Methodology

2.1. Field measurements

A portable DOAS (mini-DOAS) manufactured by Resonance Ltd was used in this study. The instrument covers a spectral range of 280–420 nm and can measure sub-part per million levels of NO_2 and SO_2. The unit, which comprises a telescope, scanning mirrors, calibration cells and a miniature CCD array spectrometer (Ocean Optics USB2000 spectrometer), is housed in a small package which is mounted on a tripod. Calibration of the instrument was carried out using the internal calibration cell. The concentration of the cell was equivalent 50 ppm m. No SO_x measurements were undertaken.

Data collection and processing were performed by Ocean Optics OOIBase32 software loaded in a laptop computer. This results in a more compact system that is easier to deploy at mine sites and provides greater flexibility in positioning the instrument in relation to the blast plume.

Prior to each monitored blast, a dark spectrum was collected by blocking light from entering the spectrometer and a scan was performed. To produce a reference spectrum, a further scan was performed in a clear sky background which contained background absorption from NO_2. The reference spectrum was required in order to determine the increase in concentration of NO_2 above ambient levels in the blast plumes.

The plume resulting from each blast was tracked with the spectrometer until the NO_2 concentration was indistinguishable from the surrounding sky. During each field measurement, the mini-DOAS and a video camera were positioned a safe operating distance from the blast at all times.

NO_2 concentrations in the plume were calculated by subtracting the dark spectrum from the measured spectrum and the reference spectrum using the supplied software.

The results obtained from the mini-DOAS are a path-averaged NO_2 concentration profile measured in units of parts per million metre (ppm m). The mini-DOAS results must be divided by the path length through the plume to yield a concentration. To estimate the amount of NO_2 released from each blast it was necessary to multiply the concentration by the volume of the plume. Hence it was necessary to estimate the dimensions of each plume.

All of the blasts monitored were video-taped using at least one, and sometimes two, video recorders. The distances between the cameras and the blast were measured by locating their positions with a handheld GPS receiver.

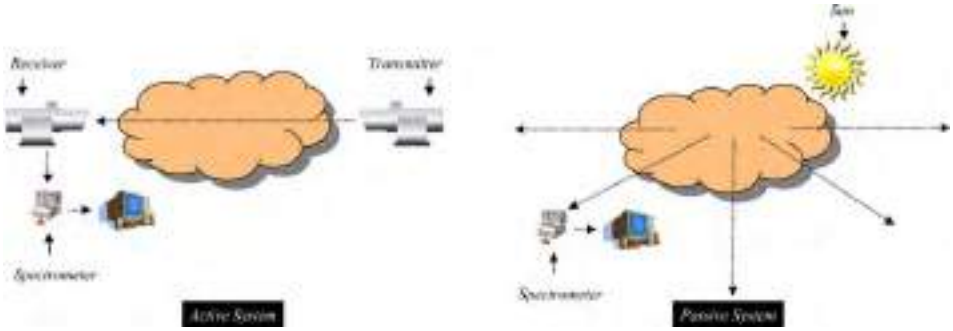

Fig. 1. Schematic diagram of DOAS systems operating in both active and passive modes.

Wind speed and directional data used to plot the directional path of the plume were obtained from a series of meteorological stations located around the mining lease. Simple trigonometry was employed to determine the distance from the video camera to the plume at the corresponding time intervals.

A rudimentary method of photogrammetry was then used to estimate the size of the plume based on still images extracted from the videos. Ratios of the plume to picture size in both the vertical and horizontal planes were made.

Once the plume to camera distance and the constraining angle for the plume is known, a crude three-dimensional estimate of the plume dimension was calculated using basic trigonometric functions. An example of the dimensions determined for a plume using this method is shown in Fig. 2.

Ground level measurements were carried out using a Greenline 8000 portable gas analyser. This instrument is capable of continuous, simultaneous analysis of O_2, CO_2, CO, SO_2, NO and NO_2. It is battery powered and can operate unattended for up to about 2 h. The instrument was calibrated against a standard gas mixture before each use. Data were logged on a laptop computer connected to the instrument.

For each experiment, the instrument was set up downwind of the blast in a location where the plume was expected to pass, but far enough away to avoid flying debris. The inlet probe was fixed at about 2 m above ground level.

It must be noted that selecting an appropriate location for the instrument was often difficult. In many cases, the wind conditions were quite variable, especially within the pit so it was not always possible to correctly anticipate the path of the blast plume. As well, the layout of the mine pit and safety considerations imposed constraints on where the instrument could be placed. Because of these problems, the plumes from many of the blasts did not pass over the analyser and data was not recorded.

2.2. Modelling

A simple modelling exercise was undertaken for this study to determine if the release of NO_2 from a blast could be of detriment to persons exposed to the plume within 5 km of the release. The results of this study are indicative and based on the assumption that the model used is appropriate. Modelling generally relies on local observational data to confirm the performance of the model. The difficulty in measuring emissions from mining blasts has meant that in this case the model is used as an indicator relying on the verifications used in the development of the chosen model. For this reason we have modelled concentrations directly downwind of theoretical blasts with AFTOX (Kunkel, 1991), a USEPA approved dispersion model (http://www.epa.gov/scram001/dispersion_alt.htm#aftox). The original DOS based QuickBasic code was transformed into Excel macros to enable many scenarios to be run.

AFTOX is a Gaussian Puff model developed for the United States Air Force to assess real time toxic chemical releases. The model uses information from US Air Weather Service (AWS) stations to calculate dispersion based on measured atmospheric conditions. As for all Gaussian models, the spread of pollutants is governed by dispersion coefficients in the horizontal (σ_y) and vertical (σ_z) directions. These coefficients depend on the atmospheric stability derived from the AWS data. In this study, the scenarios were modelled by predefining the wind speed and atmospheric stability classes. The wind speeds modelled ranged from very low (0.5 m s^{-1}) to moderate (10 m s^{-1}). Stability was modelled in six steps representing the standard Pasquill-Gifford stability classes, i.e. A–F, where A, B and C represent unstable conditions (where A is the most unstable), D is neutral and E and F are stable conditions. These stability classes are used to categorise the rate at which a plume will disperse. Unstable conditions might be found on a sunny day with light winds leading to rapid plume dispersion while the stable conditions may occur in clear skies with light winds and perhaps a temperature inversion present. Plume spread is slow in these circumstances.

AFTOX is operated by assuming an emission release from a single location. The emissions can be either continuous or instantaneous. In this study AFTOX was used to describe an area source by representing it as a large number of individual points. The area of the emission (i.e. the area over which the explosives were distributed) was

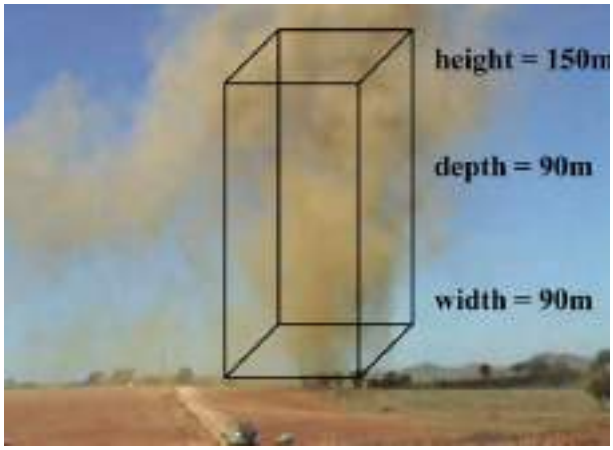

Fig. 2. Blast plume with estimated dimensions.

assumed to be 100 m × 200 m based upon sizes commonly observed during the field measurements. The area was subdivided into 10 m × 10 m units. Each square was represented by a point source with its source at the centre. In total, the area was modelled as 231 separate point sources (see Fig. 3). The total flux of emissions for the source was set at 100 kg. To estimate the maximum concentration and pollutant exposure values, the values should be multiplied by an appropriate scaling factor.

One hundred and twenty scenarios were modelled in which the 100 kg of emissions were spread randomly throughout the source area. A multi-stage process was employed for this task. In the first step, the total maximum number of points emitting was determined. This was defined by a random number between 20% and 80% of the maximum number of sources (in this case 231). The range chosen was an estimate from the portion of blasts that appeared to fume in conditions witnessed during this study. The total emission was then divided by this number. Each portion of the total emission was then placed randomly within the emission area. This process allowed certain points to receive multiple portions of the total emissions enabling the formation of hot spots. An example of one emission grid (Scenario 1 of 120) is displayed in Fig. 4.

Concentrations were determined for each of the 120 emission scenarios at distances of 200 m, 300 m, 400 m, 500 m, 750 m, 1 km, 1.25 km, 1.5 km, 2 km, 2.5 km, 3 km, 4 km and 5 km from the origin of the source. A concentration was determined for a number of discrete times that encompassed the complete plume travelling past the receptor. Further the concentrations were determined at 21 locations 10 m apart in a plane parallel and directly downwind of the source area (see Fig. 3). An average concentration from each of the receptors was determined; in this case with N equal to 21.

$$C^{*} = \frac{1}{N}\sum_{i=1}^{N} C_i \tag{5}$$

The average for each scenario was then used to create an ensemble average and standard deviation for the entire run (i.e. $N = 120$).

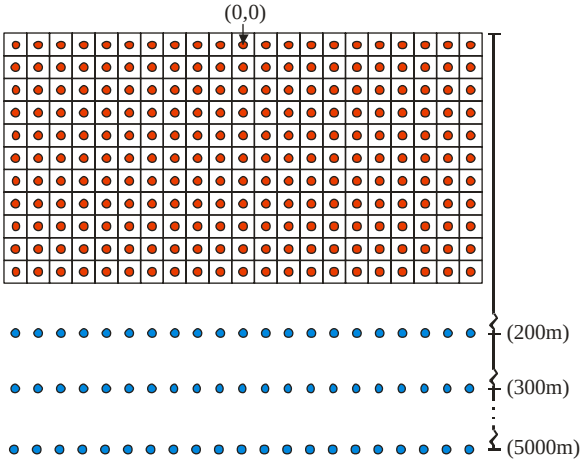

Fig. 3. Emission grid and receptor array setup.

$$\overline{C} = \frac{1}{N}\sum_{j=1}^{N} C_j^{*} \tag{6}$$

$$\sigma_{\overline{C}} = \frac{1}{N}\sum_{j=1}^{N}\left(C_j^{*} - \overline{C}\right)^2 \tag{7}$$

$$C_{\max} = \max_{k=1}^{N}[\overline{C}_k] \tag{8}$$

A dosage expressed in ppm s was determined from the times when the ensemble average plume travelled past the receptors located at each distance downwind of the source. Again N represents each discrete time step (dt) where $C' \neq 0$.

$$C_{\text{dose}} = \sum_{k=1}^{N}(\overline{C}_k)\mathrm{d}t \tag{9}$$

The relative variation for the dosage is provided by similarly treating the ensemble standard deviation.

$$\sigma_{\text{dose}} = \sum_{k=1}^{N}(\sigma_{\overline{C}k})\mathrm{d}t \tag{10}$$

3. Results and discussion

3.1. Field measurements

Plume measurements were made using the mini-DOAS spectrometer at two open-cut mine sites located in the Hunter Valley. The combination of the spectral analysis and the plume estimation technique allowed for NO_2 concentration and mass flux estimates to be made remotely, totally eliminating the requirement of physical sampling.

An example of the spectral output produced by the mini-DOAS is shown in Fig. 5. The spectral output consists of the NO_2 concentration (ppm m) as a function of time. The figure also contains a series of photographs depicting the formation of a blast plume at time intervals of 70, 110, 163, 250 and 350 s post-blast initiation. It is worth noting the change in intensity of the colour of plume and size as a function of time.

Reliable concentration measurements with the mini-DOAS may only be made when the spectrometer is aimed into a sky background above the horizon from the point of observation. In this example, a peak concentration of 580 ppm m was achieved in 163 s post-blast initiation (third image from the left). At this time the plume has risen above the horizon from the point of observation. The plume to mini-DOAS distance at this stage is approximately 500 m, with an estimated plume depth of 105 m. This results in a NO_2 concentration of 5.6 ppm at that particular stage of the plumes' dispersion.

After 350 s, the plume is barely visible and is now estimated to be approximately 650 m from the mini-DOAS unit. The plume depth has increased to 125 m with

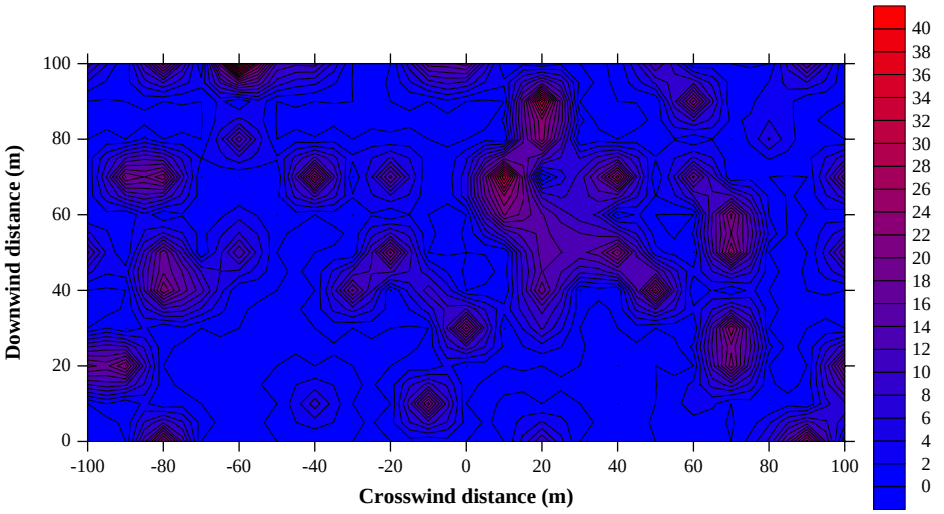

Fig. 4. Example of emission grid for 1 of the 120 scenarios modelled (the scale on the right hand side refers to NO_2 concentration in ppm).

a corresponding increase in plume volume by a factor of two. This expansion of the plume corresponds to a decrease in NO_2 concentration to 2.8 ppm.

At 360 s the plume was no longer visible to the eye and was lost for a short period of time to the mini-DOAS. This, however, was rectified with scanning of the sky with the spectrometer until the invisible plume was tracked for a further period.

Results for all plumes monitored during field work at both mine sites are given in Table 1. The table gives the peak NO_2 concentration as measured by the mini-DOAS above the horizon. Also given in the table is the plume volume at peak concentration and the calculated mass of NO_2 released from the blast. The mass of ANFO typically used in a blast was on average 210 tonnes, ranging from 60 to 565 tonnes. The explosive was distributed over an area of typically 200 m × 100 m containing approximately 200 bole holes with 200 mm diameter and to a depth of 25 m.

From the table the maximum NO_2 concentrations were found to range from 0 to about 7 ppm. This range of concentrations translated to 0–63.3 kg of NO_2 in the plume. However, no correlation can be made between blast charge and NO_2 levels.

During the measurements with the mini-DOAS ground level measurements were also carried out using a portable combustion gas analyser (Greenline 8000) to augment the airborne measurements made by the mini-DOAS. For NO_2 the ground level measures were higher than those observed using the mini-DOAS at higher altitudes. When the results of both measurement methods were applied to

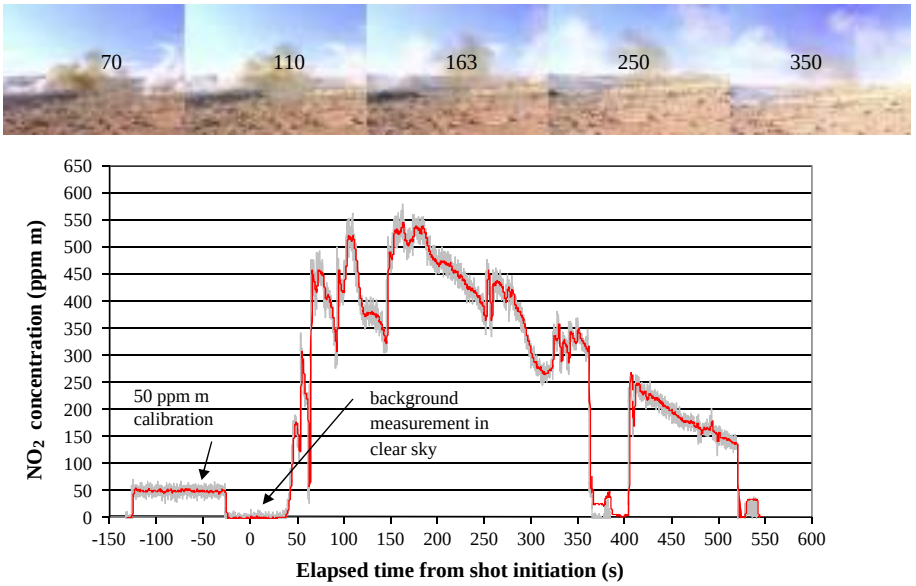

Fig. 5. Typical NO_2 spectrum demonstrating plume colour characteristics relative to concentration level.

Table 1
Through plume measurement results

Date	Total ANFO charge (t)	Peak NO_2 Conc (ppm)	Plume volume ($m^3 \times 10^{-6}$)	Mass of NO_2 (kg)	Emission flux (kg t^{-1} ANFO)		
					NO	NO_2	NO_x
12/12/2005	281	3.7	1.4	9.9	0.5	0.03	0.6
13/12/2005	150	0.4	5.3	3.7	0.4	0.03	0.4
14/12/2005	119	0.0	0.0	0.0	0.0	0.00	0.0
21/12/2005	229	1.0	4.4	7.9	0.6	0.04	0.6
22/12/2005	211	0.0	0.0	0.0	0.0	0.00	0.0
23/12/2005	222	0.0	0.0	0.0	0.0	0.00	0.0
5/01/2006	177	1.0	0.2	0.4	0.0	0.00	0.0
6/01/2006	275	1.1	15.3	30.6	1.8	0.12	1.9
12/01/2006	225	1.6	6.2	18.3	1.3	0.08	1.4
18/01/2006	169	1.3	1.7	0.2	0.4	0.02	0.4
23/01/2006	139	2.1	4.2	16.7	1.9	0.12	2.0
25/01/2006	155	0.4	4.4	2.9	0.3	0.02	0.4
30/01/2006	132	0.7	5.3	7.1	0.8	0.05	0.9
22/02/2006	224	0.0	0.00	0.0	0.0	0.00	0.0
1/03/2006	194	1.6	20.6	63.3	5.0	0.32	5.3
12/05/2006	362	6.5	1.9	23.3	1.0	0.06	1.1
15/05/2006	131	0.3	3.2	1.7	0.2	0.01	0.2
19/05/2006	168	0.0	0.00	0.0	0.0	0.00	0.0
30/05/2006	100	0.8	0.00	1.0	0.0	0.00	0.0
1/06/2006	365	0.7	3.5	4.9	0.2	0.01	0.2
6/06/2006	145	0.8	11.5	17.5	1.9	0.12	2.0
15/06/2006	60	0.0	0.00	0.0	0.0	0.00	0.0
26/06/2006	254	4.3	0.3	2.1	0.1	0.01	0.2
27/06/2006	212	5.6	0.9	10.0	0.7	0.04	0.7
28/06/2006	241	0.0	0.00	0.0	0.0	0.00	0.0
6/07/2006	565	2.8	2.7	14.0	0.4	0.03	0.4
13/07/2006	184	7.0	1.0	12.6	1.1	0.07	1.2

dispersion modelling techniques strong agreement was observed.

Point measurements which were made on Greenline 8000 indicated that a loose relationship existed between NO and NO_2 concentration. Although a strong correlation was not found, there is a general trend of increasing NO_2 with increasing NO. It was generally found that the relative proportion of NO to NO_2 from our data set was 27 to 1. This

Table 2
Maximum calculated NO_2 concentrations downwind of source

	200 m	300 m	400 m	500 m	750 m	1000 m	1250 m	1500 m	2000 m	2500 m	3000 m	4000 m	5000 m
WSPD = 0.5 m s^{-1}													
Stab A	83.0	30.0	14.4	7.9	2.5	0.9	0.4	0.2	0.1	0.0	0.0	0.0	0.0
Stab B	145.8	69.3	40.8	25.4	10.1	4.8	2.6	1.6	0.7	0.4	0.2	0.1	0.1
Stab C	219.4	122.0	80.8	55.9	26.8	14.3	8.6	5.6	2.8	1.6	1.0	0.5	0.3
Stab D	321.1	201.5	146.0	113.1	64.6	40.2	26.1	18.6	10.5	6.7	4.5	2.4	1.4
Stab E	390.2	267.4	204.3	165.5	109.6	75.9	54.6	41.3	26.4	17.9	12.7	7.1	4.5
Stab F	464.1	339.8	269.0	222.6	154.5	114.9	88.6	69.7	50.4	37.0	27.8	16.7	11.0
WSPD = 3 m s^{-1}													
Stab A	78.5	29.1	14.2	7.7	2.4	0.9	0.4	0.2	0.1	0.0	0.0	0.0	0.0
Stab B	137.6	67.7	39.7	25.1	10.0	4.8	2.6	1.6	0.7	0.4	0.2	0.1	0.1
Stab C	211.6	118.7	77.6	55.2	26.0	14.0	8.6	5.6	2.8	1.6	1.0	0.5	0.3
Stab D	312.5	197.9	143.2	110.0	62.5	39.3	26.1	18.2	10.5	6.7	4.5	2.4	1.4
Stab E	383.0	267.0	202.1	162.6	106.3	73.7	54.1	40.3	26.1	17.7	12.5	7.2	4.5
Stab F	461.5	344.6	268.4	220.8	151.1	112.3	86.1	67.6	48.9	36.4	27.5	16.6	11.0
WSPD = 7.5 m s^{-1}													
Stab A	62.5	25.5	13.0	7.3	2.3	0.9	0.4	0.2	0.1	0.0	0.0	0.0	0.0
Stab B	111.9	56.1	34.2	22.6	9.4	4.6	2.6	1.6	0.7	0.4	0.2	0.1	0.1
Stab C	173.3	100.4	66.5	47.7	23.8	13.2	8.2	5.4	2.7	1.6	1.0	0.5	0.3
Stab D	261.2	167.9	122.1	92.3	54.8	35.3	23.7	17.2	10.1	6.5	4.4	2.3	1.4
Stab E	325.9	232.2	175.8	139.6	89.5	63.8	46.7	36.0	23.9	16.8	12.1	7.0	4.4
Stab F	394.6	302.7	237.0	194.3	132.2	96.1	73.3	59.0	43.6	33.3	25.7	15.8	10.5
WSPD = 10 m s^{-1}													
Stab A	53.0	22.6	11.9	6.9	2.3	0.9	0.4	0.2	0.1	0.0	0.0	0.0	0.0
Stab B	92.3	49.7	31.0	20.9	9.0	4.5	2.5	1.5	0.7	0.4	0.2	0.1	0.1
Stab C	140.1	84.2	57.7	42.1	21.7	12.6	7.9	5.3	2.7	1.6	1.0	0.5	0.3
Stab D	205.5	138.3	102.4	79.9	48.6	31.8	22.1	16.4	9.7	6.4	4.3	2.3	1.4
Stab E	254.0	184.0	143.0	116.4	78.0	56.2	42.6	33.1	22.7	16.0	11.6	6.9	4.4
Stab F	306.8	235.8	189.6	157.9	109.9	82.8	64.5	52.2	40.0	30.9	24.0	15.2	10.2

relationship enabled the estimation of the NO fluxes in the blast plume with a reasonable level of confidence.

The results obtained in this study are the only published quantitative data available on blast plume gas composition that the authors are aware of and it is useful to compare them to the emission factors currently used for NPI estimates.

Based on the NO_2 measurements and estimates of NO, the flux for NO_x was calculated to be in the range of 0.04–5.3 kg t^{-1} ANFO. The average flux level for all the blast plumes measured was 0.9 kg t^{-1}. This figure is considerably lower than the current NPI emission factor which is 8 kg t^{-1}.

3.2. Modelling

Results of the modelling runs are summarised in Table 2 and show the peak NO_2 concentrations (ppm) at various points downwind of the blast for the six atmospheric stability classes considered.

Examples of the modelled data are plotted in Fig. 6 and Fig. 7. In Fig. 6 a plot is displayed for the concentration estimate of one scenario at a distance of 200 m from the source origin and for a wind speed of 2 m s^{-1} and a stability class C. In this plot 21 lines are shown representing the dose received directly downwind of the source at the locations displayed in Fig. 3. In this figure it is apparent that there is a considerable difference in the concentration predicted at each of the 21 receptors. It should be noted that the distance of 200 m is defined from the origin of the source area (0, 0) as displayed in Fig. 3. At this distance emission sources at 100 m will cause significantly higher concentrations than those occurring at positions toward the origin. In comparison the concentrations predicted at the receptor array 1 km from the source show more normally defined distributions with maxima occurring towards the middle receptors as a result of crosswind diffusion. Receptors toward the edge of the sample array receive less crosswind influence and are, therefore, smaller in concentration. Also apparent in these two figures is the considerable difference in the predicted peak concentrations with the values at 1 km up to 25 times lower than at 200 m. When viewing Table 2, the peak values at 5 km approach ambient levels for all but the most stable conditions which are quite commonly over predicted with Gaussian models. For future studies it is recommended that a long path technique on a mining lease boundary may provide both a measure of the model accuracy as well as a direct measure of the impact in areas directly surrounding the mining area.

The data presented in this study represent a dose directly downwind of the source and as such are a worst case scenario for exposure. The averages of the 21 receptors (i.e. the average concentration directly downwind of the source) for each of the 120 scenarios modelled were used to determine the selected data. The number of scenarios modelled was arbitrarily chosen to allow 10 scenarios to be run on each machine in a cluster of 12 computers. The maximum concentration in Table 2 is the maximum ensemble average obtained from the average of the 21 receptors for the 120 scenarios modelled. Maximum concentrations at individual locations directly downwind of hot spots are obviously higher than the values reported in this table.

When viewing Table 2 it is apparent that the peak concentrations drop dramatically as the receptor moves away from the source. It is also apparent that the peak concentrations vary little as a function of wind speed although the plume width will vary. In AFTOX a downwind concentration is determined in two steps. In the first step the size of the initial plume envelope is estimated. In its default mode AFTOX determines the size of the envelope (assumed to be a cylinder of equal height and width) from the magnitude of the emission rate. In this report the size is set at 10 m to match the grid structure used for the area

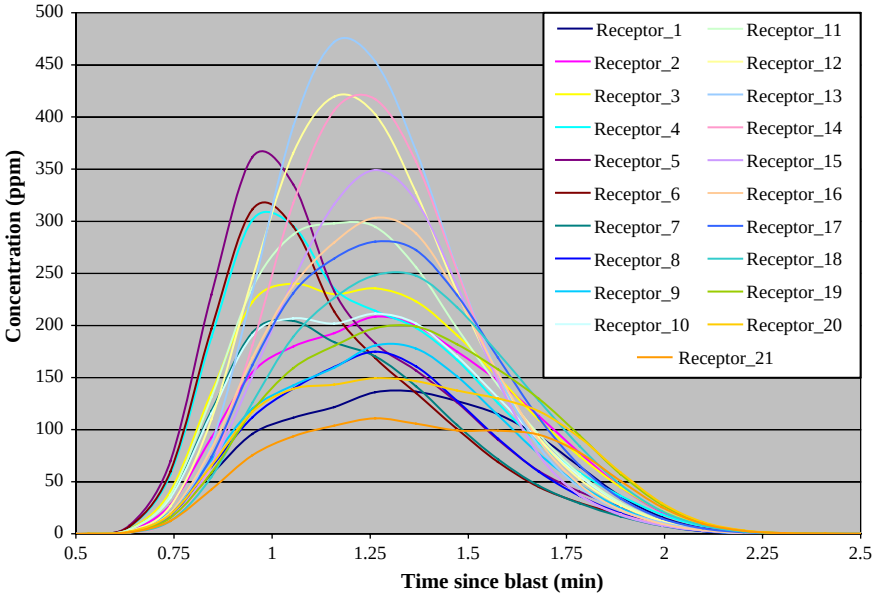

Fig. 6. Calculated NO_2 concentration profiles 200 m from source.

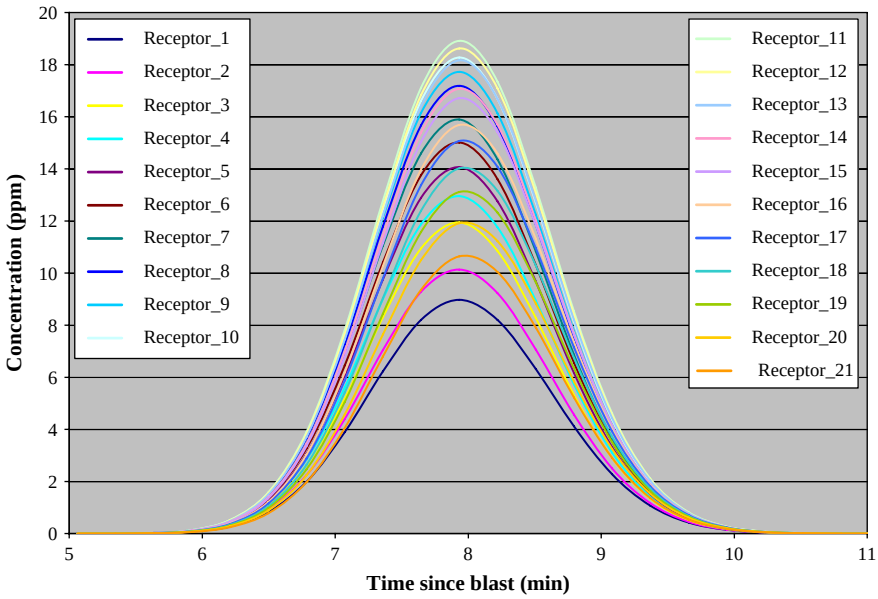

Fig. 7. Calculated NO_2 concentration profiles 1 km from source.

source. AFTOX in this regard ignores the effect of wind speed on the size of the initial envelope and as such the initial concentration of the plume is identical irrespective of wind speed by ignoring longitudinal (i.e. downwind) spread of the initial release. In the second step the concentration downwind of the initial release is determined by estimating the growth of a puff in three dimensions which in this case explicitly includes longitudinal plume spread which is assumed to be equal to the degree of crosswind spread. The degree of this spread is determined solely from the prescribed atmospheric stability class which ignores any wind speed dependence.

While the peak concentrations are similar, the dose received at a receptor is linearly dependent on wind speed. Emissions released into an atmosphere with higher wind speeds result in a receptor receiving doses for a smaller period of time. It should be noted that some of the differences in the peak concentrations displayed in Table 2 result from the number of discrete time steps used to calculate the concentrations. This was set at 25 intervals between the onset and finish of a plume as it passes by the receptor. This time is dependent on atmospheric stability and the distance from the source. In AFTOX, the puffs are assumed to disperse in the direction of plume travel proportionally with the degree of crosswind spread. As such, portions of the plume arrive before and after the main bulk of the emissions and the effect clearly demonstrated in Figs. 6 and 7. The moderate number of discrete times modelled to capture this effect while generally adequate may have led to a degree of variation particularly at larger distances from the source.

Again it should be noted that the modelled figures assume an area wide flux of 100 kg which is larger than observed in the blast recorded during this study. It should also be noted that while some of the concentrations are high close to the source the concentration at a particular location occurs for a brief period of time which is determined by the wind speed.

4. Conclusions

A portable open-path spectroscopic method was found to be effective for measuring NO_2 emissions from blasting. Overall this technique was found to be simpler, safer and more successful than other approaches that in the past have proved to be ineffective in monitoring these short lived plumes.

Quantitative measurements of NO_2 in plumes from blasting were made at two open-cut mines. The results showed that NO_2 was present in most of the plumes but in relatively low concentrations (typically ranging between 0 and 7 ppm). The highest concentration measured during all the field campaigns was about 17 ppm at ground level.

Based on field measurements, the emission factor currently used in compiling the Australian National Pollutant Inventory was found to be approximately eight times greater than that observed in our investigation. This would suggest that an over estimation of NO_x is made if the current factor is used.

Numerical modelling of the behaviour of plumes resulting from blasting was made to assess the possible downwind concentrations of NO_2. These results were compared to ambient NO_x measurements made in Muswellbrook.

- Modelling results were consistent with concentration measurements within the plumes at relatively short distances from the blast (i.e. up to about 1 km).
- Ambient monitoring did not detect NO_x events that could be attributed to individual blasts. Modelling suggested that these emissions would be very low at

distances greater than 5 km from the blast and may be indistinguishable from background levels; typically of the order of several parts per billion, in most cases.

Acknowledgements

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References

Chalmers Radio, Space Science. The optical remote sensing group. Available from: <http://www.rss.chalmers.se/ors/ >.

Galle, B., Oppenheimer, C., Geyer, A., McGonigle, A.J.S., Edmonds, M., Horrocks, L., 2002. A miniaturised ultraviolet spectrometer for remote sensing of SO_2 fluxes: a new tool for volcano surveillance. Journal of Volcanology and Geothermal Research 119, 241–254.

Kirchgessner, D.A., Piccot, S.D., Chadha, A., 1993. Estimation of methane emissions from a surface coal mine using open-path FTIR spectroscopy and modelling techniques. Chemosphere 26, 23–44.

Kunkel, B.A., 1991. AFTOX 4.0 – The Air Force Toxic Chemical Dispersion Model – A User's Guide. PL-TR-91-2119, Environmental Research Papers No. 1083, Phillips Laboratory, Directorate of Geophysics, Air Force Systems Command, Hanscom AFB, MA 01731-5000, p. 62.

Levine, S.P., Russwurm, G.M., 1994. Fourier transform infrared optical remote sensing for monitoring airborne gas and vapour contaminants in the field. Trends in Analytical Chemistry 13, 263–266.

Moffat, A.J., Milan, M.M., 1971. The applications of optical correlation techniques to the remote sensing of SO_2 plumes using sky light. Atmospheric Environment 5, 677–690.

McGonigle, A.J.S., Thomson, C.L., Tsanev, V.I., Oppenheimer, C., 2003. A simple technique for measuring power station SO_2 and NO_2 emissions. Atmospheric Environment 38, 21–25.

National Pollutant Inventory, 1999. Emission Estimation Technique Manual for Explosives Detonation and Firing Ranges. Environment Australia. Available from: <http://www.npi.gov.au/handbooks/approved_handbooks/fexplos.html>.

Piccot, S., Masemore, S., Ringler, E., Srinivasan, S., Kirchgessner, D., Herget, W., 1994. Validation of a method for estimating pollution emission rates from area sources using open-path FTIR spectroscopy and dispersion modelling techniques. Journal of the Air & Waste Management Association 44, 271–279.

Piccot, S., Masemore, S., Ringler, E., Bevan, W.L., Harris, D.H., 1996. Field assessment of a new method for estimating emission rates from volume sources using open-path FTIR spectroscopy. Journal of the Air & Waste Management Association 46, 159–171.

FACTORS AFFECTING ANFO FUMES PRODUCTION

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ABSTRACT

For many years there have been small scale tests available for evaluating the toxic fumes production by cap-sensitive explosives (DOT Class 1.1), but these could not be used with blasting agents due to the large charge sizes and heavy confinement required for proper detonation. Considering the extensive use of blasting agents in construction and mining, there is a need to determine the quantities of toxic fumes generated by blasting agents. At the International Society of Explosive Engineers Twenty Third Annual Conference on Explosives and Blasting Technique in 1997, the authors reported on a facility for detonating large (4.54 kg), confined blasting agent charges in a controlled volume that had been constructed at the National Institute for Occupational Safety and Health's Pittsburgh Research Lab's Experimental Mine. Since 1997, this facility has been used to collect data on toxic fumes produced by the detonation of various ammonium nitrate/fuel oil (ANFO) mixtures and several cap-sensitive explosives.

ANFO composition ranging from 1 to 10 percent (pct) fuel oil have been studied. As expected from previous studies, with an increase in fuel oil content the carbon monoxide production increases, while nitric oxide and nitrogen dioxide production decrease. The detonation velocity varies from 3,000 to 4,000 m/sec for the 1 to 10 pct range of fuel oil content, suggesting that ANFO mixes with improper fuel oil content may appear to detonate properly, while their fume production differs significantly from optimum. The study also considers such factors as degree of confinement, water contamination, and aluminum content on blasting agent fume production. Results indicate that water contamination of the ANFO has little effect on carbon monoxide production, but causes significant increase in nitric oxide and nitrogen dioxide production. Decreasing confinement from Schedule 80 steel pipe to 0.4-mm thick sheet metal also has little effect on carbon monoxide production, but significantly increases nitric oxide and nitrogen dioxide production. Adding 5 and 10 pct aluminum to the ANFO had no clear effect on carbon monoxide, nitric oxide, or nitrogen dioxide production.

INTRODUCTION

In February of 1997 a paper entitled "A Technique for Measuring Toxic Gases Produced by Blasting Agents" was presented at the 23rd Annual Conference on Explosives & Blasting Technique in Las Vegas, Nevada. That paper discussed a method for measuring toxic fumes produced by detonation of blasting agents. The research reported here is a continuation of that work.

Detonating ANFO in steel pipe in the Pittsburgh Research Lab (PRL) mine fumes chamber yields a baseline for comparing relative fumes production for blasting agents, but is by no means a predictor of what will happen in the field. In actual blasting operations, the confinement of the detonating ANFO will probably be less than that offered by the 4-in, Schedule 80 steel pipe employed in most tests. Additionally the ANFO evaluated in the PRL mine chamber is carefully mixed the day before and care is taken to prevent contamination. In practice, ANFO may not be exactly the 94/6 ammonium nitrate/fuel oil ratio desired or may be loaded into boreholes weeks before it is shot, exposing the explosive to water seeping into loaded boreholes and possible fuel oil evaporation. The current research looks at these factors and others in an effort to determine how they affect fumes production. Fumes measurements in the mine chamber were carried out for ANFO mixtures other than 94/6, ANFO contaminated with up to 10 pct water, ANFO detonated with less confinement than that offered by Schedule 80 steel pipe, and ANFO contaminated with limestone rock dust. Additionally, several cap-sensitive explosives, as well as ANFO containing up to 10 pct aluminum were also studied to gain an understanding of how detonation behavior affects fumes production. In each case carbon monoxide, nitrogen oxides, and ammonia were the toxic gases of primary interest.

EXPERIMENTAL APPROACH

Detonating large blasting agent charges and confining the fumes requires a larger experimental chamber than was employed in past work on cap-sensitive explosives. Towards this end, a chamber was created in the experimental mine at PRL. The facility consists of a portion of mine entry enclosed between two explosion proof bulkheads. Each bulkhead is 40 inches (1 m) thick, constructed of solid concrete block hitched 1 foot (30 cm) into the roof, ribs, and floor. On the intake side, the bulkhead is fitted with a submarine mandoor and a small port for control and sampling lines. On the return side, the bulkhead is fitted with two sealed ventilation ports. Total volume of the chamber is 9,666 ft^3 (274 m^3). The chamber volume was determined by releasing a known quantity of carbon monoxide into the chamber and sampling the atmosphere after it had mixed. Following the shot, a fan mounted at one end of the chamber mixes the chamber atmosphere at 3,500 ft^3/min, after which the chamber is vented using the mine's airflow. The layout of the chamber is illustrated in Figure 1. Up to 10 pound (4.54 kg) charges can be detonated in the chamber using a variety of confinements.

EXPERIMENTAL

A 28-inch (71-cm) length of 4-inch (20-cm) Schedule 80 seamless steel pipe was chosen to provide confinement in most tests of blasting agents and cap-sensitive explosives. Prior to loading the pipe with explosive, a continuous velocity probe of the type described by Santis is taped to the inner surface of the pipe along its length[1]. In conducting a test of a blasting agent, the commercial blasting agent minus its wrapper, or premixed ANFO are loaded into the pipe to a weight of 10 lb (4.54 kg). Initiation is provided by a 2-inch (5-cm) diameter, 2-inch (5-cm) thick cast pentolite booster, initiated by a number 8 instantaneous electric

blasting cap. In conducting a test of a cap-sensitive explosive, the cartridge explosive is loaded into the pipe to a weight of about 10 lb (4.54 kg). Cap-sensitive explosives are initiated by a number 8 instantaneous electric blasting cap.

Following detonation of an explosive in the chamber, the fan is run for about 10 minutes to uniformly mix the chamber atmosphere before fumes samples are taken out of the chamber through 1/4-inch (0.6-cm) Teflon or polyethylene tubes for analysis. Teflon sample lines are used for nitrogen oxides and ammonia to minimize loss of these constituents to absorption on the tube surface. Vacutainer[1] samples are taken and sent to the analytical laboratory for analysis; this technique is appropriate for components that are stable in the Vacutainer, namely hydrogen, carbon monoxide, and carbon dioxide. Nitrogen dioxide, nitrogen oxides, and ammonia are not amenable to analysis by the Vacutainer technique and are instead absorbed in chemical solutions in bubbler trains using the technique described by Santis[2]. That method was modified by eliminating the purging of the system with helium and using a gas meter to measure the volume of fumes bubbled through the solutions rather than measuring gas flow rate. An electrochemical carbon monoxide monitor was also employed to act as a backup to the analytical lab's carbon monoxide analysis of the Vacutainer and to allow monitoring of the mixing of the chamber atmosphere.

RESULTS

An ANFO mixture of 94 pct ammonium nitrate, 6 pct fuel oil is close to optimum from the perspective of minimum toxic fumes production. Previous research and theory show that the detonating ANFO will produce excessive levels of nitrogen oxides if the fuel oil content is too low and will produce excessive levels of carbon monoxide and ammonia if the fuel oil content is too high.[3,4,5] This behavior is supported by data collected in the current research, as illustrated in Figures 2, 3, and 4.

In Figure 5 the data from figures 2, 3, and 4 is presented in terms of oxygen balance. Figure 5 is a plot of carbon monoxide production versus oxygen balance for ANFO and several cap-sensitive explosives. As the oxygen balance is increased for ANFO the carbon monoxide production decreases. This would be expected since there is increasing oxygen to convert the carbon monoxide to carbon dioxide. ANFO mixed at 6 pct fuel oil produces approximately the same amount of carbon monoxide as cap-sensitive explosives of equivalent oxygen balance. The opposite is true when looking at nitrogen oxides production as a function of oxygen balance, as illustrated in Figure 6. When the oxygen balance is increased, the nitrogen oxides and nitrogen dioxide production increased. ANFO mixed at 6 pct fuel oil produced significantly more nitrogen oxides and nitrogen dioxide than cap-sensitive explosives. Figure 7 illustrates that as the oxygen balance for ANFO is increased the ammonia production decreases. With the exception of a couple data points that may be anomalous, ANFO mixed at 6 pct fuel oil produced about the same quantity of ammonia as cap-sensitive explosives of equivalent oxygen balance.

Figure 8 shows that adding water to an ANFO mixture of 94 pct ammonium nitrate and 6 pct fuel oil had little effect on carbon monoxide production for water percentages from 0 to 10 pct. However the nitrogen oxides and nitrogen dioxide increased dramatically when water is added to the ANFO mixture. This is demonstrated in Figure 9. Figure 10 shows the effect of water on ammonia fumes production; adding water to the ANFO yields an erratic trend, indicating that further study is needed.

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[1]Reference to Specific products is for informational purposes and does not imply endorsement by NIOSH.

As mentioned earlier, shooting ANFO in 4-inch schedule 80 seamless steel pipe is probably much more confinement than seen in the field. To examine the effect of reduced confinement on fumes production, ANFO was tested in sheet metal and PVC pipe. As seen in Figure 11, reduced confinement doesn't have much effect on carbon monoxide production. Carbon monoxide production for ANFO shot in the PVC pipe was much higher than that for the steel or sheet metal pipe. The high carbon monoxide might be attributed to burning of the PVC pipe. The degree to which the PVC pipe reacted was not studied in detail, but it is safe to assume that at least some of the PVC burned during the ANFO detonation. The high carbon monoxide production would be consistent with the earlier observation that the higher the fuel content of the explosive, the higher the carbon monoxide production.

Explosive packaging is an important consideration relative to toxic fumes production. For example, a blast pattern may contain a number of boreholes that are contaminated with water and the blaster may decide to insert sleeves into the boreholes contaminated with water to keep the ANFO dry. If the sleeves are made of a combustible material they could add to the carbon monoxide production. Figure 12 shows that the production of nitrogen oxides and nitrogen dioxide increases dramatically with lower confinement, while Figure 13 shows that with less confinement ammonia decreases.

Limestone rock dust (approximately 73 pct through 200 mesh) was added to the ANFO mixture to simulate drill cuttings being mixed with the ANFO as it was loaded into a borehole. The rock dust had little effect on the carbon monoxide production, as illustrated in Figure 14. Figure 15 shows that the addition of the rock dust led to an increase in nitrogen oxides production and a decrease in nitrogen dioxide production. Since the nitrogen oxides consist essentially of nitric oxide and nitrogen dioxide, this indicates that nitric oxide production increased significantly. Figure 16 shows that adding rock dust to the ANFO caused a significant increase in ammonia production .

Aluminum is sometimes added to ANFO to increase the velocity and the output energy. Figure 14 illustrates that the aluminum added to the ANFO mixture has little effect on the production of carbon monoxide. From Figure 15 it is not clear whether or not the nitrogen oxides and nitrogen dioxide production is affected by the added aluminum. The ammonia increased with the added aluminum, as illustrated in figure 16. It should be noted that the addition of aluminum had no clear effect on the ANFO's detonation velocity. The aluminum added to the ANFO mixture was Fine Aluminum Paint Pigment Powder, Alcoa # 422 flake. This type was used to give the fastest possible burning rate for experimental purposes. For commercial explosives, the lowest and least expensive grade of aluminum is typically used, consisting of ground scrap aluminum of various particle sizes.

DISCUSSION

Several factors that may effect the fumes production of ANFO have been investigated. Probably the easiest to control is the fuel oil content. To minimize toxic fumes production , the ANFO should be mixed at 6 pct fuel oil. Deviating from the 6 pct will lead to excessive fumes. Water contamination may not have an affect on carbon monoxide production, but it increases the production of nitrogen oxides and nitrogen dioxide. At the present time in our research it is not clear how the production of ammonia is affected. The confinement of ANFO doesn't appear to make a difference in the production of carbon monoxide, but it makes a difference in the production of nitrogen oxides , nitrogen dioxide, and ammonia.

In the case of nitrogen oxides and nitrogen dioxide the fumes production will increase, while the ammonia fumes production will decrease.

Adding aluminum or rock dust to ANFO does not affect the fumes production of carbon monoxide. The addition of aluminum does not have a significant affect on nitrogen oxides and nitrogen dioxide production, but the addition of rock dust leads to an increased production of nitrogen oxides. Additionally, the rock dust appears to have an effect on the ratio of nitric oxide to nitrogen dioxide. The addition of aluminum and rock dust increased the production of ammonia. The effect of rock dust on fume production was based on limited data and requires further study to look at the effect of particle size and dust type.

Its important to understand that the data reported here applies only to the test conditions under which the data was collected. For example, the schedule 80 steel pipe may provide more confinement than many field blasts. The research reported here shows that the confinement will affect the quantity of toxic fumes produced. In the field the toxic fumes released from a blast will differ significantly from the data reported here. There is a need to collect data from the field to develop an understanding of how data from the PRL fumes chamber compare to fumes production in the field. This, in return, will help in developing improved tests for evaluating fumes production.

1. Santis, L. D. and R. A. Cortese, A Method of Measuring Continuous Detonation Rates Using Off-the-Shelf Items, Proceedings of the Twenty-Second Annual Conference on Explosives and Blasting Technique, Orlando, FL, February 4-8, 1996.

2. Santis, L. D., J. H. Rowland, III, D. J. Viscusi, and M. H. Weslowski, The Large Chamber Test for Toxic Fumes Analysis for Permissible Explosives, Proceedings of the Twenty-First Annual Conference on Explosives and Blasting Technique, Nashville, TN, February 5-9, 1995.

3. Mainiero, R.J., A Technique for Measuring Toxic Gases Produced by Blasting Agents, Proceedings of the Twenty Third Annual Conference on Explosives and Blasting Technique, Las Vegas, NV, February 2-5, 1997.

4. Blaster's Handbook , Sixteenth Edition, E.I. du Pont de Nemours and Company, 1977, p. 59.

5. Explosives and Rock Blasting, Atlas Powder Company, 1987, p. 25-27.

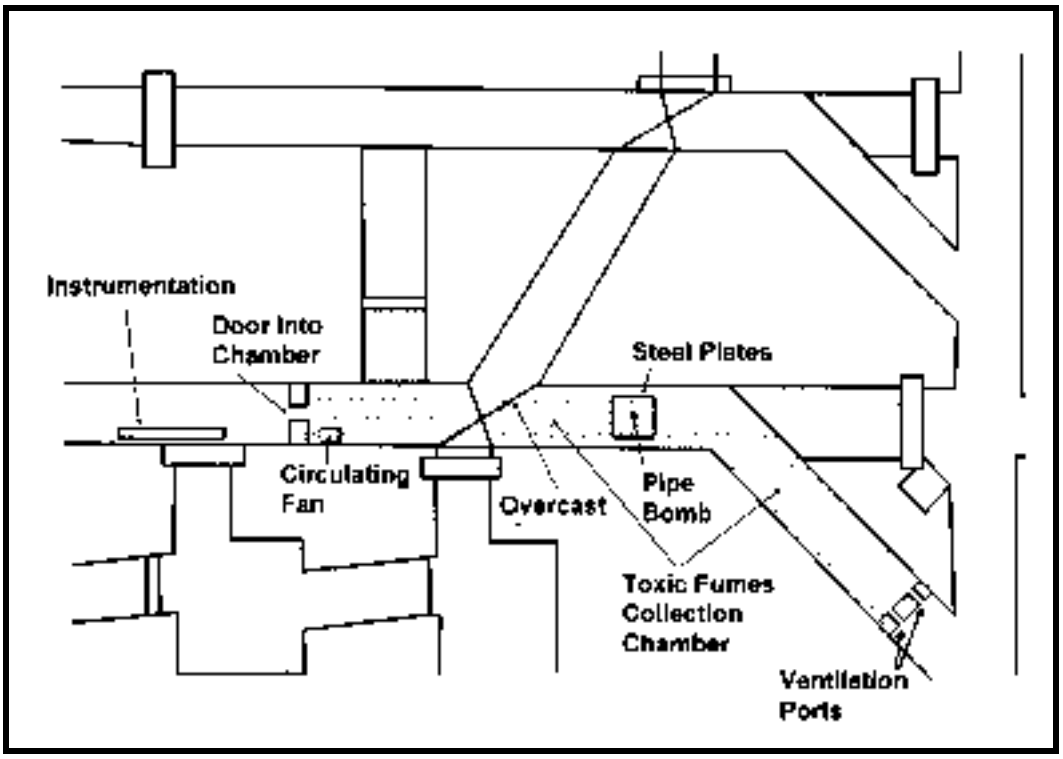

Figure 1. Research was conducted in a chamber created in the underground mine at the Pittsburgh Research Lab.

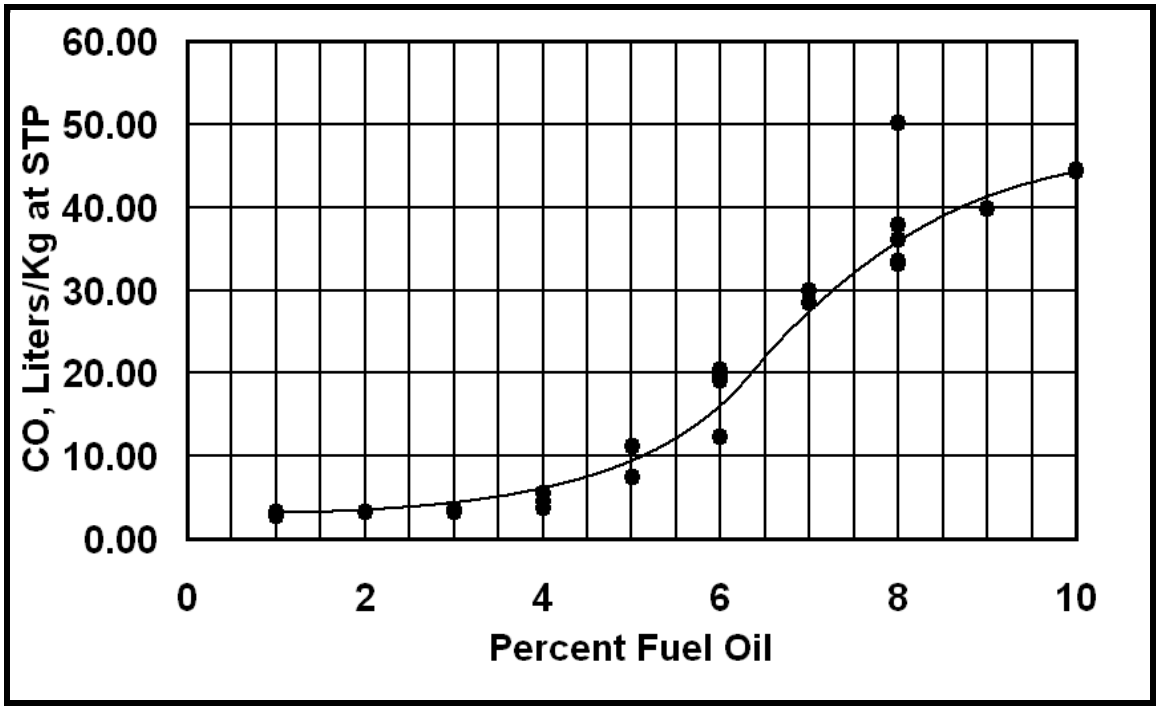

Figure 2. Effect of ANFO fuel oil content on carbon monoxide production. In all figures, the line is a polynomial fit to the data; it is included for illustrative purposes and does not represent a fit of theoretical results.

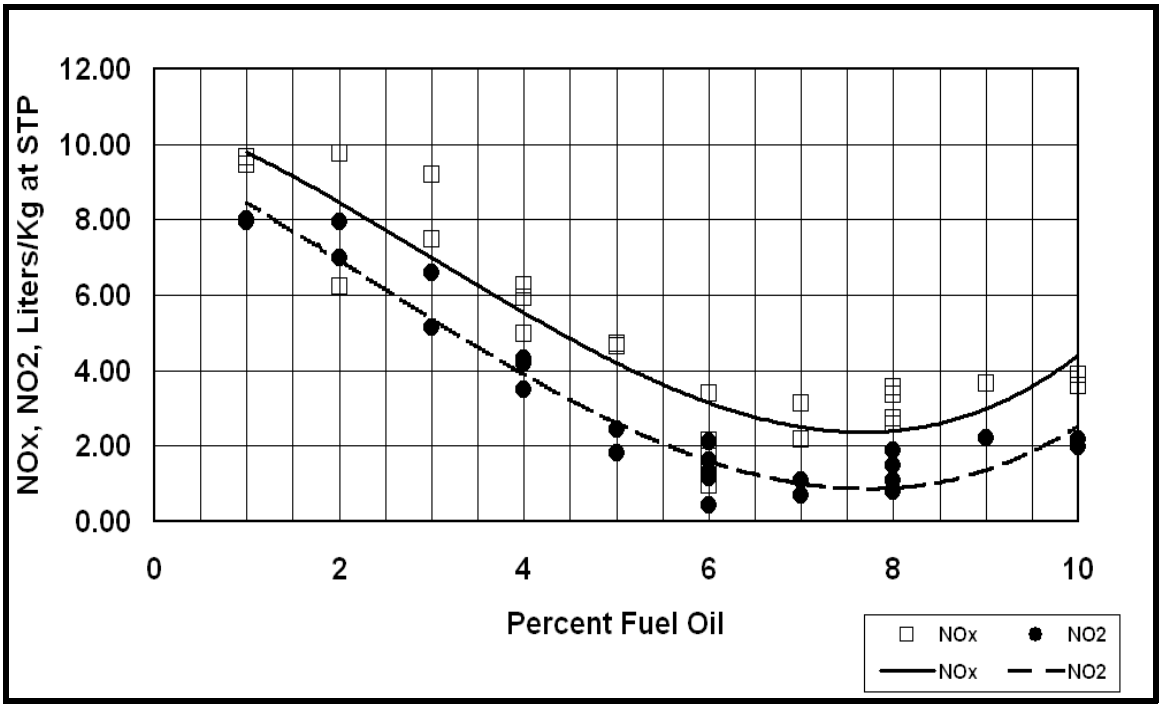

Figure 3. Effect of ANFO fuel oil content on nitrogen oxides and nitrogen dioxide production.

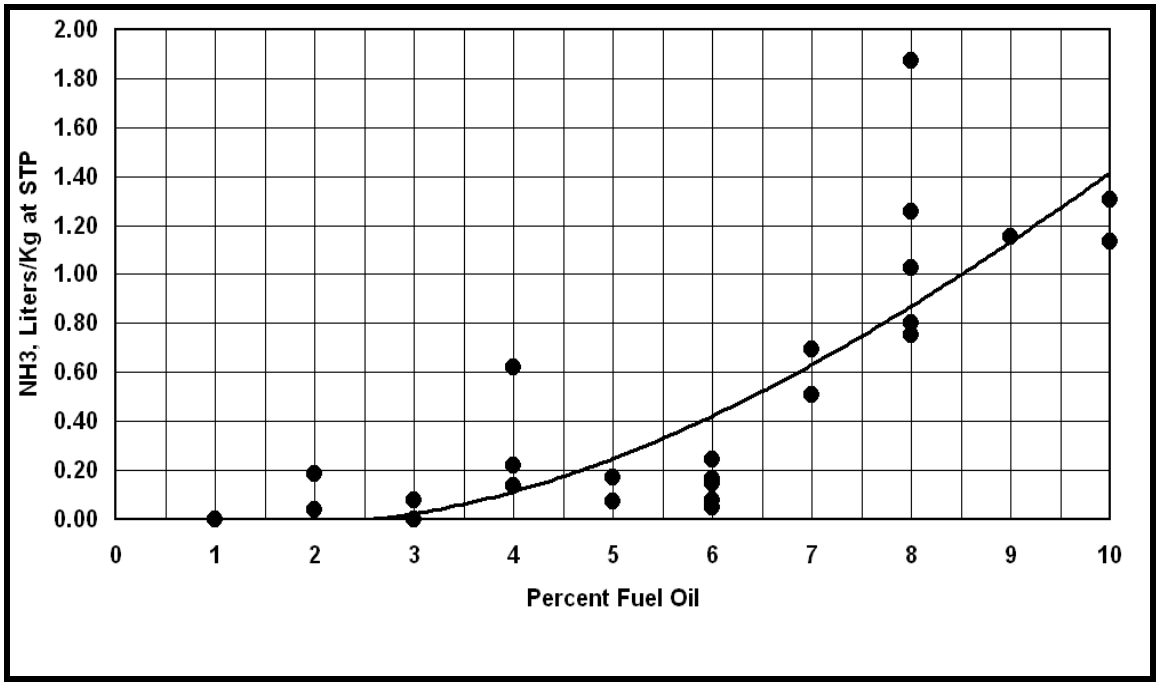

Figure 4. Effect of ANFO fuel oil content on ammonia production.

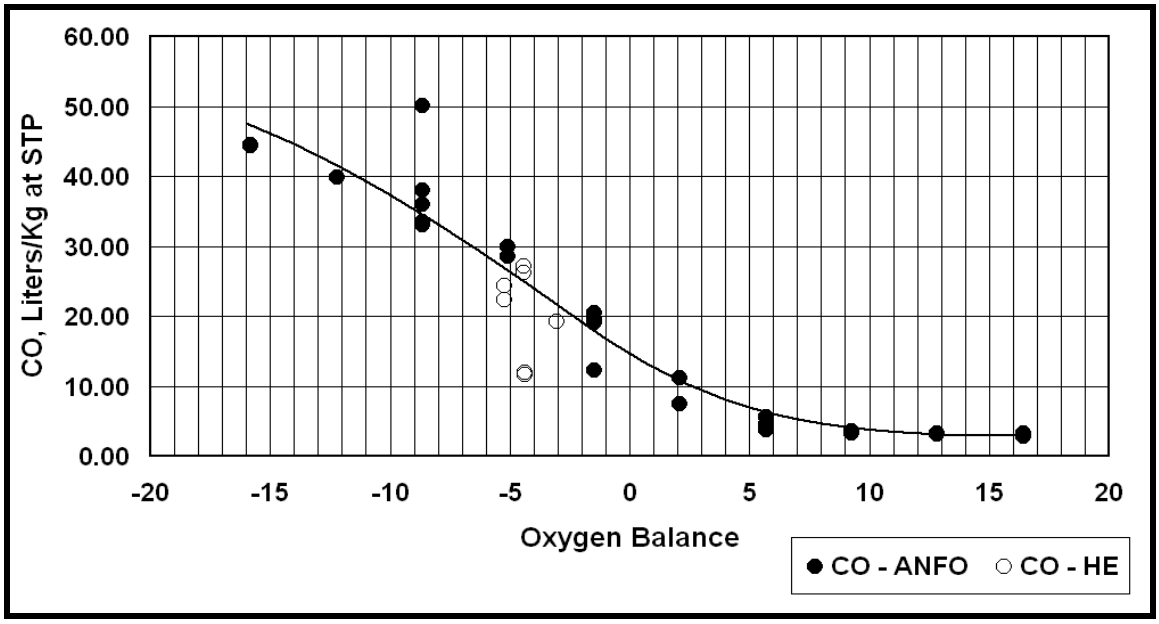

Figure 5. Effect of Oxygen Balance on carbon monoxide production for 94/6 ANFO and high explosives (cap-sensitive explosives).

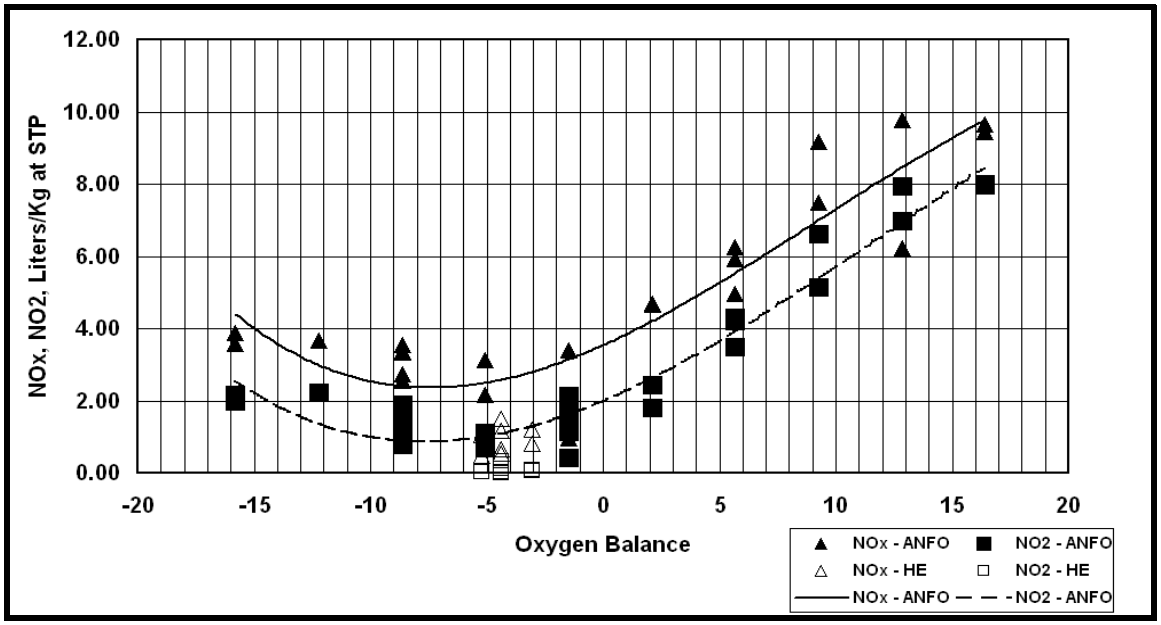

Figure 6. Effect of Oxygen Balance on nitrogen oxides and nitrogen dioxide production for 94/6 ANFO and high explosives (cap-sensitive explosives).

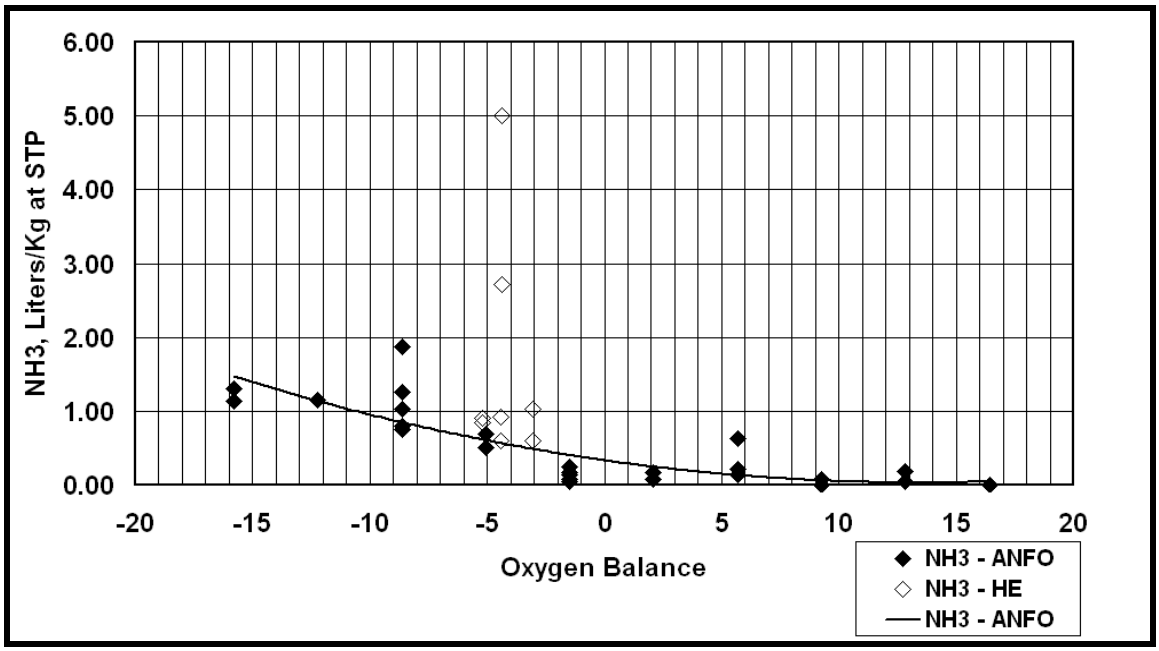

Figure 7. Effect of Oxygen Balance on ammonia production for 94/6 ANFO and high explosives (cap-sensitive explosives).

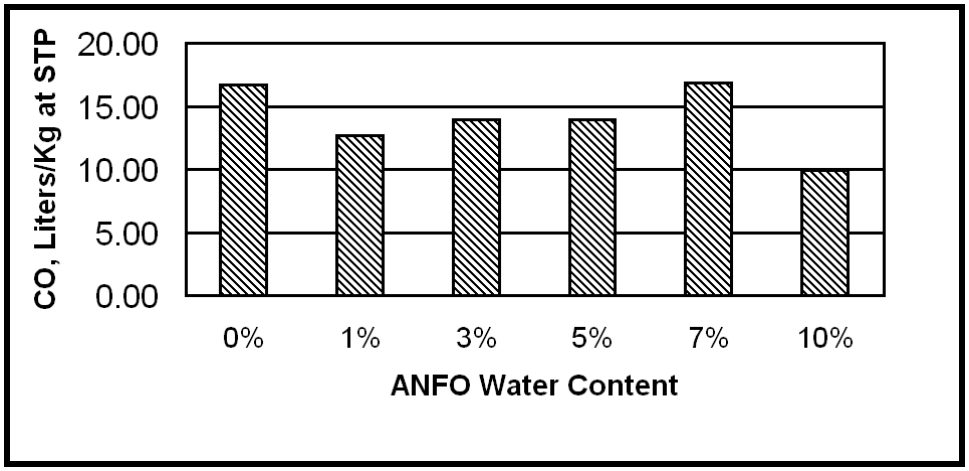

Figure 8. Effect of ANFO water content on carbon monoxide production for a 94/6 mix.

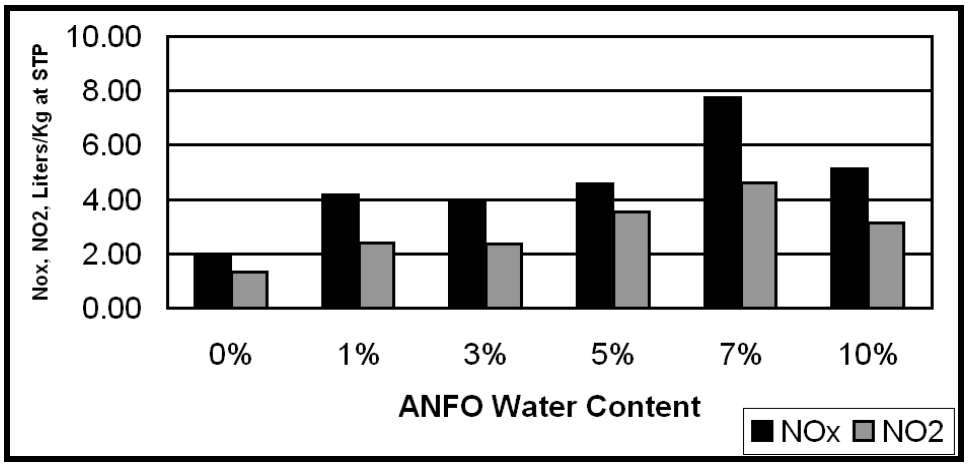

Figure 9. Effect of 94/6 ANFO water content on nitrogen oxides and nitrogen dioxide production.

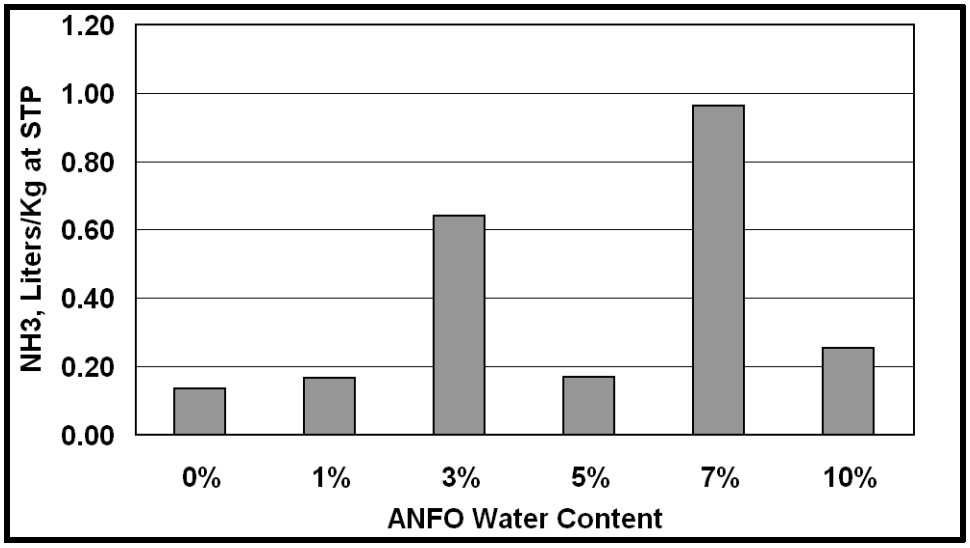

Figure 10. Effect of 94/6 ANFO water content on ammonia production.

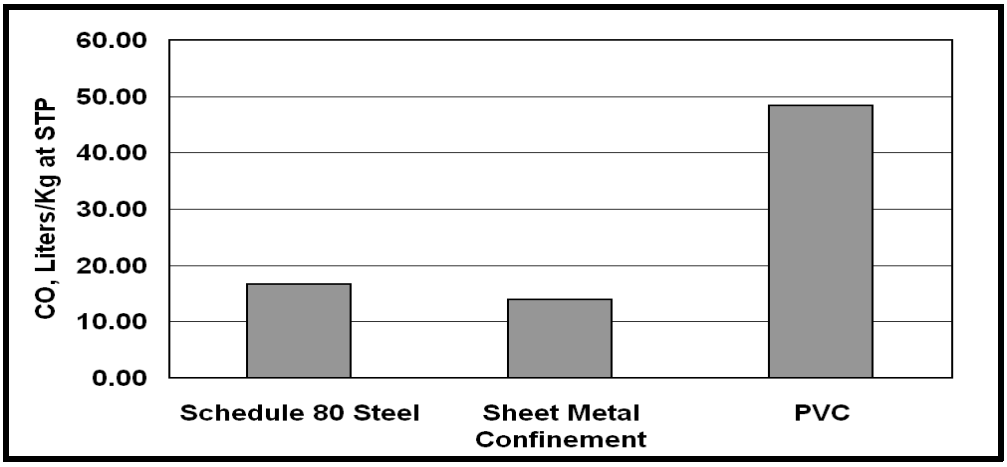

Figure 11. Effect of 94/6 ANFO confinement on carbon monoxide production.

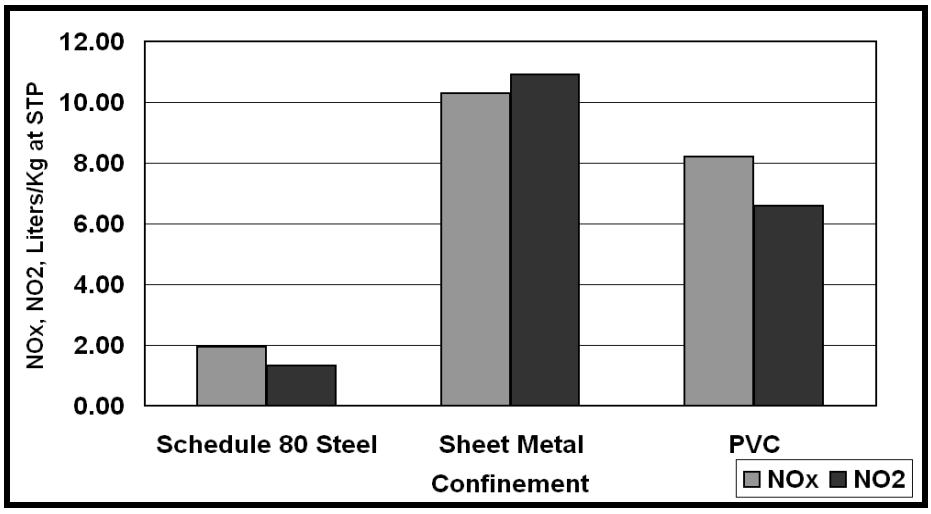

Figure 12. Effect of 94/6 ANFO confinement on nitrogen oxides and nitrogen dioxide production.

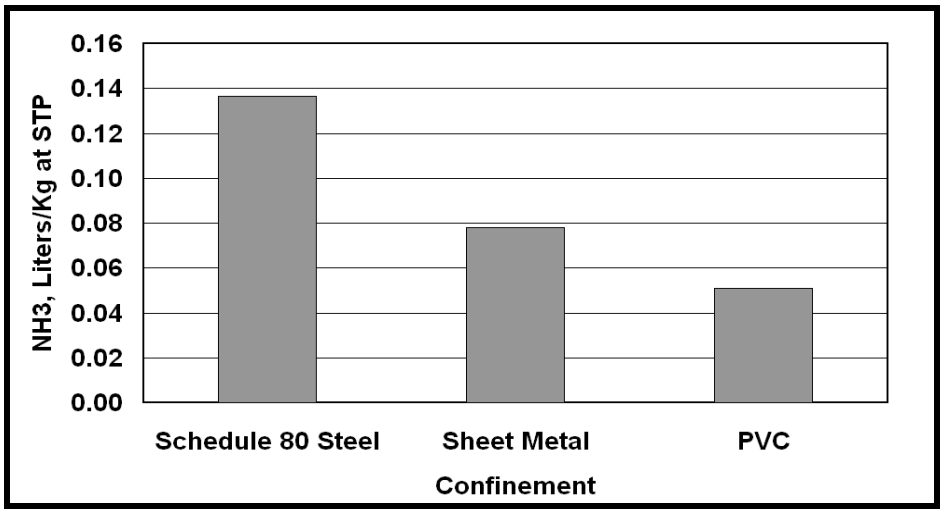

Figure 13. Effect of 94/6 ANFO confinement on ammonia production.

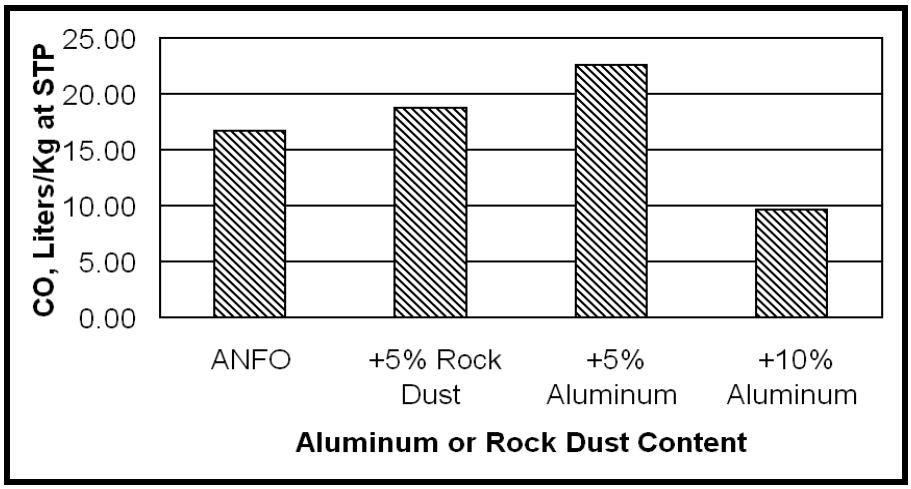

Figure 14. Effect of aluminum and rock dust content on carbon monoxide production.

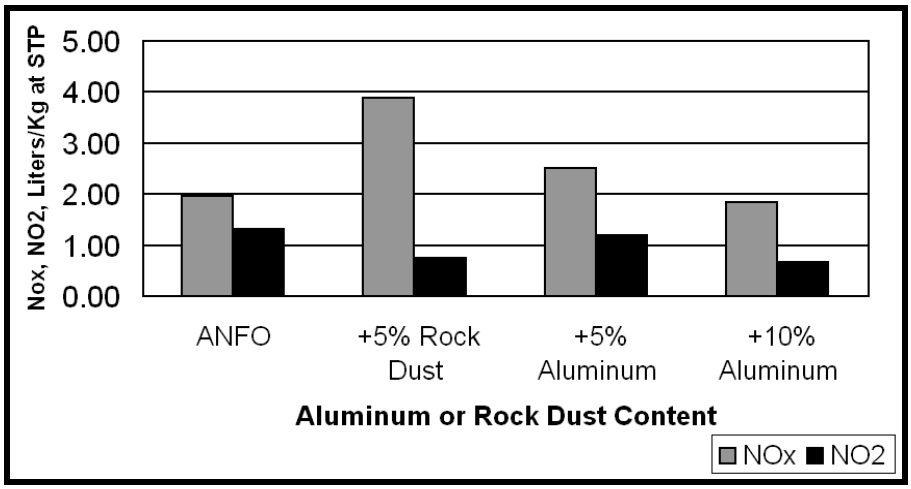

Figure 15. Effect of aluminum and rock dust content on nitrogen oxides and nitrogen dioxide production.

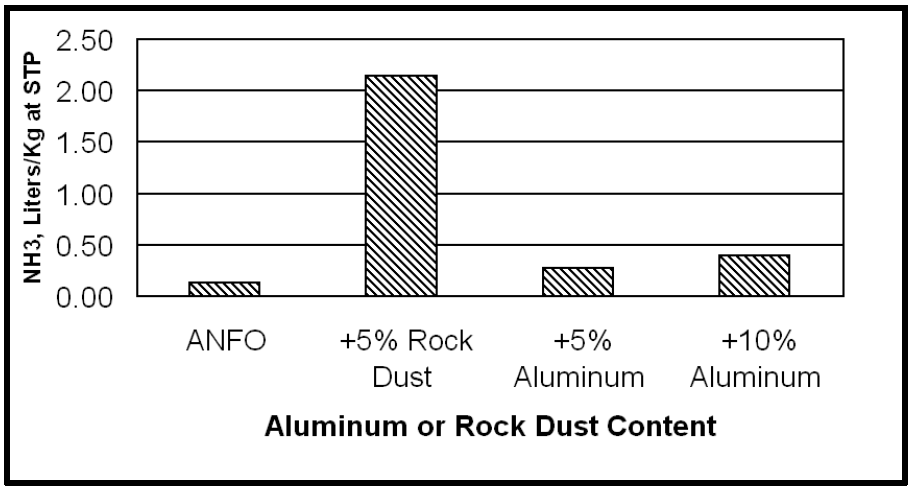

Figure 16. Effect of aluminum or rock dust content on ammonia production.

Table 11.9-1 (English Units). EMISSION FACTOR EQUATIONS FOR UNCONTROLLED OPEN DUST SOURCES AT WESTERN SURFACE COAL MINES[a]

Operation	Material	Emissions By Particle Size Range (Aerodynamic Diameter)[b,c]				Units	EMISSION FACTOR RATING
		Emission Factor Equations		Scaling Factors			
		TSP ≤30 μm	≤15 μm	≤10 μm[d]	≤2.5 μm/TSP[e]		
Blasting[f]	Coal or overburden	$0.000014(A)^{1.5}$	ND	0.52[e]	0.03	lb/blast	C_DD
Truck loading	Coal	$\frac{1.16}{(M)^{1.2}}$	$\frac{0.119}{(M)^{0.9}}$	0.75	0.019	lb/ton	BBCC
Bulldozing	Coal	$\frac{78.4\ (s)^{1.2}}{(M)^{1.3}}$	$\frac{18.6\ (s)^{1.5}}{(M)^{1.4}}$	0.75	0.022	lb/hr	CCDD
	Overburden	$\frac{5.7\ (s)^{1.2}}{(M)^{1.3}}$	$\frac{1.0\ (s)^{1.5}}{(M)^{1.4}}$	0.75	0.105	lb/hr	BCDD
Dragline	Overburden	$\frac{0.0021\ (d)^{1.1}}{(M)^{0.3}}$	$\frac{0.0021\ (d)^{0.7}}{(M)^{0.3}}$	0.75	0.017	lb/yd^3	BCDD
Vehicle traffic[g]							
Grading		$0.040\ (S)^{2.5}$	$0.051\ (S)^{2.0}$	0.60	0.031	lb/VMT	CCDD
Active storage pile[h] (wind erosion and maintenance)	Coal	0.72 u	ND	ND	ND	$\frac{\text{lb}}{(\text{acre})(\text{hr})}$	C[i]_ _ _

[a] Reference 1, except as noted. VMT = vehicle miles traveled. ND = no data. Quality ratings coded where "Q, X, Y, Z" are ratings for ≤30 μm, ≤15 μm, ≤10 μm, and ≤2.5 μm, respectively. See also note below.

[b] Particulate matter less than or equal to 30 μm in aerodynamic diameter is sometimes termed "suspendable particulate" and is often used as a surrogate for TSP (total suspended particulate). TSP denotes what is measured by a standard high volume sampler (see Section 13.2).

[c] Symbols for equations:

A = horizontal area (ft^2), with blasting depth ≤ 70 ft. Not for vertical face of a bench.
M = material moisture content (%)
s = material silt content (%)
u = wind speed (mph)
d = drop height (ft)
W = mean vehicle weight (tons)
S = mean vehicle speed (mph)
w = mean number of wheels

Federal Environment and Safety Codified Regulations
TITLE 40—Protection of Environment
PART 98—MANDATORY GREENHOUSE GAS REPORTING
SUBPART C—General Stationary Fuel Combustion Sources

Table C-1 to Subpart C of Part 98 —Default CO_2 Emission Factors and High Heat Values for Various Types of Fuel

Fuel type	Default high heat value	Default CO_2 emission factor
Coal and coke	mmBtu/short ton	kg CO_2/mmBtu
Anthracite	25.09	103.69
Bituminous	24.93	93.28
Subbituminous	17.25	97.17
Lignite	14.21	97.72
Coal Coke	24.80	113.67
Mixed (Commercial sector)	21.39	94.27
Mixed (Industrial coking)	26.28	93.90
Mixed (Industrial sector)	22.35	94.67
Mixed (Electric Power sector)	19.73	95.52
Natural gas	mmBtu/scf	kg CO_2/mmBtu
(Weighted U.S. Average)	1.026×10^{-3}	53.06
Petroleum products	mmBtu/gallon	kg CO_2/mmBtu
Distillate Fuel Oil No. 1	0.139	73.25
Distillate Fuel Oil No. 2	0.138	73.96
Distillate Fuel Oil No. 4	0.146	75.04
Residual Fuel Oil No. 5	0.140	72.93
Residual Fuel Oil No. 6	0.150	75.10
Used Oil	0.138	74.00
Kerosene	0.135	75.20
Liquefied petroleum gases (LPG) [1]	0.092	61.71
Propane [1]	0.091	62.87
Propylene [2]	0.091	67.77
Ethane [1]	0.068	59.60
Ethanol	0.084	68.44
Ethylene [2]	0.058	65.96
Isobutane [1]	0.099	64.94
Isobutylene [1]	0.103	68.86
Butane [1]	0.103	64.77
Butylene [1]	0.105	68.72

Naphtha (<401 deg F)	0.125	68.02
Natural Gasoline	0.110	66.88
Other Oil (>401 deg F)	0.139	76.22
Pentanes Plus	0.110	70.02
Petrochemical Feedstocks	0.125	71.02
Petroleum Coke	0.143	102.41
Special Naphtha	0.125	72.34
Unfinished Oils	0.139	74.54
Heavy Gas Oils	0.148	74.92
Lubricants	0.144	74.27
Motor Gasoline	0.125	70.22
Aviation Gasoline	0.120	69.25
Kerosene-Type Jet Fuel	0.135	72.22
Asphalt and Road Oil	0.158	75.36
Crude Oil	0.138	74.54
Other fuels—solid	mmBtu/short ton	kg CO_2/mmBtu
Municipal Solid Waste	9.95 [3]	90.7
Tires	28.00	85.97
Plastics	38.00	75.00
Petroleum Coke	30.00	102.41
Other fuels—gaseous	mmBtu/scf	kg CO_2/mmBtu
Blast Furnace Gas	0.092×10^{-3}	274.32
Coke Oven Gas	0.599×10^{-3}	46.85
Propane Gas	2.516×10^{-3}	61.46
Fuel Gas [4]	1.388×10^{-3}	59.00
Biomass fuels—solid	mmBtu/short ton	kg CO_2/mmBtu
Wood and Wood Residuals (dry basis) [5]	17.48	93.80
Agricultural Byproducts	8.25	118.17
Peat	8.00	111.84
Solid Byproducts	10.39	105.51
Biomass fuels—gaseous	mmBtu/scf	kg CO_2/mmBtu
Landfill Gas	0.485×10^{-3}	52.07
Other Biomass Gases	0.655×10^{-3}	52.07
Biomass Fuels—Liquid	mmBtu/gallon	kg CO_2/mmBtu
Ethanol	0.084	68.44
Biodiesel (100%)	0.128	73.84
Rendered Animal Fat	0.125	71.06
Vegetable Oil	0.120	81.55

[1] The HHV for components of LPG determined at 60 °F and saturation pressure with the exception of ethylene.

[2] Ethylene HHV determined at 41 °F (5 °C) and saturation pressure.

[3] Use of this default HHV is allowed only for: (a) Units that combust MSW, do not generate steam, and are

allowed to use Tier 1; (b) units that derive no more than 10 percent of their annual heat input from MSW and/or tires; and (c) small batch incinerators that combust no more than 1,000 tons of MSW per year.

[4] Reporters subject to subpart X of this part that are complying with § 98.243(d) or subpart Y of this part may only use the default HHV and the default CO_2 emission factor for fuel gas combustion under the conditions prescribed in § 98.243(d)(2)(i) and (d)(2)(ii) and § 98.252(a)(1) and (a)(2), respectively. Otherwise, reporters subject to subpart X or subpart Y shall use either Tier 3 (Equation C-5) or Tier 4.

[5] Use the following formula to calculate a wet basis HHV for use in Equation C-1: $HHV_w = ((100 - M)/100)*HHV_d$ where HHV_w = wet basis HHV, M = moisture content (percent) and HHV_d = dry basis HHV from Table C-1.

[78 FR page 71950, Nov. 29, 2013]

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Federal Environment and Safety Codified Regulations
TITLE 40—Protection of Environment
PART 98—MANDATORY GREENHOUSE GAS REPORTING
SUBPART C—General Stationary Fuel Combustion Sources

Table C-2 to Subpart C of Part 98 —Default CH_4 and N_2O Emission Factors for Various Types of Fuel

Fuel type	Default CH_4 emission factor (kg CH_4/mmBtu)	Default N_2O emission factor (kg N_2O/mmBtu)
Coal and Coke (All fuel types in Table C-1)	1.1×10^{-02}	1.6×10^{-03}
Natural Gas	1.0×10^{-03}	1.0×10^{-04}
Petroleum (All fuel types in Table C-1)	3.0×10^{-03}	6.0×10^{-04}
Fuel Gas	3.0×10^{-03}	6.0×10^{-04}
Municipal Solid Waste	3.2×10^{-02}	4.2×10^{-03}
Tires	3.2×10^{-02}	4.2×10^{-03}
Blast Furnace Gas	2.2×10^{-05}	1.0×10^{-04}
Coke Oven Gas	4.8×10^{-04}	1.0×10^{-04}
Biomass Fuels—Solid (All fuel types in Table C-1, except wood and wood residuals)	3.2×10^{-02}	4.2×10^{-03}
Wood and wood residuals	7.2×10^{-03}	3.6×10^{-03}
Biomass Fuels—Gaseous (All fuel types in Table C-1)	3.2×10^{-03}	6.3×10^{-04}
Biomass Fuels—Liquid (All fuel types in Table C-1)	1.1×10^{-03}	1.1×10^{-04}

Note: Those employing this table are assumed to fall under the IPCC definitions of the "Energy Industry" or "Manufacturing Industries and Construction". In all fuels except for coal the values for these two categories are identical. For coal combustion, those who fall within the IPCC "Energy Industry" category may employ a value of 1g of CH_4/mmBtu.

[75 FR page 79154, Dec. 17, 2010; 78 FR page 71952, Nov. 29, 2013]

ISSN 2167-8065

Table 11.19.2-2 (English Units). EMISSION FACTORS FOR CRUSHED STONE PROCESSING OPERATIONS (lb/Ton)[a]

Source [b]	Total Particulate Matter [r,s]	EMISSION FACTOR RATING	Total PM-10	EMISSION FACTOR RATING	Total PM-2.5	EMISSION FACTOR RATING
Primary Crushing (SCC 3-05-020-01)	ND		ND[n]		ND[n]	
Primary Crushing (controlled) (SCC 3-05-020-01)	ND		ND[n]		ND[n]	
Secondary Crushing (SCC 3-05-020-02)	ND		ND[n]		ND[n]	
Secondary Crushing (controlled) (SCC 3-05-020-02)	ND		ND[n]		ND[n]	
Tertiary Crushing (SCC 3-050030-03)	0.0054[d]	E	0.0024[o]	C	ND[n]	
Tertiary Crushing (controlled) (SCC 3-05-020-03)	0.0012[d]	E	0.00054[p]	C	0.00010[q]	E
Fines Crushing (SCC 3-05-020-05)	0.0390[e]	E	0.0150[e]	E	ND	
Fines Crushing (controlled) (SCC 3-05-020-05)	0.0030[f]	E	0.0012[f]	E	0.000070[q]	E
Screening (SCC 3-05-020-02, 03)	0.025[c]	E	0.0087[l]	C	ND	
Screening (controlled) (SCC 3-05-020-02, 03)	0.0022[d]	E	0.00074[m]	C	0.000050[q]	E
Fines Screening (SCC 3-05-020-21)	0.30[g]	E	0.072[g]	E	ND	
Fines Screening (controlled) (SCC 3-05-020-21)	0.0036[g]	E	0.0022[g]	E	ND	
Conveyor Transfer Point (SCC 3-05-020-06)	0.0030[h]	E	0.00110[h]	D	ND	
Conveyor Transfer Point (controlled) (SCC 3-05-020-06)	0.00014[i]	E	4.6×10^{-5}[i]	D	1.3×10^{-5}[q]	E
Wet Drilling - Unfragmented Stone (SCC 3-05-020-10)	ND		8.0×10^{-5}[j]	E	ND	
Truck Unloading -Fragmented Stone (SCC 3-05-020-31)	ND		1.6×10^{-5}[j]	E	ND	
Truck Loading - Conveyor, crushed stone (SCC 3-05-020-32)	ND		0.00010[k]	E	ND	

a. Emission factors represent uncontrolled emissions unless noted. Emission factors in lb/Ton of material of throughput. SCC = Source Classification Code. ND = No data.

b. Controlled sources (with wet suppression) are those that are part of the processing plant that employs current wet suppression technology similar to the study group. The moisture content of the study group without wet suppression systems operating (uncontrolled) ranged from 0.21 to 1.3 percent, and the same facilities operating wet suppression systems (controlled) ranged from 0.55 to 2.88 percent. Due to carry over of the small amount of moisture required, it has been shown that each source, with the exception of crushers, does not need to employ direct water sprays. Although the moisture content was the only variable measured, other process features may have as much influence on emissions from a given source. Visual observations from each source under normal operating conditions are probably the best indicator of which emission factor is most appropriate. Plants that employ substandard control measures as indicated by visual observations should use the uncontrolled factor with an appropriate control efficiency that best reflects the effectiveness of the controls employed.

c. References 1, 3, 7, and 8

d. References 3, 7, and 8

13.2.2 Unpaved Roads

13.2.2.1 General

When a vehicle travels an unpaved road, the force of the wheels on the road surface causes pulverization of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

The particulate emission factors presented in the previous draft version of this section of AP-42, dated October 2001, implicitly included the emissions from vehicles in the form of exhaust, brake wear, and tire wear as well as resuspended road surface material[25]. EPA included these sources in the emission factor equation for unpaved public roads (equation 1b in this section) since the field testing data used to develop the equation included both the direct emissions from vehicles and emissions from resuspension of road dust.

This version of the unpaved public road emission factor equation only estimates particulate emissions from resuspended road surface material [23, 26]. The particulate emissions from vehicle exhaust, brake wear, and tire wear are now estimated separately using EPA's MOBILE6.2 [24]. This approach eliminates the possibility of double counting emissions. Double counting results when employing the previous version of the emission factor equation in this section and MOBILE6.2 to estimate particulate emissions from vehicle traffic on unpaved public roads. It also incorporates the decrease in exhaust emissions that has occurred since the unpaved public road emission factor equation was developed. The previous version of the unpaved public road emission factor equation includes estimates of emissions from exhaust, brake wear, and tire wear based on emission rates for vehicles in the 1980 calendar year fleet. The amount of PM released from vehicle exhaust has decreased since 1980 due to lower new vehicle emission standards and changes in fuel characteristics.

13.2.2.2 Emissions Calculation And Correction Parameters[1-6]

The quantity of dust emissions from a given segment of unpaved road varies linearly with the volume of traffic. Field investigations also have shown that emissions depend on source parameters that characterize the condition of a particular road and the associated vehicle traffic. Characterization of these source parameters allow for "correction" of emission estimates to specific road and traffic conditions present on public and industrial roadways.

Dust emissions from unpaved roads have been found to vary directly with the fraction of silt (particles smaller than 75 micrometers [μm] in diameter) in the road surface materials.[1] The silt fraction is determined by measuring the proportion of loose dry surface dust that passes a 200-mesh screen, using the ASTM-C-136 method. A summary of this method is contained in Appendix C of AP-42. Table 13.2.2-1 summarizes measured silt values for industrial unpaved roads. Table 13.2.2-2 summarizes measured silt values for public unpaved roads. It should be noted that the ranges of silt content vary over two orders of magnitude. Therefore, the use of data from this table can potentially introduce considerable error. Use of this data is strongly discouraged when it is feasible to obtain locally gathered data.

Since the silt content of a rural dirt road will vary with geographic location, it should be measured for use in projecting emissions. As a conservative approximation, the silt content of the parent soil in the area can be used. Tests, however, show that road silt content is normally lower than in the surrounding parent soil, because the fines are continually removed by the vehicle traffic, leaving a higher percentage of coarse particles.

Other variables are important in addition to the silt content of the road surface material. For example, at industrial sites, where haul trucks and other heavy equipment are common, emissions are highly correlated with vehicle weight. On the other hand, there is far less variability in the weights of cars and pickup trucks that commonly travel publicly accessible unpaved roads throughout the United States. For those roads, the moisture content of the road surface material may be more dominant in determining differences in emission levels between, for example a hot, desert environment and a cool, moist location.

The PM-10 and TSP emission factors presented below are the outcomes from stepwise linear regressions of field emission test results of vehicles traveling over unpaved surfaces. Due to a limited amount of information available for PM-2.5, the expression for that particle size range has been scaled against the result for PM-10. Consequently, the quality rating for the PM-2.5 factor is lower than that for the PM-10 expression.

Table 13.2.2-1. TYPICAL SILT CONTENT VALUES OF SURFACE MATERIAL ON INDUSTRIAL UNPAVED ROADS[a]

Industry	Road Use Or Surface Material	Plant Sites	No. Of Samples	Silt Content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16 - 19	17
Iron and steel production	Plant road	19	135	0.2 - 19	6.0
Sand and gravel processing	Plant road	1	3	4.1 - 6.0	4.8
	Material storage area	1	1	-	7.1
Stone quarrying and processing	Plant road	2	10	2.4 - 16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4 - 7.1	4.3
	Haul road to/from pit	1	12	3.9 - 9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8 - 18	8.4
	Plant road	2	2	4.9 - 5.3	5.1
	Scraper route	3	10	7.2 - 25	17
	Haul road (freshly graded)	2	5	18 - 29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2 - 21	6.4

[a]References 1,5-15.

The following empirical expressions may be used to estimate the quantity in pounds (lb) of size-specific particulate emissions from an unpaved road, per vehicle mile traveled (VMT):

For vehicles traveling on unpaved surfaces at industrial sites, emissions are estimated from the following equation:

$$E = k\,(s/12)^a (W/3)^b \quad (1a)$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions may be estimated from the following:

$$E = \frac{k\,(s/12)^a (S/30)^d}{(M/0.5)^c} - C \quad (1b)$$

where k, a, b, c and d are empirical constants (Reference 6) given below and

E = size-specific emission factor (lb/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
S = mean vehicle speed (mph)
C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

The source characteristics s, W and M are referred to as correction parameters for adjusting the emission estimates to local conditions. The metric conversion from lb/VMT to grams (g) per vehicle kilometer traveled (VKT) is as follows:

1 lb/VMT = 281.9 g/VKT

The constants for Equations 1a and 1b based on the stated aerodynamic particle sizes are shown in Tables 13.2.2-2 and 13.2.2-4. The PM-2.5 particle size multipliers (k-factors) are taken from Reference 27.

Table 13.2.2-2. CONSTANTS FOR EQUATIONS 1a AND 1b

Constant	Industrial Roads (Equation 1a)			Public Roads (Equation 1b)		
	PM-2.5	PM-10	PM-30*	PM-2.5	PM-10	PM-30*
k (lb/VMT)	0.15	1.5	4.9	0.18	1.8	6.0
a	0.9	0.9	0.7	1	1	1
b	0.45	0.45	0.45	-	-	-
c	-	-	-	0.2	0.2	0.3
d	-	-	-	0.5	0.5	0.3
Quality Rating	B	B	B	B	B	B

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 13.2.2-2 also contains the quality ratings for the various size-specific versions of Equation 1a and 1b. The equation retains the assigned quality rating, if applied within the ranges of source conditions, shown in Table 13.2.2-3, that were tested in developing the equation:

Table 13.2.2-3. RANGE OF SOURCE CONDITIONS USED IN DEVELOPING EQUATION 1a AND 1b

Emission Factor	Surface Silt Content, %	Mean Vehicle Weight		Mean Vehicle Speed		Mean No. of Wheels	Surface Moisture Content, %
		Mg	ton	km/hr	mph		
Industrial Roads (Equation 1a)	1.8-25.2	1.8-260	2-290	8-69	5-43	4-17[a]	0.03-13
Public Roads (Equation 1b)	1.8-35	1.4-2.7	1.5-3	16-88	10-55	4-4.8	0.03-13

[a] See discussion in text.

As noted earlier, the models presented as Equations 1a and 1b were developed from tests of traffic on unpaved surfaces. Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall or watering, because of traffic-enhanced natural evaporation. (Factors influencing how fast a road dries are discussed in Section 13.2.2.3, below.) The quality ratings given above pertain to the mid-range of the measured source conditions for the equation. A higher mean vehicle weight and a higher than normal traffic rate may be justified when performing a worst-case analysis of emissions from unpaved roads.

The emission factors for the exhaust, brake wear and tire wear of a 1980's vehicle fleet (*C*) was obtained from EPA's MOBILE6.2 model [23]. The emission factor also varies with aerodynamic size range

as shown in Table 13.2.2-4

Table 13.2.2-4. EMISSION FACTOR FOR 1980'S VEHICLE FLEET EXHAUST, BRAKE WEAR AND TIRE WEAR

Particle Size Range[a]	*C*, Emission Factor for Exhaust, Brake Wear and Tire Wear[b] lb/VMT
$PM_{2.5}$	0.00036
PM_{10}	0.00047
PM_{30}[c]	0.00047

[a] Refers to airborne particulate matter (PM-x) with an aerodynamic diameter equal to or less than x micrometers.
[b] Units shown are pounds per vehicle mile traveled (lb/VMT).
[c] PM-30 is sometimes termed "suspendable particulate" (SP) and is often used as a surrogate for TSP.

It is important to note that the vehicle-related source conditions refer to the average weight, speed, and number of wheels for all vehicles traveling the road. For example, if 98 percent of traffic on the road are 2-ton cars and trucks while the remaining 2 percent consists of 20-ton trucks, then the mean weight is 2.4 tons. More specifically, Equations 1a and 1b are *not* intended to be used to calculate a separate emission factor for each vehicle class within a mix of traffic on a given unpaved road. That is, in the example, one should *not* determine one factor for the 2-ton vehicles and a second factor for the 20-ton trucks. Instead, only one emission factor should be calculated that represents the "fleet" average of 2.4 tons for all vehicles traveling the road.

Moreover, to retain the quality ratings when addressing a group of unpaved roads, it is necessary that reliable correction parameter values be determined for the road in question. The field and laboratory procedures for determining road surface silt and moisture contents are given in AP-42 Appendices C.1 and C.2. Vehicle-related parameters should be developed by recording visual observations of traffic. In some cases, vehicle parameters for industrial unpaved roads can be determined by reviewing maintenance records or other information sources at the facility.

In the event that site-specific values for correction parameters cannot be obtained, then default values may be used.In the absence of site-specific silt content information, an appropriate mean value from Table 13.2.2-1 may be used as a default value, but the quality rating of the equation is reduced by two letters. Because of significant differences found between different types of road surfaces and between different areas of the country, use of the default moisture content value of 0.5 percent in Equation 1b is discouraged. The quality rating should be downgraded two letters when the default moisture content value is used. (It is assumed that readers addressing industrial roads have access to the information needed to develop average vehicle information in Equation 1a for their facility.)

The effect of routine watering to control emissions from unpaved roads is discussed below in Section 13.2.2.3, “Controls”. However, all roads are subject to some natural mitigation because of rainfall and other precipitation. The Equation 1a and 1b emission factors can be extrapolated to annual

average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation:

$$E_{ext} = E\ [(365 - P)/365] \quad (2)$$

where:

E_{ext} = annual size-specific emission factor extrapolated for natural mitigation, lb/VMT

E = emission factor from Equation 1a or 1b

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation (see below)

Figure 13.2.2-1 gives the geographical distribution for the mean annual number of "wet" days for the United States.

Equation 2 provides an estimate that accounts for precipitation on an annual average basis for the purpose of inventorying emissions. It should be noted that Equation 2 does not account for differences in the temporal distributions of the rain events, the quantity of rain during any event, or the potential for the rain to evaporate from the road surface. In the event that a finer temporal and spatial resolution is desired for inventories of public unpaved roads, estimates can be based on a more complex set of assumptions. These assumptions include:

1. The moisture content of the road surface material is increased in proportion to the quantity of water added;
2. The moisture content of the road surface material is reduced in proportion to the Class A pan evaporation rate;
3. The moisture content of the road surface material is reduced in proportion to the traffic volume; and
4. The moisture content of the road surface material varies between the extremes observed in the area. The CHIEF Web site (http://www.epa.gov/ttn/chief/ap42/ch13/related/c13s02-2.html) has a file which contains a spreadsheet program for calculating emission factors which are temporally and spatially resolved. Information required for use of the spreadsheet program includes monthly Class A pan evaporation values, hourly meteorological data for precipitation, humidity and snow cover, vehicle traffic information, and road surface material information.

It is emphasized that the simple assumption underlying Equation 2 and the more complex set of assumptions underlying the use of the procedure which produces a finer temporal and spatial resolution have not been verified in any rigorous manner. For this reason, the quality ratings for either approach should be downgraded one letter from the rating that would be applied to Equation 1.

13.2.2.3 Controls[18-22]

A wide variety of options exist to control emissions from unpaved roads. Options fall into the following three groupings:

1. Vehicle restrictions that limit the speed, weight or number of vehicles on the road;

2. Surface improvement, by measures such as (a) paving or (b) adding gravel or slag to a dirt road; and
3. Surface treatment, such as watering or treatment with chemical dust suppressants.

Available control options span broad ranges in terms of cost, efficiency, and applicability. For example, traffic controls provide moderate emission reductions (often at little cost) but are difficult to enforce. Although paving is highly effective, its high initial cost is often prohibitive. Furthermore, paving is not feasible for industrial roads subject to very heavy vehicles and/or spillage of material in transport. Watering and chemical suppressants, on the other hand, are potentially applicable to most industrial roads at moderate to low costs. However, these require frequent reapplication to maintain an acceptable level of control. Chemical suppressants are generally more cost-effective than water but not in cases of temporary roads (which are common at mines, landfills, and construction sites). In summary, then, one needs to consider not only the type and volume of traffic on the road but also how long the road will be in service when developing control plans.

Vehicle restrictions. These measures seek to limit the amount and type of traffic present on the road or to lower the mean vehicle speed. For example, many industrial plants have restricted employees from driving on plant property and have instead instituted bussing programs. This eliminates emissions due to employees traveling to/from their worksites. Although the heavier average vehicle weight of the busses increases the base emission factor, the decrease in vehicle-miles-traveled results in a lower overall emission rate.

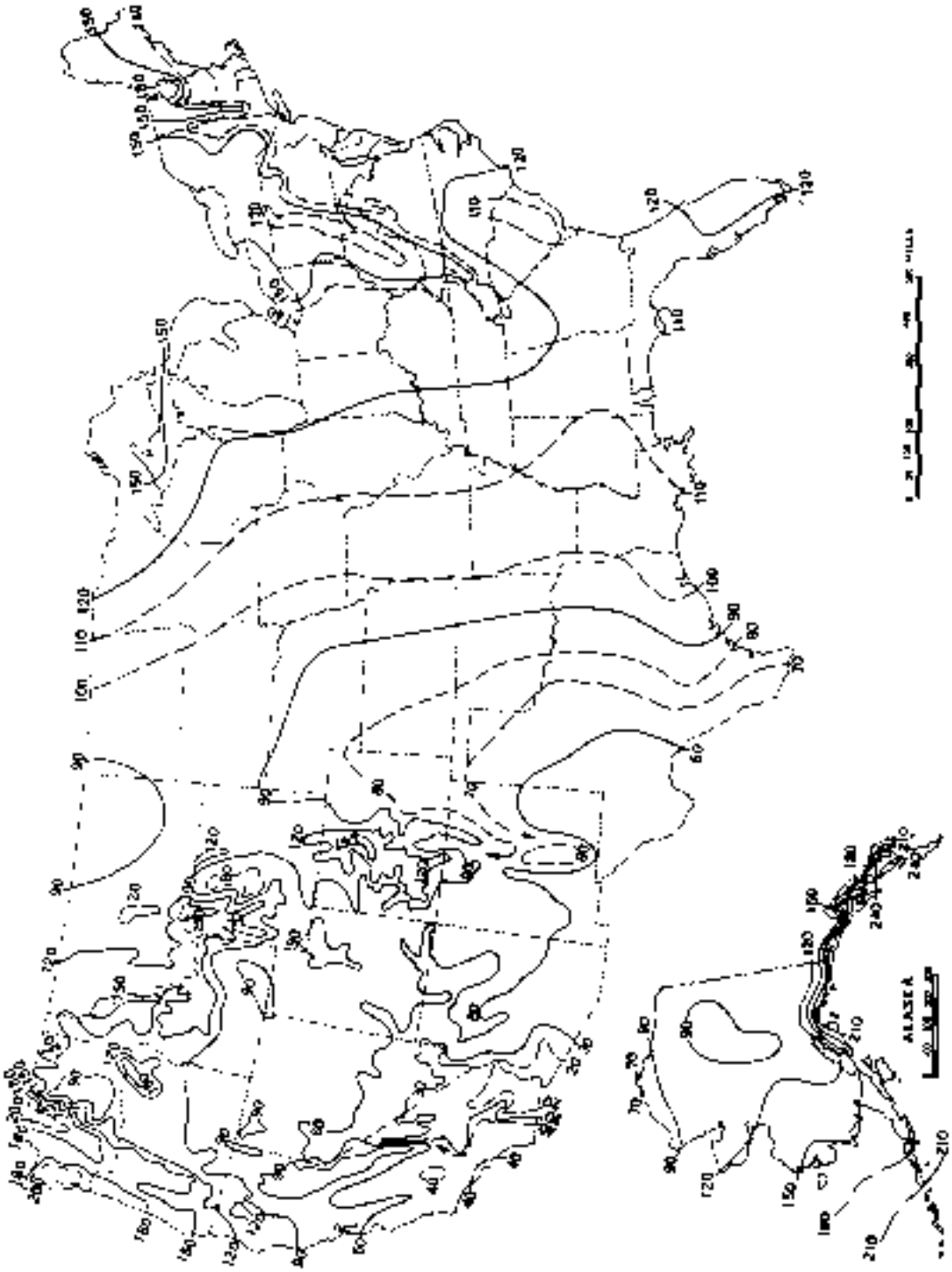

Figure 13.2.2-1. Mean number of days with 0.01 inch or more of precipitation in United States.

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DEPARTMENT ACCEPTED VALUES FOR:
AGGREGATE HANDLING, STORAGE PILE, and HAUL ROAD EMISSIONS

TO: Applicants and Air Quality Bureau Permitting Staff

SUBJECT: Department accepted default values for percent silt, wind speed, moisture content, and control efficiencies for haul road control measures

This guidance document provides the Department accepted default values for correction parameters in the emission calculation equations for aggregate handling and storage piles emissions in construction permit applications and notices of intent submitted under 20.2.72 and 20.2.73 NMAC; and the Department accepted control efficiencies for haul road control measures for applications submitted under 20.2.72 NMAC.

Aggregate Handling and Storage Pile Emission Calculations

Applicants should calculate the particulate matter emissions from aggregate handling and storage piles using the EPA's AP-42 Chapter 13.2.4.
http://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0204.pdf

Equation 1 from Chapter 13.2.4 requires users to input values for two correction parameters, U and M, where U = mean wind speed and M = material moisture content. Below are the accepted values for U and M:

Default Values for Chapter 13.2.4, Equation 1:

Parameter	Default Value
U = Mean wind speed (miles per hour)	11 mph
M = Material moisture content (% water)	2%

Applicants must receive preapproval from the Department if they wish to assume a higher moisture content and/or a lower wind speed in these calculations. Higher moisture contents may require site specific testing either as a permit condition or submitted with the application. Applicants may assume higher wind speeds and lower percent moisture content in their calculations without prior approval from the Department.

Haul Road Emissions and Control Measure Efficiencies

Applicants should calculate the particulate matter emissions from unpaved haul roads using the EPA's AP-42 Chapter 13.2.2. http://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf

Equation 1(a) from Chapter 13.2.2 requires users to input values for two correction parameters, s and W, where s = surface material silt content (%) and W = mean vehicle weight (tons). The applicant should calculate the mean vehicle weight in accordance with the chapter's instructions. Below is the accepted value for the parameter s:

Default Values for Chapter 13.2.2, Equation 1(a):

Parameter	Default Value
s = surface material silt content (%)	4.8%

Applicants may use a higher silt content without prior approval from the Department. Use of a lower silt content requires prior approval from the Department and may require site specific testing in support of the request.

Equation 2 from Chapter 13.2.2 allows users to take credit for the number of days that receive precipitation in excess of 0.01 inches, in the annual emissions calculation, where P = number of days in a year with at least 0.01 inches of precipitation.

Default Values for Chapter 13.2.2, Equation 2:

Parameter	Default Value
P = number of days in a year with at least 0.01 inches of precipitation	70 days

Applications submitted under Part 72 may request to apply control measures to reduce the particulate matter emissions from facility haul roads. Applications submitted under Part 73 may not consider any emission reduction from control measures in the potential emission rate calculation, as registrations issued under Part 73 are not federally enforceable under the Clean Air Act or the New Mexico Air Quality Control Act. In order for those control measures to be federally enforceable, the controls must be a requirement in an air quality permit.

Below are the Department accepted control efficiencies for various haul road control measures:

Haul Road Control Measures and Control Efficiency:

Control Measure	Control Efficiency
None	0%
Base course **or** watering	60%
Base course **and** watering	80%
Base course **and** surfactant	90%
Paved **and** Swept	95%

WRAP Fugitive Dust Handbook

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Fugitive Dust Control Measures Applicable for the WRAP Region

Source Category	Control Measure	Published PM10 Control Efficiency
Agricultural Tilling	Reduce tilling during high winds	1 – 5%
	Roughen surface	15 – 64%
	Modify equipment	50%
	Employ sequential cropping	50%
	Increase soil moisture	90%
	Use other conservation management practices	25 - 100%
Agricultural Harvesting	Limited activity during high winds	5 – 70%
	Modify equipment	50%
	Night farming	10%
	New techniques for drying fruit	25 –60%
Construction/Demolition	Water unpaved surfaces	10 – 74%
	Limit on-site vehicle speed to 15 mph	57%
	Apply dust suppressant to unpaved areas	84%
	Prohibit activities during high winds	98%
Materials Handling	Implement wet suppression	50 – 90%
	Erect 3-sided enclosure around storage piles	75%
	Cover storage pile with a tarp during high winds	90%
Paved Roads	Sweep streets	4 – 26%
	Minimize trackout	40 – 80%
	Remove deposits on road ASAP	> 90%
Unpaved Roads	Limit vehicle speed to 25 mph	44%
	Apply water	10 – 74%
	Apply dust suppressant	84%
	Pave the surface	>90%
Mineral Products Industry	Cyclone or muliclone	68 –79%
	Wet scrubber	78 –98%
	Fabric filter	99 – 99.8%
	Electrostatic precipitator	90 – 99.5%
Abrasive Blasting	Water spray	50 – 93%
	Fabric filter	> 95%
Livestock Husbandry	Daily watering of corrals and pens	> 10%
	Add wood chips or mulch to working pens	> 10%
Wind Erosion (agricultural, open area, and storage piles)	Plant trees or shrubs as a windbreak	25%
	Create cross-wind ridges	24 – 93%
	Erect artificial wind barriers	4 – 88%
	Apply dust suppressant or gravel	84%
	Revegetate; apply cover crop	90%
	Water exposed area before high winds	90%

13.2.4 Aggregate Handling And Storage Piles

13.2.4.1 General

Inherent in operations that use minerals in aggregate form is the maintenance of outdoor storage piles. Storage piles are usually left uncovered, partially because of the need for frequent material transfer into or out of storage.

Dust emissions occur at several points in the storage cycle, such as material loading onto the pile, disturbances by strong wind currents, and loadout from the pile. The movement of trucks and loading equipment in the storage pile area is also a substantial source of dust.

13.2.4.2 Emissions And Correction Parameters

The quantity of dust emissions from aggregate storage operations varies with the volume of aggregate passing through the storage cycle. Emissions also depend on 3 parameters of the condition of a particular storage pile: age of the pile, moisture content, and proportion of aggregate fines.

When freshly processed aggregate is loaded onto a storage pile, the potential for dust emissions is at a maximum. Fines are easily disaggregated and released to the atmosphere upon exposure to air currents, either from aggregate transfer itself or from high winds. As the aggregate pile weathers, however, potential for dust emissions is greatly reduced. Moisture causes aggregation and cementation of fines to the surfaces of larger particles. Any significant rainfall soaks the interior of the pile, and then the drying process is very slow.

Silt (particles equal to or less than 75 micrometers [μm] in diameter) content is determined by measuring the portion of dry aggregate material that passes through a 200-mesh screen, using ASTM-C-136 method.[1] Table 13.2.4-1 summarizes measured silt and moisture values for industrial aggregate materials.

Table 13.2.4-1. TYPICAL SILT AND MOISTURE CONTENTS OF MATERIALS AT VARIOUS INDUSTRIES[a]

Industry	No. Of Facilities	Material	Silt Content (%)			Moisture Content (%)		
			No. Of Samples	Range	Mean	No. Of Samples	Range	Mean
Iron and steel production	9	Pellet ore	13	1.3 - 13	4.3	11	0.64 - 4.0	2.2
		Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.0	5.4
		Coal	12	2.0 - 7.7	4.6	11	2.8 - 11	4.8
		Slag	3	3.0 - 7.3	5.3	3	0.25 - 2.0	0.92
		Flue dust	3	2.7 - 23	13	1	—	7
		Coke breeze	2	4.4 - 5.4	4.9	2	6.4 - 9.2	7.8
		Blended ore	1	—	15	1	—	6.6
		Sinter	1	—	0.7	0	—	—
		Limestone	3	0.4 - 2.3	1.0	2	ND	0.2
Stone quarrying and processing	2	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
		Various limestone products	8	0.8 - 14	3.9	8	0.46 - 5.0	2.1
Taconite mining and processing	1	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.0	0.9
		Tailings	2	ND	11	1	—	0.4
Western surface coal mining	4	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
		Overburden	15	3.8 - 15	7.5	0	—	—
		Exposed ground	3	5.1 - 21	15	3	0.8 - 6.4	3.4
Coal-fired power plant	1	Coal (as received)	60	0.6 - 4.8	2.2	59	2.7 - 7.4	4.5
Municipal solid waste landfills	4	Sand	1	—	2.6	1	—	7.4
		Slag	2	3.0 - 4.7	3.8	2	2.3 - 4.9	3.6
		Cover	5	5.0 - 16	9.0	5	8.9 - 16	12
		Clay/dirt mix	1	—	9.2	1	—	14
		Clay	2	4.5 - 7.4	6.0	2	8.9 - 11	10
		Fly ash	4	78 - 81	80	4	26 - 29	27
		Misc. fill materials	1	—	12	1	—	11

[a] References 1-10. ND = no data.

13.2.4.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles result from several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

The quantity of particulate emissions generated by either type of drop operation, per kilogram (kg) (ton) of material transferred, may be estimated, with a rating of A, using the following empirical expression:[11]

$$E = k(0.0016) \frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (kg/megagram [Mg])} \quad (1)$$

$$E = k(0.0032) \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \text{ (pound [lb]/ton)}$$

where:

E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, meters per second (m/s) (miles per hour [mph])
M = material moisture content (%)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k) For Equation 1				
< 30 μm	< 15 μm	< 10 μm	< 5 μm	< 2.5 μm
0.74	0.48	0.35	0.20	0.053[a]

[a] Multiplier for < 2.5 μm taken from Reference 14.

The equation retains the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equation, as follows. Note that silt content is included, even though silt content does not appear as a correction parameter in the equation. While it is reasonable to expect that silt content and emission factors are interrelated, no significant correlation between the 2 was found during the derivation of the equation, probably because most tests with high silt contents were conducted under lower winds, and vice versa. It is recommended that estimates from the equation be reduced 1 quality rating level if the silt content used in a particular application falls outside the range given:

Ranges Of Source Conditions For Equation 1			
Silt Content (%)	Moisture Content (%)	Wind Speed	
		m/s	mph
0.44 - 19	0.25 - 4.8	0.6 - 6.7	1.3 - 15

To retain the quality rating of the equation when it is applied to a specific facility, reliable correction parameters must be determined for specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site-specific values for

correction parameters cannot be obtained, the appropriate mean from Table 13.2.4-1 may be used, but the quality rating of the equation is reduced by 1 letter.

For emissions from equipment traffic (trucks, front-end loaders, dozers, etc.) traveling between or on piles, it is recommended that the equations for vehicle traffic on unpaved surfaces be used (see Section 13.2.2). For vehicle travel between storage piles, the silt value(s) for the areas among the piles (which may differ from the silt values for the stored materials) should be used.

Worst-case emissions from storage pile areas occur under dry, windy conditions. Worst-case emissions from materials-handling operations may be calculated by substituting into the equation appropriate values for aggregate material moisture content and for anticipated wind speeds during the worst case averaging period, usually 24 hours. The treatment of dry conditions for Section 13.2.2, vehicle traffic, "Unpaved Roads", follows the methodology described in that section centering on parameter p. A separate set of nonclimatic correction parameters and source extent values corresponding to higher than normal storage pile activity also may be justified for the worst-case averaging period.

13.2.4.4 Controls[12-13]

Watering and the use of chemical wetting agents are the principal means for control of aggregate storage pile emissions. Enclosure or covering of inactive piles to reduce wind erosion can also reduce emissions. Watering is useful mainly to reduce emissions from vehicle traffic in the storage pile area. Watering of the storage piles themselves typically has only a very temporary slight effect on total emissions. A much more effective technique is to apply chemical agents (such as surfactants) that permit more extensive wetting. Continuous chemical treating of material loaded onto piles, coupled with watering or treatment of roadways, can reduce total particulate emissions from aggregate storage operations by up to 90 percent.[12]

References For Section 13.2.4

1. C. Cowherd, Jr., *et al., Development Of Emission Factors For Fugitive Dust Sources*, EPA-450/3-74-037, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

2. R. Bohn, *et al., Fugitive Emissions From Integrated Iron And Steel Plants*, EPA-600/2-78-050, U. S. Environmental Protection Agency, Cincinnati, OH, March 1978.

3. C. Cowherd, Jr., *et al., Iron And Steel Plant Open Dust Source Fugitive Emission Evaluation*, EPA-600/2-79-103, U. S. Environmental Protection Agency, Cincinnati, OH, May 1979.

4. *Evaluation Of Open Dust Sources In The Vicinity Of Buffalo, New York*, EPA Contract No. 68-02-2545, Midwest Research Institute, Kansas City, MO, March 1979.

5. C. Cowherd, Jr., and T. Cuscino, Jr., *Fugitive Emissions Evaluation*, MRI-4343-L, Midwest Research Institute, Kansas City, MO, February 1977.

6. T. Cuscino, Jr., *et al., Taconite Mining Fugitive Emissions Study*, Minnesota Pollution Control Agency, Roseville, MN, June 1979.

7. *Improved Emission Factors For Fugitive Dust From Western Surface Coal Mining Sources*, 2 Volumes, EPA Contract No. 68-03-2924, PEDCo Environmental, Kansas City, MO, and Midwest Research Institute, Kansas City, MO, July 1981.

8. *Determination Of Fugitive Coal Dust Emissions From Rotary Railcar Dumping*, TRC, Hartford, CT, May 1984.

9. *PM-10 Emission Inventory Of Landfills In the Lake Calumet Area*, EPA Contract No. 68-02-3891, Midwest Research Institute, Kansas City, MO, September 1987.

10. *Chicago Area Particulate Matter Emission Inventory — Sampling And Analysis*, EPA Contract No. 68-02-4395, Midwest Research Institute, Kansas City, MO, May 1988.

11. *Update Of Fugitive Dust Emission Factors In AP-42 Section 11.2*, EPA Contract No. 68-02-3891, Midwest Research Institute, Kansas City, MO, July 1987.

12. G. A. Jutze, *et al., Investigation Of Fugitive Dust Sources Emissions And Control*, EPA-450/3-74-036a, U. S. Environmental Protection Agency, Research Triangle Park, NC, June 1974.

13. C. Cowherd, Jr., *et al., Control Of Open Fugitive Dust Sources*, EPA-450/3-88-008, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 1988.

14. C. Cowherd, *Background Document for Revisions to Fine Fraction Ratios &sed for AP-42 Fugitive Dust Emission Factors*. Prepared by Midwest Research Institute for Western Governors Association, Western Regional Air Partnership, Denver, CO, February 1, 2006.

3.3 Gasoline And Diesel Industrial Engines

3.3.1 General

The engine category addressed by this section covers a wide variety of industrial applications of both gasoline and diesel internal combustion (IC) engines such as aerial lifts, fork lifts, mobile refrigeration units, generators, pumps, industrial sweepers/scrubbers, material handling equipment (such as conveyors), and portable well-drilling equipment. The three primary fuels for reciprocating IC engines are gasoline, diesel fuel oil (No.2), and natural gas. Gasoline is used primarily for mobile and portable engines. Diesel fuel oil is the most versatile fuel and is used in IC engines of all sizes. The rated power of these engines covers a rather substantial range, up to 250 horsepower (hp) for gasoline engines and up to 600 hp for diesel engines. (Diesel engines greater than 600 hp are covered in Section 3.4, "Large Stationary Diesel And All Stationary Dual-fuel Engines".) Understandably, substantial differences in engine duty cycles exist. It was necessary, therefore, to make reasonable assumptions concerning usage in order to formulate some of the emission factors.

3.3.2 Process Description

All reciprocating IC engines operate by the same basic process. A combustible mixture is first compressed in a small volume between the head of a piston and its surrounding cylinder. The mixture is then ignited, and the resulting high-pressure products of combustion push the piston through the cylinder. This movement is converted from linear to rotary motion by a crankshaft. The piston returns, pushing out exhaust gases, and the cycle is repeated.

There are 2 methods used for stationary reciprocating IC engines: compression ignition (CI) and spark ignition (SI). This section deals with both types of reciprocating IC engines. All diesel-fueled engines are compression ignited, and all gasoline-fueled engines are spark ignited.

In CI engines, combustion air is first compression heated in the cylinder, and diesel fuel oil is then injected into the hot air. Ignition is spontaneous because the air temperature is above the autoignition temperature of the fuel. SI engines initiate combustion by the spark of an electrical discharge. Usually the fuel is mixed with the air in a carburetor (for gasoline) or at the intake valve (for natural gas), but occasionally the fuel is injected into the compressed air in the cylinder.

CI engines usually operate at a higher compression ratio (ratio of cylinder volume when the piston is at the bottom of its stroke to the volume when it is at the top) than SI engines because fuel is not present during compression; hence there is no danger of premature autoignition. Since engine thermal efficiency rises with increasing pressure ratio (and pressure ratio varies directly with compression ratio), CI engines are more efficient than SI engines. This increased efficiency is gained at the expense of poorer response to load changes and a heavier structure to withstand the higher pressures.[1]

3.3.3 Emissions

Most of the pollutants from IC engines are emitted through the exhaust. However, some total organic compounds (TOC) escape from the crankcase as a result of blowby (gases that are vented from the oil pan after they have escaped from the cylinder past the piston rings) and from the fuel tank and carburetor because of evaporation. Nearly all of the TOCs from diesel CI engines enter the

atmosphere from the exhaust. Evaporative losses are insignificant in diesel engines due to the low volatility of diesel fuels.

The primary pollutants from internal combustion engines are oxides of nitrogen (NO_x), total organic compounds (TOC), carbon monoxide (CO), and particulates, which include both visible (smoke) and nonvisible emissions. Nitrogen oxide formation is directly related to high pressures and temperatures during the combustion process and to the nitrogen content, if any, of the fuel. The other pollutants, HC, CO, and smoke, are primarily the result of incomplete combustion. Ash and metallic additives in the fuel also contribute to the particulate content of the exhaust. Sulfur oxides (SO_x) also appear in the exhaust from IC engines. The sulfur compounds, mainly sulfur dioxide (SO_2), are directly related to the sulfur content of the fuel.[2]

3.3.3.1 Nitrogen Oxides -

Nitrogen oxide formation occurs by two fundamentally different mechanisms. The predominant mechanism with internal combustion engines is thermal NO_x which arises from the thermal dissociation and subsequent reaction of nitrogen (N_2) and oxygen (O_2) molecules in the combustion air. Most thermal NO_x is formed in the high-temperature region of the flame from dissociated molecular nitrogen in the combustion air. Some NO_x, called prompt NO_x, is formed in the early part of the flame from reaction of nitrogen intermediary species, and HC radicals in the flame. The second mechanism, fuel NO_x, stems from the evolution and reaction of fuel-bound nitrogen compounds with oxygen. Gasoline, and most distillate oils have no chemically-bound fuel N_2 and essentially all NO_x formed is thermal NO_x.

3.3.3.2 Total Organic Compounds -

The pollutants commonly classified as hydrocarbons are composed of a wide variety of organic compounds and are discharged into the atmosphere when some of the fuel remains unburned or is only partially burned during the combustion process. Most unburned hydrocarbon emissions result from fuel droplets that were transported or injected into the quench layer during combustion. This is the region immediately adjacent to the combustion chamber surfaces, where heat transfer outward through the cylinder walls causes the mixture temperatures to be too low to support combustion.

Partially burned hydrocarbons can occur because of poor air and fuel homogeneity due to incomplete mixing, before or during combustion; incorrect air/fuel ratios in the cylinder during combustion due to maladjustment of the engine fuel system; excessively large fuel droplets (diesel engines); and low cylinder temperature due to excessive cooling (quenching) through the walls or early cooling of the gases by expansion of the combustion volume caused by piston motion before combustion is completed.[2]

3.3.3.3 Carbon Monoxide -

Carbon monoxide is a colorless, odorless, relatively inert gas formed as an intermediate combustion product that appears in the exhaust when the reaction of CO to CO_2 cannot proceed to completion. This situation occurs if there is a lack of available oxygen near the hydrocarbon (fuel) molecule during combustion, if the gas temperature is too low, or if the residence time in the cylinder is too short. The oxidation rate of CO is limited by reaction kinetics and, as a consequence, can be accelerated only to a certain extent by improvements in air and fuel mixing during the combustion process.[2-3]

3.3.3.4 Smoke and Particulate Matter -

White, blue, and black smoke may be emitted from IC engines. Liquid particulates appear as white smoke in the exhaust during an engine cold start, idling, or low load operation. These are formed in the quench layer adjacent to the cylinder walls, where the temperature is not high enough to ignite the fuel. Blue smoke is emitted when lubricating oil leaks, often past worn piston rings, into the combustion chamber and is partially burned. Proper maintenance is the most effective method of preventing blue smoke emissions from all types of IC engines. The primary constituent of black smoke is agglomerated carbon particles (soot) formed in regions of the combustion mixtures that are oxygen deficient.[2]

3.3.3.5 Sulfur Oxides -

Sulfur oxides emissions are a function of only the sulfur content in the fuel rather than any combustion variables. In fact, during the combustion process, essentially all the sulfur in the fuel is oxidized to SO_2. The oxidation of SO_2 gives sulfur trioxide (SO_3), which reacts with water to give sulfuric acid (H_2SO_4), a contributor to acid precipitation. Sulfuric acid reacts with basic substances to give sulfates, which are fine particulates that contribute to PM-10 and visibility reduction. Sulfur oxide emissions also contribute to corrosion of the engine parts.[2-3]

3.3.4 Control Technologies

Control measures to date are primarily directed at limiting NO_x and CO emissions since they are the primary pollutants from these engines. From a NO_x control viewpoint, the most important distinction between different engine models and types of reciprocating engines is whether they are rich-burn or lean-burn. Rich-burn engines have an air-to-fuel ratio operating range that is near stoichiometric or fuel-rich of stoichiometric and as a result the exhaust gas has little or no excess oxygen. A lean-burn engine has an air-to-fuel operating range that is fuel-lean of stoichiometric; therefore, the exhaust from these engines is characterized by medium to high levels of O_2. The most common NO_x control technique for diesel and dual-fuel engines focuses on modifying the combustion process. However, selective catalytic reduction (SCR) and nonselective catalytic reduction (NSCR) which are post-combustion techniques are becoming available. Controls for CO have been partly adapted from mobile sources.[4]

Combustion modifications include injection timing retard (ITR), preignition chamber combustion (PCC), air-to-fuel ratio adjustments, and derating. Injection of fuel into the cylinder of a CI engine initiates the combustion process. Retarding the timing of the diesel fuel injection causes the combustion process to occur later in the power stroke when the piston is in the downward motion and combustion chamber volume is increasing. By increasing the volume, the combustion temperature and pressure are lowered, thereby lowering NO_x formation. ITR reduces NO_x from all diesel engines; however, the effectiveness is specific to each engine model. The amount of NO_x reduction with ITR diminishes with increasing levels of retard.[4]

Improved swirl patterns promote thorough air and fuel mixing and may include a precombustion chamber (PCC). A PCC is an antechamber that ignites a fuel-rich mixture that propagates to the main combustion chamber. The high exit velocity from the PCC results in improved mixing and complete combustion of the lean air/fuel mixture which lowers combustion temperature, thereby reducing NO_x emissions.[4]

The air-to-fuel ratio for each cylinder can be adjusted by controlling the amount of fuel that enters each cylinder. At air-to-fuel ratios less than stoichiometric (fuel-rich), combustion occurs under conditions of insufficient oxygen which causes NO_x to decrease because of lower oxygen and lower temperatures. Derating involves restricting the engine operation to lower than normal levels of power production for the given application. Derating reduces cylinder pressures and temperatures, thereby lowering NO_x formation rates.[4]

SCR is an add-on NO_x control placed in the exhaust stream following the engine and involves injecting ammonia (NH_3) into the flue gas. The NH_3 reacts with NO_x in the presence of a catalyst to form water and nitrogen. The effectiveness of SCR depends on fuel quality and engine duty cycle (load fluctuations). Contaminants in the fuel may poison or mask the catalyst surface causing a reduction or termination in catalyst activity. Load fluctuations can cause variations in exhaust temperature and NO_x concentration which can create problems with the effectiveness of the SCR system.[4]

NSCR is often referred to as a three-way conversion catalyst system because the catalyst reactor simultaneously reduces NO_x, CO, and HC and involves placing a catalyst in the exhaust stream of the engine. The reaction requires that the O_2 levels be kept low and that the engine be operated at fuel-rich air-to-fuel ratios.[4]

The most accurate method for calculating such emissions is on the basis of "brake-specific" emission factors (pounds per horsepower-hour [lb/hp-hr]). Emissions are the product of the brake-specific emission factor, the usage in hours, the rated power available, and the load factor (the power actually used divided by the power available). However, for emission inventory purposes, it is often easier to assess this activity on the basis of fuel used.

Once reasonable usage and duty cycles for this category were ascertained, emission values were aggregated to arrive at the factors for criteria and organic pollutants presented. Factors in Table 3.3-1 are in pounds per million British thermal unit (lb/MMBtu). Emission data for a specific design type were weighted according to estimated material share for industrial engines. The emission factors in these tables, because of their aggregate nature, are most appropriately applied to a population of industrial engines rather than to an individual power plant. Table 3.3-2 shows unweighted speciated organic compound and air toxic emission factors based upon only 2 engines. Their inclusion in this section is intended for rough order-of-magnitude estimates only.

Table 3.3-3 summarizes whether the various diesel emission reduction technologies (some of which may be applicable to gasoline engines) will generally increase or decrease the selected parameter. These technologies are categorized into fuel modifications, engine modifications, and exhaust after-treatments. Current data are insufficient to quantify the results of the modifications. Table 3.3-3 provides general information on the trends of changes on selected parameters.

3.3.5 Updates Since the Fifth Edition

The Fifth Edition was released in January 1995. Revisions to this section since that date are summarized below. For further detail, consult the memoranda describing each supplement or the background report for this section.

Supplement A, February 1996

No changes.

Supplement B, October 1996

- Text was revised concerning emissions and controls.
- The CO_2 emission factor was adjusted to reflect 98.5 percent conversion efficiency.

Table 3.3-1. EMISSION FACTORS FOR UNCONTROLLED GASOLINE AND DIESEL INDUSTRIAL ENGINES[a]

Pollutant	Gasoline Fuel (SCC 2-02-003-01, 2-03-003-01)		Diesel Fuel (SCC 2-02-001-02, 2-03-001-01)		EMISSION FACTOR RATING
	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	Emission Factor (lb/hp-hr) (power output)	Emission Factor (lb/MMBtu) (fuel input)	
NO_x	0.011	1.63	0.031	4.41	D
CO	6.96 E-03[d]	0.99[d]	6.68 E-03	0.95	D
SO_x	5.91 E-04	0.084	2.05 E-03	0.29	D
PM-10[b]	7.21 E-04	0.10	2.20 E-03	0.31	D
CO_2[c]	1.08	154	1.15	164	B
Aldehydes	4.85 E-04	0.07	4.63 E-04	0.07	D
TOC					
Exhaust	0.015	2.10	2.47 E-03	0.35	D
Evaporative	6.61 E-04	0.09	0.00	0.00	E
Crankcase	4.85 E-03	0.69	4.41 E-05	0.01	E
Refueling	1.08 E-03	0.15	0.00	0.00	E

[a] References 2,5-6,9-14. When necessary, an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr was used to convert from lb/MMBtu to lb/hp-hr. To convert from lb/hp-hr to kg/kw-hr, multiply by 0.608. To convert from lb/MMBtu to ng/J, multiply by 430. SCC = Source Classification Code. TOC = total organic compounds.

[b] PM-10 = particulate matter less than or equal to 10 μm aerodynamic diameter. All particulate is assumed to be ≤ 1 μm in size.

[c] Assumes 99% conversion of carbon in fuel to CO_2 with 87 weight % carbon in diesel, 86 weight % carbon in gasoline, average BSFC of 7,000 Btu/hp-hr, diesel heating value of 19,300 Btu/lb, and gasoline heating value of 20,300 Btu/lb.

[d] Instead of 0.439 lb/hp-hr (power output) and 62.7 lb/mmBtu (fuel input), the correct emissions factors values are 6.96 E-03 lb/hp-hr (power output) and 0.99 lb/mmBtu (fuel input), respectively. This is an editorial correction. March 24, 2009

Table 3.3-2. SPECIATED ORGANIC COMPOUND EMISSION FACTORS FOR UNCONTROLLED DIESEL ENGINES[a]

EMISSION FACTOR RATING: E

Pollutant	Emission Factor (Fuel Input) (lb/MMBtu)
Benzene[b]	9.33 E-04
Toluene[b]	4.09 E-04
Xylenes[b]	2.85 E-04
Propylene	2.58 E-03
1,3-Butadiene[b,c]	<3.91 E-05
Formaldehyde[b]	1.18 E-03
Acetaldehyde[b]	7.67 E-04
Acrolein[b]	<9.25 E-05
Polycyclic aromatic hydrocarbons (PAH)	
Naphthalene[b]	8.48 E-05
Acenaphthylene	<5.06 E-06
Acenaphthene	<1.42 E-06
Fluorene	2.92 E-05
Phenanthrene	2.94 E-05
Anthracene	1.87 E-06
Fluoranthene	7.61 E-06
Pyrene	4.78 E-06
Benzo(a)anthracene	1.68 E-06
Chrysene	3.53 E-07
Benzo(b)fluoranthene	<9.91 E-08
Benzo(k)fluoranthene	<1.55 E-07
Benzo(a)pyrene	<1.88 E-07
Indeno(1,2,3-cd)pyrene	<3.75 E-07
Dibenz(a,h)anthracene	<5.83 E-07
Benzo(g,h,l)perylene	<4.89 E-07
TOTAL PAH	1.68 E-04

[a] Based on the uncontrolled levels of 2 diesel engines from References 6-7. Source Classification Codes 2-02-001-02, 2-03-001-01. To convert from lb/MMBtu to ng/J, multiply by 430.
[b] Hazardous air pollutant listed in the *Clean Air Act*.
[c] Based on data from 1 engine.

Table 3.3-3. EFFECT OF VARIOUS EMISSION CONTROL TECHNOLOGIES ON DIESEL ENGINES[a]

Technology	Affected Parameter	
	Increase	Decrease
Fuel modifications		
Sulfur content increase	PM, wear	
Aromatic content increase	PM, NO_x	
Cetane number		PM, NO_x
10% and 90% boiling point		PM
Fuel additives		PM, NO_x
Water/Fuel emulsions		NO_x
Engine modifications		
Injection timing retard	PM, BSFC	NO_x, power
Fuel injection pressure	PM, NO_x	
Injection rate control		NO_x, PM
Rapid spill nozzles		PM
Electronic timing & metering		NO_x, PM
Injector nozzle geometry		PM
Combustion chamber modifications		NO_x, PM
Turbocharging	PM, power	NO_x
Charge cooling		NO_x
Exhaust gas recirculation	PM, power, wear	NO_x
Oil consumption control		PM, wear
Exhaust after-treatment		
Particulate traps		PM
Selective catalytic reduction		NO_x
Oxidation catalysts		TOC, CO, PM

[a] Reference 8. PM = particulate matter. BSFC = brake-specific fuel consumption.

References For Section 3.3

1. H. I. Lips, *et al., Environmental Assessment Of Combustion Modification Controls For Stationary Internal Combustion Engines*, EPA-600/7-81-127, U. S. Environmental Protection Agency, Cincinnati, OH, July 1981.

2. *Standards Support And Environmental Impact Statement, Volume 1: Stationary Internal Combustion Engines*, EPA-450/2-78-125a, U. S. Environmental Protection Agency, Research Triangle Park, NC, July 1979.

3. M. Hoggan, *et al., Air Quality Trends In California's South Coast And Southeast Desert Air Basins, 1976-1990, Air Quality Management Plan, Appendix II-B*, South Coast Air Quality Management District, July 1991.

4. R. B. Snyder, *Alternative Control Techniques Document .. NO_x Emissions From Stationary Reciprocating Internal Combustion Engines*, EPA-453/R-93-032, U. S. Environmental Protection Agency, Research Triangle Park, July 1993.

5. C. T. Hare and K. J. Springer, *Exhaust Emissions From Uncontrolled Vehicles And Related Equipment Using Internal Combustion Engines, Part 5: Farm, Construction, And Industrial Engines*, APTD-1494, U. S. Environmental Protection Agency, Research Triangle Park, NC, October 1973.

6. *Pooled Source Emission Test Report: Oil And Gas Production Combustion Sources, Fresno And Ventura Counties, California*, ENSR 7230-007-700, Western States Petroleum Association, Bakersfield, CA, December 1990.

7. W. E. Osborn and M. D. McDannel, *Emissions Of Air Toxic Species: Test Conducted Under AB2588 For The Western States Petroleum Association*, CR 72600-2061, Western States Petroleum Association, Glendale, CA, May 1990.

8. *Technical Feasibility Of Reducing NO_x And Particulate Emissions From Heavy-duty Engines*, CARB Contract A132-085, California Air Resources Board, Sacramento, CA, March 1992.

9. G. Marland and R. M. Rotty, *Carbon Dioxide Emissions From Fossil Fuels: A Procedure For Estimation And Results For 1951-1981*, DOE/NBB-0036 TR-003, Carbon Dioxide Research Division, Office of Energy Research, U. S. Department of Energy, Oak Ridge, TN, 1983.

10. A. Rosland, *Greenhouse Gas Emissions in Norway: Inventories and Estimation Methods*, Oslo: Ministry of Environment, 1993.

11. *Sector-Specific Issues and Reporting Methodologies Supporting the General Guidelines for the Voluntary Reporting of Greenhouse Gases under Section 1605(b) of the Energy Policy Act of 1992* (1994) DOE/PO-0028, Volume 2 of 3, U.S. Department of Energy.

12. G. Marland and R. M. Rotty, *Carbon Dioxide Emissions From Fossil Fuels: A Procedure For Estimation And Results For 1950-1982*, Tellus 36B:232-261, 1984.

13. *Inventory Of U. S. Greenhouse Gas Emissions And Sinks: 1990-1991*, EPA-230-R-96-006, U. S. Environmental Protection Agency, Washington, DC, November 1995.

14. *IPCC Guidelines For National Greenhouse Gas Inventories Workbook*, Intergovernmental Panel on Climate Change/Organization for Economic Cooperation and Development, Paris, France, 1995.

Nonroad Compression-Ignition Engines: Exhaust Emission Standards

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr)	NOx (g/kW-hr)	PM (g/kW-hr)	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	kW < 8	1	2000-2004	-	10.5	-	1.0	8.0	20/15/50	3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	8.0			
		4	2008+	-	7.5	-	0.40 [c]	8.0			
	8 ≤ kW < 19	1	2000-2004	-	9.5	-	0.80	6.6		3,000/5	1,500/2
		2	2005-2007	-	7.5	-	0.80	6.6			
		4	2008+	-	7.5	-	0.40	6.6			
	19 ≤ kW < 37	1	1999-2003	-	9.5	-	0.80	5.5		5,000/7 [d]	3,000/5 [e]
		2	2004-2007	-	7.5	-	0.60	5.5			
		4	2008-2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
	37 ≤ kW < 56	1	1998-2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004-2007	-	7.5	-	0.40	5.0			
		3 [f]	2008-2011	-	4.7	-	0.40	5.0			
		4 (Option 1) [g]	2008-2012	-	4.7	-	0.30	5.0			
		4 (Option 2) [g]	2012	-	4.7	-	0.03	5.0			
		4	2013+	-	4.7	-	0.03	5.0			
	56 ≤ kW < 75	1	1998-2003	-	-	9.2	-	-			
		2	2004-2007	-	7.5	-	0.40	5.0			
		3	2008-2011	-	4.7	-	0.40	5.0			
		4	2012-2013 [h]	-	4.7	-	0.02	5.0			
			2014+ [i]	0.19	-	0.40	0.02	5.0			
	75 ≤ kW < 130	1	1997-2002	-	-	9.2	-	-			
		2	2003-2006	-	6.6	-	0.30	5.0			
		3	2007-2011	-	4.0	-	0.30	5.0			
		4	2012-2013 [h]	-	4.0	-	0.02	5.0			
			2014+	0.19	-	0.40	0.02	5.0			

Continued

	Rated Power (kW)	Tier	Model Year	NMHC (g/kW-hr)	NMHC + NOx (g/kW-hr	NOx (g/kW-hr	PM (g/kW-hr	CO (g/kW-hr)	Smoke [a] (Percentage)	Useful Life (hours /years) [b]	Warranty Period (hours /years) [b]
Federal	130 ≤ kW < 225	1	1996-2002	1.3 [j]	-	9.2	0.54	11.4	20/15/50	8,000/10	3,000/5
		2	2003-2005	-	6.6	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	225 ≤ kW < 450	1	1996-2000	1.3 [j]	-	9.2	0.54	11.4			
		2	2001-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	450 ≤ kW < 560	1	1996-2001	1.3 [j]	-	9.2	0.54	11.4			
		2	2002-2005	-	6.4	-	0.20	3.5			
		3	2006-2010	-	4.0	-	0.20	3.5			
		4	2011-2013 [h]	-	4.0	-	0.02	3.5			
			2014+ [i]	0.19	-	0.40	0.02	3.5			
	560 ≤ kW < 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			
	kW > 900	1	2000-2005	1.3 [j]	-	9.2	0.54	11.4			
		2	2006-2010	-	6.4	-	0.20	3.5			
		4	2011-2014	0.40	-	3.5 [k]	0.10	3.5			
			2015+ [i]	0.19	-	3.5 [k]	0.04 [l]	3.5			

Notes on following page.

Notes:

- For Tier 1, 2, and 3 standards, exhaust emissions of nitrogen oxides (NOx), carbon monoxide (CO), hydrocarbons (HC), and non-methane hydrocarbons (NMHC) are measured using the procedures in 40 Code of Federal Regulations (CFR) Part 89 Subpart E. For Tier 1, 2, and 3 standards, particulate matter (PM) exhaust emissions are measured using the California Regulations for New 1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines.
- For Tier 4 standards, engines are tested for transient and steady-state exhaust emissions using the procedures in 40 CFR Part 1039 Subpart F. Transient standards do not apply to engines below 37 kilowatts (kW) before the 2013 model year, constant-speed engines, engines certified to Option 1, and engines above 560 kW.
- Tier 2 and later model naturally aspirated nonroad engines shall not discharge crankcase emissions into the atmosphere unless these emissions are permanently routed into the exhaust. This prohibition does not apply to engines using turbochargers, pumps, blowers, or superchargers.
- In lieu of the Tier 1, 2, and 3 standards for NOX, NMHC + NOX, and PM, manufacturers may elect to participate in the averaging, banking, and trading (ABT) program described in 40 CFR Part 89 Subpart C.

a Smoke emissions may not exceed 20 percent during the acceleration mode, 15 percent during the lugging mode, and 50 percent during the peaks in either mode. Smoke emission standards do not apply to single-cylinder engines, constant-speed engines, or engines certified to a PM emission standard of 0.07 grams per kilowatt-hour (g/kW-hr) or lower. Smoke emissions are measured using procedures in 40 CFR Part 86 Subpart I.

b Useful life and warranty period are expressed hours and years, whichever comes first.

c Hand-startable air-cooled direct injection engines may optionally meet a PM standard of 0.60 g/kW-hr. These engines may optionally meet Tier 2 standards through the 2009 model years. In 2010 these engines are required to meet a PM standard of 0.60 g/kW-hr.

d Useful life for constant speed engines with rated speed 3,000 revolutions per minute (rpm) or higher is 5 years or 3,000 hours, whichever comes first.

e Warranty period for constant speed engines with rated speed 3,000 rpm or higher is 2 years or 1,500 hours, whichever comes first.

f These Tier 3 standards apply only to manufacturers selecting Tier 4 Option 2. Manufacturers selecting Tier 4 Option 1 will be meeting those standards in lieu of Tier 3 standards.

g A manufacturer may certify all their engines to either Option 1 or Option 2 sets of standards starting in the indicated model year. Manufacturers selecting Option 2 must meet Tier 3 standards in the 2008-2011 model years.

h These standards are phase-out standards. Not more than 50 percent of a manufacturer's engine production is allowed to meet these standards in each model year of the phase out period. Engines not meeting these standards must meet the final Tier 4 standards.

i These standards are phased in during the indicated years. At least 50 percent of a manufacturer's engine production must meet these standards during each year of the phase in. Engines not meeting these standards must meet the applicable phase-out standards.

j For Tier 1 engines the standard is for total hydrocarbons.

k The NOx standard for generator sets is 0.67 g/kW-hr.

l The PM standard for generator sets is 0.03 g/kW-hr.

Citations: Code of Federal Regulations (CFR) citations:

- 40 CFR 89.112 = Exhaust emission standards
- 40 CFR 1039.101 = Exhaust emission standards for after 2014 model year
- 40 CFR 1039.102 = Exhaust emission standards for model year 2014 and earlier
- 40 CFR 1039 Subpart F = Exhaust emissions transient and steady state test procedures
- 40 CFR 86 Subpart I = Smoke emission test procedures
- 40 CFR 1065 = Test equipment and emissions measurement procedures

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	GDF1
City:	Silver City
State:	New Mexico
Company:	Freeport McMoRan
Type of Tank:	Horizontal Tank
Description:	Tyrone GDF1

Tank Dimensions

Shell Length (ft):	28.00
Diameter (ft):	11.00
Volume (gallons):	20,000.00
Turnovers:	3.17
Net Throughput(gal/yr):	63,353.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Red/Primer
Shell Condition	Poor

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Roswell, New Mexico (Avg Atmospheric Pressure = 12.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

GDF1 - Horizontal Tank
Silver City, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 10)	All	76.33	59.43	93.23	65.28	7.0490	5.1283	9.5024	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

GDF1 - Horizontal Tank
Silver City, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	14,502.5513
Vapor Space Volume (cu ft):	1,694.8592
Vapor Density (lb/cu ft):	0.0809
Vapor Space Expansion Factor:	0.8854
Vented Vapor Saturation Factor:	0.3274
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	1,694.8592
Tank Diameter (ft):	11.0000
Effective Diameter (ft):	19.8080
Vapor Space Outage (ft):	5.5000
Tank Shell Length (ft):	28.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0809
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.0490
Daily Avg. Liquid Surface Temp. (deg. R):	535.9964
Daily Average Ambient Temp. (deg. F):	60.8167
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	524.9467
Tank Paint Solar Absorptance (Shell):	0.9100
Daily Total Solar Insulation Factor (Btu/sqft day):	1,810.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.8854
Daily Vapor Temperature Range (deg. R):	67.5988
Daily Vapor Pressure Range (psia):	4.3741
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.0490
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	5.1283
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	9.5024
Daily Avg. Liquid Surface Temp. (deg R):	535.9964
Daily Min. Liquid Surface Temp. (deg R):	519.0967
Daily Max. Liquid Surface Temp. (deg R):	552.8961
Daily Ambient Temp. Range (deg. R):	29.8333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.3274
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	7.0490
Vapor Space Outage (ft):	5.5000
Working Losses (lb):	701.7619
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	7.0490
Annual Net Throughput (gal/yr.):	63,353.0000
Annual Turnovers:	3.1677
Turnover Factor:	1.0000
Tank Diameter (ft):	11.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	15,204.3133

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

GDF1 - Horizontal Tank
Silver City, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	701.76	14,502.55	15,204.31

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification

User Identification:	GDF2
City:	Silver City
State:	New Mexico
Company:	Freeport McMoRan
Type of Tank:	Horizontal Tank
Description:	Tyrone GDF2

Tank Dimensions

Shell Length (ft):	12.00
Diameter (ft):	5.33
Volume (gallons):	2,000.00
Turnovers:	31.01
Net Throughput(gal/yr):	62,024.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N

Paint Characteristics

Shell Color/Shade:	Gray/Medium
Shell Condition	Good

Breather Vent Settings

Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

Meterological Data used in Emissions Calculations: Roswell, New Mexico (Avg Atmospheric Pressure = 12.73 psia)

TANKS 4.0.9d
Emissions Report - Detail Format
Liquid Contents of Storage Tank

GDF2 - Horizontal Tank
Silver City, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 10)	All	72.26	58.28	86.25	63.90	6.5422	5.0150	8.4192	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

GDF2 - Horizontal Tank
Silver City, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	1,579.7624
Vapor Space Volume (cu ft):	170.5399
Vapor Density (lb/cu ft):	0.0756
Vapor Space Expansion Factor:	0.6455
Vented Vapor Saturation Factor:	0.5197
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	170.5399
Tank Diameter (ft):	5.3300
Effective Diameter (ft):	9.0265
Vapor Space Outage (ft):	2.6650
Tank Shell Length (ft):	12.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0756
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	6.5422
Daily Avg. Liquid Surface Temp. (deg. R):	531.9348
Daily Average Ambient Temp. (deg. F):	60.8167
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	523.5667
Tank Paint Solar Absorptance (Shell):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,810.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.6455
Daily Vapor Temperature Range (deg. R):	55.9424
Daily Vapor Pressure Range (psia):	3.4042
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	6.5422
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	5.0150
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	8.4192
Daily Avg. Liquid Surface Temp. (deg R):	531.9348
Daily Min. Liquid Surface Temp. (deg R):	517.9492
Daily Max. Liquid Surface Temp. (deg R):	545.9204
Daily Ambient Temp. Range (deg. R):	29.8333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.5197
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	6.5422
Vapor Space Outage (ft):	2.6650
Working Losses (lb):	637.6481
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	6.5422
Annual Net Throughput (gal/yr.):	62,024.0000
Annual Turnovers:	31.0120
Turnover Factor:	1.0000
Tank Diameter (ft):	5.3300
Working Loss Product Factor:	1.0000
Total Losses (lb):	2,217.4104

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

GDF2 - Horizontal Tank
Silver City, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 10)	637.65	1,579.76	2,217.41

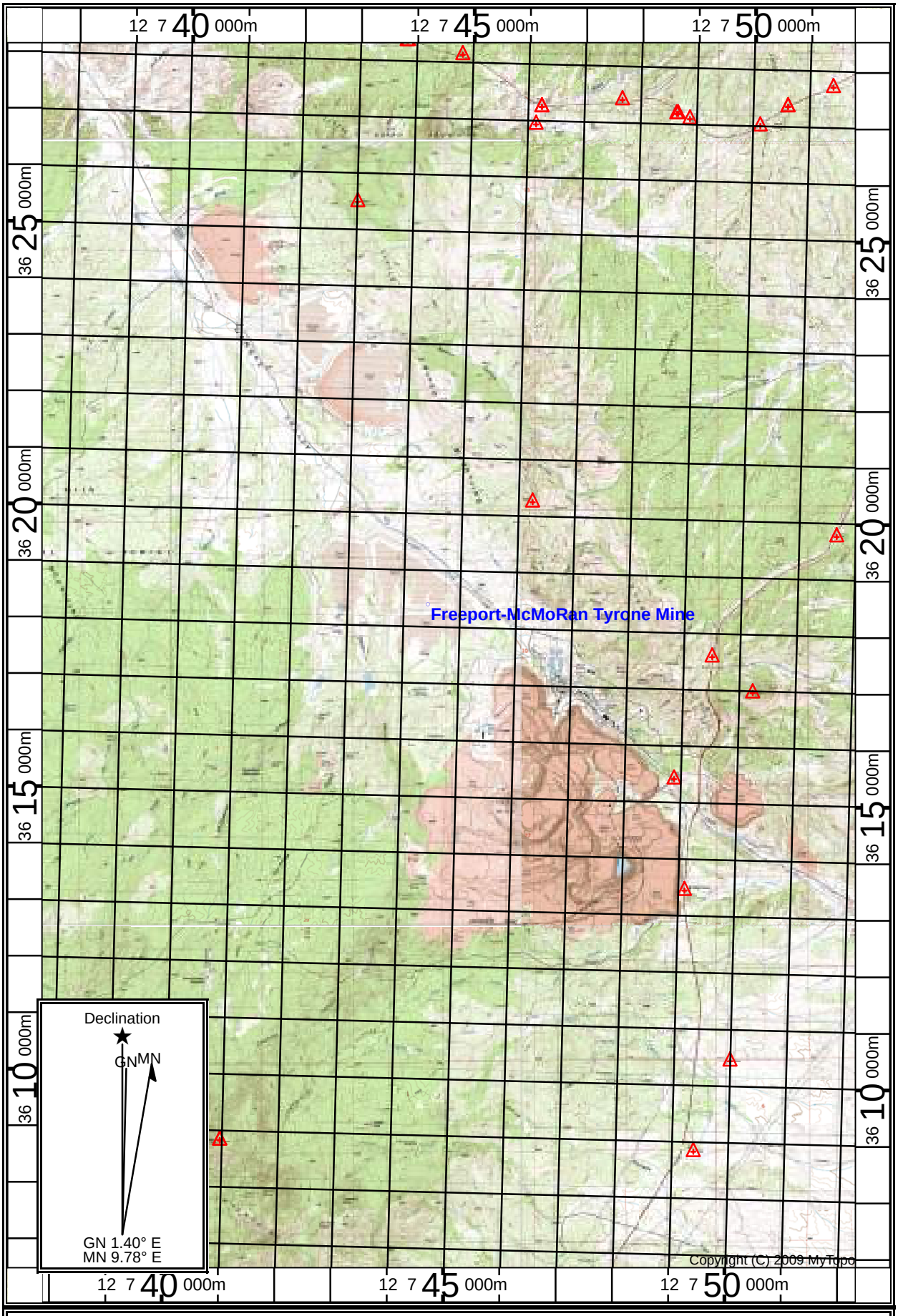
Section 8

Map(s)

A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	The area which will be restricted to public access
A graphical scale	

A map showing the location of this facility is attached.



Map Name: WIND MT
Print Date: 06/06/2019

Scale: 1 inch = 8,000 ft.
Map Center: 12 0744818 E 3617[illegible]

Horizontal Datum: WGS84

Section 9

Proof of Public Notice

(for NSR applications submitting under 20.2.72 or 20.2.74 NMAC)
(This proof is required by: 20.2.72.203.A.14 NMAC "Documentary Proof of applicant's public notice")

☑ **I have read the AQB "Guidelines for Public Notification for Air Quality Permit Applications"**
This document provides detailed instructions about public notice requirements for various permitting actions. It also provides public notice examples and certification forms. Material mistakes in the public notice will require a re-notice before issuance of the permit.

Unless otherwise allowed elsewhere in this document, the following items document proof of the applicant's Public Notification. Please include this page in your proof of public notice submittal with checkmarks indicating which documents are being submitted with the application.

New Permit and **Significant Permit Revision** public notices must include all items in this list.

Technical Revision public notices require only items 1, 5, 9, and 10.

Per the Guidelines for Public Notification document mentioned above, include:

1. ☑ A copy of the certified letter receipts with post marks (20.2.72.203.B NMAC)
2. ☑ A list of the places where the public notice has been posted in at least four publicly accessible and conspicuous places, including the proposed or existing facility entrance. (e.g: post office, library, grocery, etc.)
3. ☑ A copy of the property tax record (20.2.72.203.B NMAC).
4. ☑ A sample of the letters sent to the owners of record.
5. ☑ A sample of the letters sent to counties, municipalities, and Indian tribes.
6. ☑ A sample of the public notice posted and a verification of the local postings.
7. ☑ A table of the noticed citizens, counties, municipalities and tribes and to whom the notices were sent in each group.
8. ☑ A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
9. ☑ A copy of the classified or legal ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
10. ☑ A copy of the display ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
11. ☑ A map with a graphic scale showing the facility boundary and the surrounding area in which owners of record were notified by mail. This is necessary for verification that the correct facility boundary was used in determining distance for notifying land owners of record.

Proof of public notice is attached.

U.S. Postal Service™
CERTIFIED MAIL® RECEIPT
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For delivery information, visit our website at www.usps.com®.
SILVER CITY, NM 88062

OFFICIAL USE

Certified Mail Fee $3.55
$2.85
Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total $6.95
Sent To LT Rand LLC
Street P.O. Box 1497
City Silver City, NM 88062

0871
04
Postmark Here
2020031370O
03/13/2020

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 5906

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Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total $6.95
Sent To Annie A. Brown Estate Trust
Street c/o James McCauley
City P.O. Box 1497
Silver City, NM 88062

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04
Postmark Here
2020031370O
03/13/2020

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SAFFORD, AZ 85546

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Certified Mail Fee $3.55
$2.85
Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total $6.95
Sent To Mr. David C. & Mary Dee Estes
Street 215 E. 7th Street
City Safford, AZ 85546

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04
Postmark Here
2020031370O
03/13/2020

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SILVER CITY, NM 88061

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$2.85
Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total $6.95
Sent To Cordova Associates
Street 3343 US Hwy 90
City Silver City, NM 88061

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2020031370O
03/13/2020

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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TYRONE, NM 88065

OFFICIAL USE

Certified Mail Fee $3.55
$2.85
Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total $6.95
Sent To Mr. David R. Woodward
Street P.O. Box 231
City Tyrone, NM 88065

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03/13/2020

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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Certified Mail Fee $3.55
$2.85
Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total $6.95
Sent To Mr. George Bender &
Street Diana L. Bender
City P.O. Box 1126
Silver City, NM 88062

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03/13/2020

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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Certified Mail Fee $3.55
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $2.85
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $6.95

0871
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20200313-100
03/13/2020

Sent To: Mr. Jason & Julie Turner
Street and Apt. No.: 11588 Hwy 180 East
City, State, ZIP+4®: Silver City, NM 88061

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $2.85
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $6.95

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Postmark Here

20200313-100
03/13/2020

Sent To: US Forest Service
Street and Apt. No.: 3005 Camino del Bosque
City, State, ZIP+4®: Silver City, NM 88061

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Certified Mail Fee $3.55
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $2.85
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $6.95

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20200313-100
03/13/2020

Sent To: U Bar Ranch
Street and Apt. No.: HCR 88061-Box 10199
City, State, ZIP+4®: Hwy 180 W.
Silver City, NM 88061

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LAS CRUCES, NM 88005

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Certified Mail Fee $3.55
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $2.85
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $6.95

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20200313-100
03/13/2020

Sent To: Las Cruces District Office
Street and Apt. No.: Bureau of Land Management
City, State, ZIP+4®: 1800 Marquess Street
Las Cruces, NM 88005-3370

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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TYRONE, NM 88065

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Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $2.85
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $6.95

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20200313-100
03/13/2020

Sent To: Pacific Western Land Company
Street and Apt. No.: P.O. Box 571
City, State, ZIP+4®: Tyrone, NM 88065

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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SILVER CITY, NM 88062

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Certified Mail Fee $3.55
Extra Services & Fees (check box, add fee as appropriate)
- Return Receipt (hardcopy) $2.85
- Return Receipt (electronic) $0.00
- Certified Mail Restricted Delivery $0.00
- Adult Signature Required $0.00
- Adult Signature Restricted Delivery $

Postage $0.55
Total Postage and Fees $6.95

0871
04

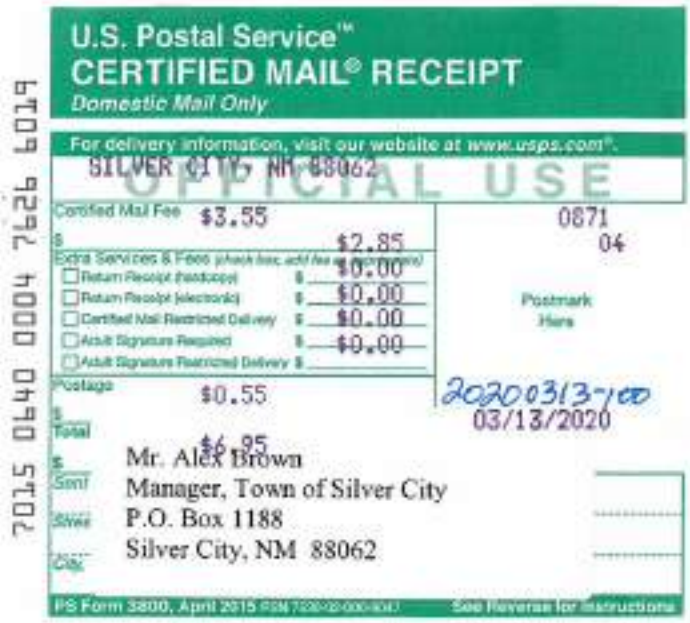
Postmark Here

20200313-100
03/13/2020

Sent To: The Honorable Ken Ladner
Street and Apt. No.: Mayor, Town of Silver City
City, State, ZIP+4®: P.O. Box 1188
Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7626 6002



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SILVER CITY, NM 88062

OFFICIAL USE

Certified Mail Fee $3.55
$2.85
Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total $6.95

0871
04

Postmark Here

20200313-700
03/13/2020

Sent To
Mr. Alex Brown
Manager, Town of Silver City
Street and
P.O. Box 1188
City, St
Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

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SILVER CITY, NM 88062

OFFICIAL USE

Certified Mail Fee $3.55
$2.85
Extra Services & Fees (check box, add fee as appropriate)
☐ Return Receipt (hardcopy) $0.00
☐ Return Receipt (electronic) $0.00
☐ Certified Mail Restricted Delivery $0.00
☐ Adult Signature Required $0.00
☐ Adult Signature Restricted Delivery $
Postage $0.55
Total Po $6.95

0871
04

Postmark Here

20200313-700
03/13/2020

Sent To
Ms. Charlene Webb
Manager, County of Grant
Street a
P.O. Box 898
City, St
Silver City, NM 88062

PS Form 3800, April 2015 PSN 7530-02-000-9047 See Reverse for Instructions

7015 0640 0004 7624 6026

General Posting of Notices – Certification

I, Erich J. Bower, the undersigned, certify that on March 13, 2020, posted a true and correct copy of the attached Public Notice in the following publicly accessible and conspicuous places in the towns of Tyrone and Silver City in Grant County, State of New Mexico on the following dates:

1. Tyrone Property Boundary; March 13, 2020
2. Tyrone Security Gate; March 13, 2020
3. Tyrone Post Office/Community Center; March 13, 2020
4. Silver City Public Library; March 13, 2020
5. Grant County Administration Building; March 13, 2020

Signed this 13 day of March, 2020

Signature

3/13/2020
Date

Erich J. Bower
Printed Name

President; General Manager, Freeport-McMoRan Tyrone Inc.
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}

Tax Account

Summary

Account Id	P000229
Parcel Number	
Owners	TURNER JASON & TURNER JULIE
Address	PO BOX 2222 SILVER CITY, NM 88062
Situs Address	
Legal	

Inquiry

As Of 02/15/2018

Payment Type ○ First ◉ Full

Total Due $0.00

Value

		Area Id	Taxes
Special Assessment		DCLPEN	$37.60
Area Id			**Mill Levy**
01O_NR - 01O_NR			20.8240000
		Actual	**Assessed**
CATTLE-COWS - 500		66,774	22,258
CATTLE-HEIFERS CALVES - 530		14,975	4,992
CATTLE-STEER CALVES - 540		19,578	6,526
CATTLE-BULLS - 550		7,062	2,354
Total Value		108,389	36,130
Taxes			$752.36
		Area Id	**Taxes**
Special Assessment	951 - CATTLE INDEMNITY		$361.30
Total Billed			**$1,151.26**

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R085738
Parcel Number	3086114330264
Owners	LT RANCH LLC
Address	PO BOX 1497 SILVER CITY, NM 88062
Situs Address	
Legal	Quarter: NE S: 35 T: 19S R: 15W GOV LOT 2 GOV LOT 4 GOV LOT 5 (PT NEQ) NWQNEQ Quarter: SE S: 35 T: 19S R: 15W GOV LOT 6 GOV LOT 7 (PT EHSEQ) WHSEQ Quarter: SW S: 35 T: 19S R: 15W SWQ Quarter: NW S: 35 T: 19S R: 15W GOV LOT 1 GOV LOT 3 (PT WHNWQ) EHNWQ 571.200 AC, SELF GRAZED P066643

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	3,084	1,028
Taxes		$21.40

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R087845
Parcel Number	3087114185238
Owners	BROWN ANNIE A ESTATE TRUST
Address	PO BOX 1497 SILVER CITY, NM 88062
Situs Address	
Legal	Quarter: NE S: 34 T: 19S R: 15W Quarter: SE S: 34 T: 19S R: 15W MINE: CHERRY CREEK - MS 1782 13.96 MineAcres 13.960 AC, LEASE LT RANCH P066643

Inquiry

As Of 02/15/2018

Payment Type ○ First ◉ Full

Total Due $0.00

Value

	Area Id	**Taxes**
Special Assessment	MINTAX	$0.00
	Area Id	**Taxes**
Special Assessment	ADMINFEE	$4.48
Area Id		**Mill Levy**
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	75	25
Taxes		$0.52

Original Taxes	$5.00
Adjustments	$0.00
Total Billed	**$5.00**

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R088189
Parcel Number	3088113376071
Owners	ESTES ROCKY
Address	215 E 7TH ST SAFFORD, AZ 85546
Situs Address	
Legal	Quarter: NW S: 28 T: 19S R: 15W GOV LOT 2 (PT EHNWQ) 18.190 AC, NOTE: PROCESSED WITH RECOGNIZED DEED ERROR - CHAIN OF TITLE

Inquiry

As Of 02/15/2018

Payment Type ○ First ◉ Full

Total Due $0.00

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
MISC N/R LAND - 0081	72,760	24,253
Taxes		$505.04

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R087987
Parcel Number	3085110010400
Owners	CORDOVA ASSOCIATES
Address	1039 E BADILLO ST COVINA, CA 91724
Situs Address	
Legal	Quarter: SE S: 12 T: 19S R: 15W PT GOV LOTS 1, 6 LYING E OF NM HWY 90 R/W 5.786 AC

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Second

Taxes Due $11.04
Total Due $11.04

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
MISC N/R LAND - 0081	3,182	1,061
Taxes		$22.08

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R087488
Parcel Number	3084109396132
Owners	WOODWARD DAVID R WOODWARD JOAN M
Address	PO BOX 231 TYRONE, NM 88065
Situs Address	190 BALD MTN RANCH RD
Legal	Quarter: NW S: 06 T: 19S R: 14W GOV LOT 3 (NEQNWQ) GOV LOT 4 (NWQNWQ) GOV LOT 5 (SWQNWQ) SEQNWQ 165.600 AC, SELF GRAZED P066921

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Total Due $0.00

Value

Area Id		Mill Levy
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	894	298
Taxes		$6.20

The amounts of taxes due on this page are based on **last year's** property value assesments.

Tax Account

Summary

Account Id	R076300
Parcel Number	3089112170510
Owners	OSMER MARY LOUISE
Address	10140 HIGHWAY 180 W SILVER CITY, NM 88061-9243
Situs Address	
Legal	Quarter: SE S: 20 T: 19S R: 15W Quarter: NE S: 29 T: 19S R: 15W MINE: MEMPHIS MILLSITE - MS 1207-B 5.00 MineAcres 5.00 AC, SOLE & SEPARATE

Inquiry

As Of 02/15/2018

Payment Type ○ First
◉ Full

Taxes Due $656.16
Interest Due $45.96
Penalty Due $21.42
Total Due $723.54

Value

Area Id		**Mill Levy**
01O_R - 01O_R		15.0600000
	Actual	**Assessed**
RESIDENTIAL LOT IMPROVED - 0210	10,000	3,333
Taxes		$50.20
Area Id		**Mill Levy**
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
MISC N/R LAND - 0081	40,000	13,333
Taxes		$277.64
Total Billed		**$327.84**

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Tax Account

Summary

Account Id	P065988
Parcel Number	L00363540508D154548
Owners	U BAR RANCH PARTNERSHIP
Address	PO BOX 10 GILA, NM 88038
Situs Address	
Legal	

Inquiry

As Of 02/15/2018

Payment Type ○ First ◉ Full

Total Due $0.00

Value

Area Id		**Mill Levy**
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
CATTLE-COWS - 500	809,186	269,729
CATTLE-HEIFERS CALVES - 530	99,434	33,145
CATTLE-BULLS - 550	153,010	51,003
CATTLE-HEIFER (REPLACEMENT) - 551	122,464	40,821
CATTLE-REG. COWS - 560	210,092	70,031
CATTLE-REG. HEIFER CALVES - 580	33,040	11,013
CATTLE-REG.BULLS - 590	11,368	3,789
CATTLE-REG. HEIFER (REPLACEMENT) - 591	41,244	13,748
HORSES-HORSES - 900	15,300	5,100
Total Value	1,495,138	498,379
Taxes		$10,378.24

	Area Id	**Taxes**
Special Assessment	951 - CATTLE INDEMNITY	$4,932.80

	Area Id	**Taxes**
Special Assessment	954 - EQUINE	$35.52

Total Billed **$15,346.56**

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Tax Account

Summary

Account Id	R087725
Parcel Number	3088109099033
Owners	PACIFIC WESTERN LAND COMPANY
Address	PO BOX 571 TYRONE, NM 88065
Situs Address	
Legal	Quarter: NE S: 04 T: 19S R: 15W GOV LOT 1 (NEQNEQ) PT GOV LOT 2 (NWQNEQ) 71.460 AC

Inquiry

As Of 02/15/2018

Payment Type ○ First
● Full

Total Due $0.00

Value

	Area Id	Taxes
Special Assessment	MINTAX	$0.00
	Area Id	**Taxes**
Special Assessment	ADMINFEE	$2.32
Area Id		**Mill Levy**
01O_NR - 01O_NR		20.8240000
	Actual	**Assessed**
GRAZING - ALL ONE CLASS - 0010	386	129
Taxes		$2.68

Original Taxes	$5.00
Adjustments	$0.00
Total Billed	**$5.00**

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265890
Return Receipt Required

Dear Neighbor:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **April 3, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec. The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

The proposed **revision** consists of updating emissions associated with mine operations and adding engines.

The estimated maximum quantities of any regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy).
These reported emissions could change slightly during the course of the Department's review:

Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	8,200 tpy
PM_{10}	1,020 pph	2,140 tpy
$PM_{2.5}$	100 pph	230 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address:

Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, or send a copy of this notice along with your comments, since the Department may have not yet received the permit application. Please include a legible return mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Attención
Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor comuníquese con esa oficina al teléfono 505-476-5557.

Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20200313-100

Notice of Non-Discrimination
NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Kristine Yurdin, Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. You may also visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265906
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PM_{10}	1,020 pph	2,140 tpy
$PM_{2.5}$	100 pph	230 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265913
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Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

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P.O. Box 571, Tyrone, NM 88065

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FREEPORT-MCMORAN

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265920
Return Receipt Required

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Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
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FREEPORT-MCMORAN

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265937
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Nitrogen Oxides (NO_x)	860 pph	320 tpy
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Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

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20200313-100

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265944
Return Receipt Required

Dear Neighbor:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **April 3, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec. The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

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Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	8,200 tpy
PM_{10}	1,020 pph	2,140 tpy
$PM_{2.5}$	100 pph	230 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address:

Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

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Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20200313-100

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265951
Return Receipt Required

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Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

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P.O. Box 571, Tyrone, NM 88065

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FREEPORT-MCMORAN

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265968
Return Receipt Required

US Forest Service
3005 Camino de Bosque
Silver City, NM 88061

To Whom it Concerns:

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P.O. Box 571, Tyrone, NM 88065

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265975
Return Receipt Required

U Bar Ranch
HCR 88061-Box 10199
Hwy 180 W.
Silver City, NM 88061

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265982
Return Receipt Required

Las Cruces District Office
Bureau of Land Management
1800 Marquess Street
Las Cruces, NM 88005-3370

To Whom it Concerns:

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476265999
Return Receipt Required

Pacific Western Land Company
P.O. Box 571
Tyrone, NM 88065

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476266002
Return Receipt Required

The Honorable Ken Ladner
Mayor, Town of Silver City
P.O. Box 1188
Silver City, NM 88062

Dear Mr. Ladner:

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Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

Please refer to the company name and facility name, or send a copy of this notice along with your comments, since the Department may have not yet received the permit application. Please include a legible return mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Attención
Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo México, acerca de las emisiones producidas por un establecimiento en esta área. Si usted desea información en español, por favor comuníquese con esa oficina al teléfono 505-476-5557.

Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20200313-100

Notice of Non-Discrimination
NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities, as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Kristine Yurdin, Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. You may also visit our website at https://www.env.nm.gov/non-employee-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476266019
Return Receipt Required

Mr. Alex Brown
Manager, Town of Silver City
P.O. Box 1188
Silver City, NM 88062

Dear Mr. Brown:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **April 3, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec. The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

The proposed **revision** consists of updating emissions associated with mine operations and adding engines.

The estimated maximum quantities of any regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy).
These reported emissions could change slightly during the course of the Department's review:

Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	8,200 tpy
PM_{10}	1,020 pph	2,140 tpy
$PM_{2.5}$	100 pph	230 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

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Please refer to the company name and facility name, or send a copy of this notice along with your comments, since the Department may have not yet received the permit application. Please include a legible return mailing address with your comments. Once the Department has performed a preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

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Sincerely,

Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20200313-100

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FREEPORT-McMoRan

Tyrone Operations
P.O. Box 571
Tyrone, NM 88065

March 13, 2020

Certified Mail #70150640000476266026
Return Receipt Required

Ms. Charlene Webb
Manager, County of Grant
P.O. Box 898
Silver City, NM 88062

Dear Ms. Webb:

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **April 3, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude **32** deg, **40** min, **34.5** sec and longitude **-108** deg, **23** min, **35.8** sec. The approximate location of this facility is **4.5** miles **southwest** of **Tyrone, NM** in **Grant County.**

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Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	8,200 tpy
PM_{10}	1,020 pph	2,140 tpy
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Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

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P.O. Box 571, Tyrone, NM 88065

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Erich J. Bower
President; General Manager
Freeport-McMoRan Tyrone Inc.

20200313-100

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General Posting of Notices – Certification

I, Erich J. Bower, the undersigned, certify that on March 13, 2020, posted a true and correct copy of the attached Public Notice in the following publicly accessible and conspicuous places in the towns of Tyrone and Silver City in Grant County, State of New Mexico on the following dates:

1. Tyrone Property Boundary; March 13, 2020
2. Tyrone Security Gate; March 13, 2020
3. Tyrone Post Office/Community Center; March 13, 2020
4. Silver City Public Library; March 13, 2020
5. Grant County Administration Building; March 13, 2020

Signed this 13 day of March, 2020

Signature

3/13/2020
Date

Erich J. Bower
Printed Name

President; General Manager, Freeport-McMoRan Tyrone Inc.
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}

NOTICE

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The exact location for the facility known as, **Tyrone Mine** is at latitude **32 deg, 40 min, 34.5 sec** and longitude **-108 deg, 23 min, 35.8 sec.** The approximate location of this facility is **4.5 miles southwest of Tyrone, NM in Grant County.**

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Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

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Public Notice Posted at the Grant County Administration Building 3/13/2020

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Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

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MJ 3.13

Public Notice Posted at the Silver City Public Library 3/13/2020

NOTICE

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Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

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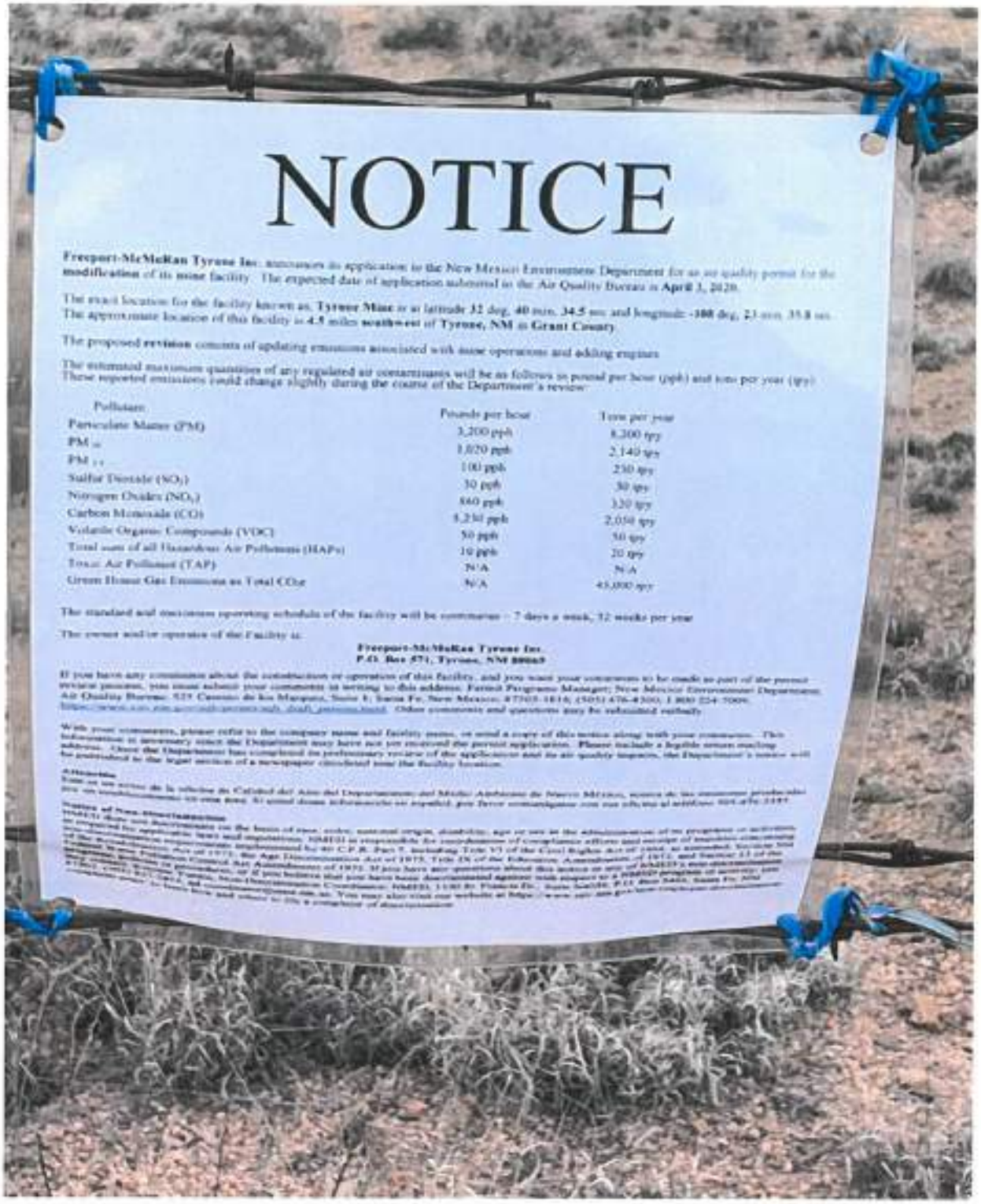
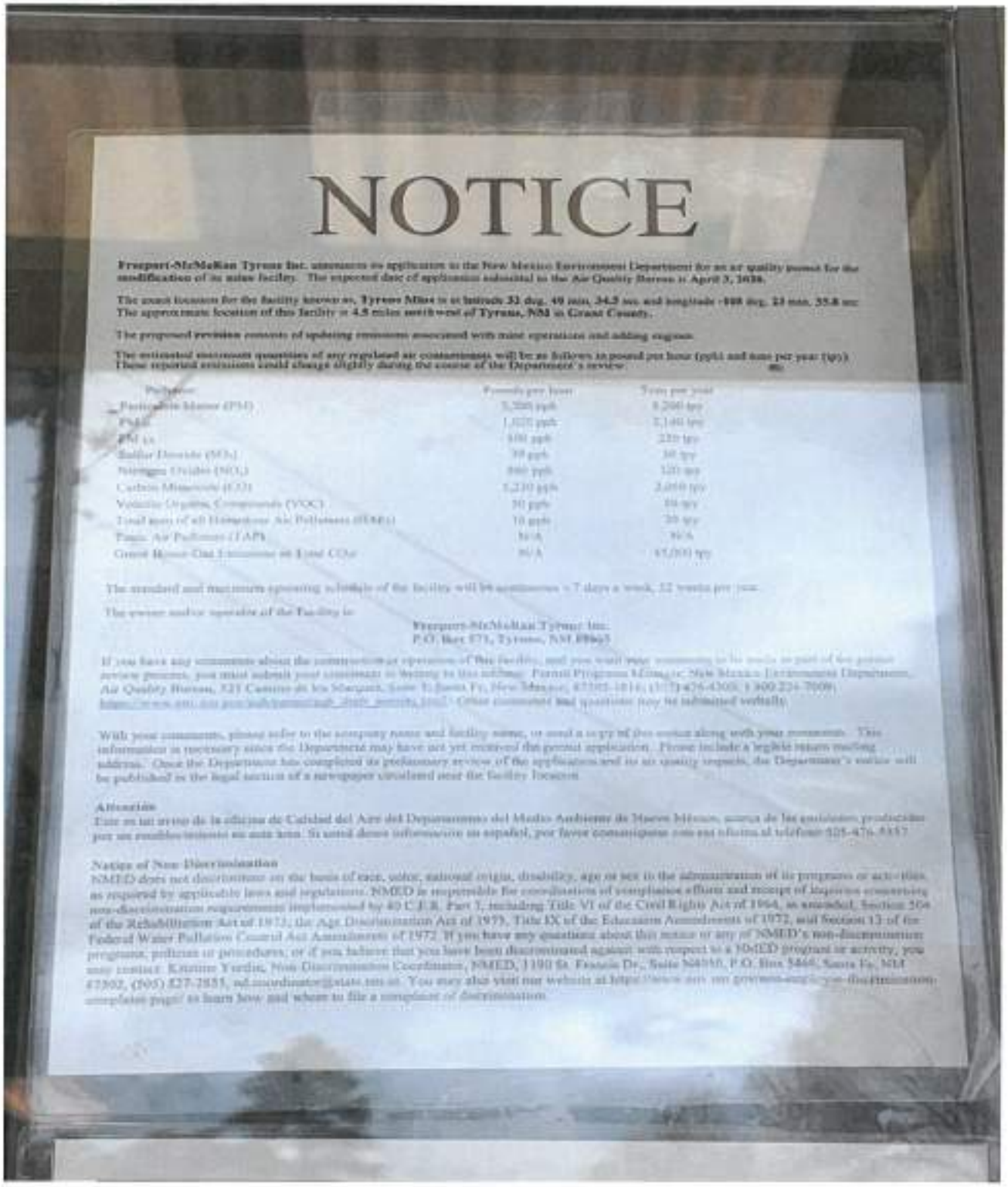
Posted:

Public Notice Posted at the Tyrone Post Office/Community Center 3/13/2020



Public Notice Posted at the Tyrone Property Boundary 3/13/2020



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Pollutant	Pounds per hour	Tons per year
Particulate Matter (PM)	5,200 pph	8,200 tpy
PM10	1,020 pph	3,140 tpy
PM2.5	630 pph	220 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	880 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	80 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	20 tpy
Single Air Pollutant (TAPs)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	65,000 tpy

The standard and maximum operating schedule of the facility will be continuous - 7 days a week, 52 weeks per year.

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Notice of Non-Discrimination
NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the administration of its programs or activities as required by applicable laws and regulations. NMED is responsible for coordination of compliance efforts and receipt of inquiries concerning non-discrimination requirements implemented by 40 C.F.R. Part 7, including Title VI of the Civil Rights Act of 1964, as amended; Section 504 of the Rehabilitation Act of 1973; the Age Discrimination Act of 1975, Title IX of the Education Amendments of 1972, and Section 13 of the Federal Water Pollution Control Act Amendments of 1972. If you have any questions about this notice or any of NMED's non-discrimination programs, policies or procedures, or if you believe that you have been discriminated against with respect to a NMED program or activity, you may contact: Kristine Yurdin, Non-Discrimination Coordinator, NMED, 1190 St. Francis Dr., Suite N4050, P.O. Box 5469, Santa Fe, NM 87502, (505) 827-2855, nd.coordinator@state.nm.us. You may also visit our website at https://www.env.nm.gov/general/non-discrimination-complaint-page/ to learn how and where to file a complaint of discrimination.

Public Notice Posted at the Tyrone Security Gate 3/13/2020

Section 9 - Public Notice

Property Owners

Recipient	Address		City	State	Zip Code
Pacific Western Land Company		PO Box 571	Tyrone	NM	88065
U Bar Ranch	HCR 88061-Box 10199	Hwy 180 W.	Silver City	NM	88061
Las Cruces District Office	Bureau of Land Management	1800 Marquess Street	Las Cruces	NM	88005
Mr. George Bender & Diana L. Bender		PO Box 1126	Silver City	NM	88062
US Forest Service		3005 Camino del Bosque	Silver City	NM	88061
Annie A. Brown Estate Trust c/o James McCauley		PO Box 1497	Silver City	NM	88062
Mr. David C. & Mary Dee Estes		215 E. 7th Street	Safford	AZ	85546
Cordova Associates		3343 US Hwy 90	Silver City	NM	88061
Mr. David R. Woodward		PO Box 231	Tyrone	NM	88065
Mr. Jason & Julie Turner		11588 Hwy 180 East	Silver City	NM	88061
LT Ranch LLC		PO Box 1497	Silver City	NM	88062

Municipalities

Recipient	Address		City	State	Zip Code
Mr. Alex Brown	Manager, Town of Silver City	PO Box 1188	Silver City	NM	88062
The Honorable Ken Ladner	Mayor, Town of Silver City	PO Box 1188	Silver City	NM	88062

Counties

Recipient	Address		City	State	Zip Code
Ms. Charlene Webb	Manager, County of Grant	PO Box 898	Silver City	NM	88062

There are no Indian Tribes within a 10 mile radius of the facility boundary.

Submittal of Public Service Announcement – Certification

I, Michael Celente, the undersigned, certify that on **March 11, 2020**, submitted a public service announcement to **SILVER CITY RADIO** that serves **SILVER CITY**, **GRANT** County, New Mexico, in which the source is or is proposed to be located and that **SILVER CITY RADIO DID NOT RESPOND.**

Signed this 11 day of MARCH, 2020,

Signature

March 11, 2020
Date

Michael J Celente
Printed Name

Trinity Consultants, Inc
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}

Mike Celente

From: Mike Celente
Sent: Wednesday, March 11, 2020 4:52 PM
To: events@silvercityradio.com
Cc: Adam Erenstein; MacKenzie Russell
Subject: PSA Request for Air Quality Permit - Tyrone Mine

Dear Silver City Radio,

Per New Mexico Administrative Code 20.2.72.203.B NMAC and according to the Guidance for Public Notice for Air Quality Permit Applications - **(5) Notifications: Submittal of Public Service Announcement (PSA):** A public service announcement required for permits or significant permit revisions must be submitted to at least one radio or television station, which services the municipality, or county which the facility is or will be located. **Therefore, based on the above, we respectfully ask you to air the information shown below as a Public Service Announcement**.

The public service announcement request must contain the following information about the facility or proposed facility (20.2.72.203.D NMAC).

- **(a)** The name: **Tyrone Mine**, location: **4.5 miles southwest of Tyrone, NM; P.O. Box 571, Tyrone, NM 88065** and type of business: **Mine.**
- **(b)** The name of the principal owner or operator: **Freeport-McMoRan Tyrone Inc.**. – owner & operator.
- **(c)** The type of process or change for which the permit is sought: **NSR Significant Revision – updating emissions associated with mine operations and adding engines.**
- **(d)** Locations where the notices have been posted**: (1) Tyrone Mine Property Boundary; (2) Tyrone Mine Security Gate; (3) Tyrone Post Office/Community Center; (4) Silver City Public Library; (5) Grant County Administration Building**
- **(e)** The Department's address or telephone number to which comments may be directed: **Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1, Santa Fe, New Mexico; 87505-1816; (505) 476-4300**

Best Regards,
Mike

Michael Celente, M.S. | Senior Consultant

Trinity Consultants
9400 Holly Ave NE, Building 3, Suite 300 | Albuquerque, NM 87122

Office: **505-266-6611 x138**|
Email: mcelente@trinityconsultants.com

Viva San Vicente

God's Umbrella: Dale Renner

"In World War II, you knew where the enemy was, what kind of equipment he had and what kind of war you were going to fight," Dale Renner said. "Today's wars are completely different and a tremendous challenge."

When Renner was 18 years old, he tried to volunteer for the Marines and the Seabees, but because of a broken arm that he cannot straighten, the Marines would not take him and neither would the Seabees. "My only alternative was to wait for the draft," Renner said. "Nine months later, I was drafted into the Army and sent to Fort Sill, Oklahoma, for basic."

The Germans were doing well in North Africa, so his training changed to make him part of a tactical amphibious assault team on DUKWs, pronounced "ducks." The D indicated a vehicle designed in 1942, the U meant utility amphibious, the K indicated all-wheel drive and the W indicated two powered rear axles. The land-sea vehicle could be used on the water and then driven directly onto beaches and onward over land.

Renner was sent to train for the invasion of southern France. "We were part of a transport group of 113 ships," he said. "It was the first major transport that attempted to go into the Mediterranean [Sea] without air cover." The Germans attacked the convoy with submarines and Messerschmitt Schwalbes — dive bombers. The attacks usually came from the left rear side by submarine. "Thirteen of our ships sank," Renner said. "My ship was the next in line. I was part of a deck gunner crew. My job was to get ammunition to the gunner. He was hit, but I didn't know it until he quit shooting. Our convoy was turned around and we landed in Oran, Algeria."

His next stop was Italy to become part of the invasion force into France. "My assignment was to go in before the landing craft," Renner said. "We had three and one-half tons of TNT on the DUKW. Our job was to blow up the anti-landing emplacements."

A German aircraft shot down a barrage balloon, placed to support netting to stop low-flying aircraft, directly in front of the DUKW carrying Renner, Cpl. Frank Kirby from Memphis, Tenn., and the platoon leader, Lt. Earl E. Walker. The DUKW's propeller became entangled, which killed the motor. Then mortar fire began to hit the vehicle from shore. "The first one was short; the second one long," Renner reported. "The French Army on shore knocked out the pillbox that was firing on us, so we got to shore and unloaded our dynamite. The Germans were expecting us to land in a different place."

In a letter written to Renner's mother, Lt. Walker told her that he had recommended her son be sent to Officer Candidate School in Paris. Walker recounted that Renner and Kirby dived off the entangled DUKW, and "with shells falling very close in the water, they freed the DUKW and we proceeded to shore and accomplished our mission. If a shell had hit the DUKW with three and one-half tons of TNT … well, I would not be writing you this letter and Dale would not be going to school. … I think you have a son to be proud of, Mrs. Renner, and all the luck in the world to him when he goes to school."

Renner attended school in Fontainebleau, France, and was commissioned as a second lieutenant. While in Germany, Renner was stationed in Blaubeuren near Heidenheim, the hometown of the "Desert Fox," Gen. Erwin Rommel, who was noted for his military exploits in North Africa. Rommel was accused of plotting to assassinate Adolf Hitler, and was shot and killed near Blaubeuren by the Waffen-SS shortly before Renner and his outfit arrived in the area. He was at the Dachau concentration camp when the Jews were being released. "I had some photos of wagonloads of dead Jewish prisoners," Renner said. "I gave them to a Jewish woman in Texas." At that point, he stopped talking about his time at war and didn't talk more about his life afterward, either.

This is the 12th installment in a series of stories from a book titled "God's Umbrella, Southwest New Mexico World War II Survivors," by Mary Alice Murphy, copyright 2018, Mercury Heartlink, Silver City. This story was excerpted and edited by Mark Richard to promote the history of San Vicente de la Cienega and its surroundings.

NOTICE OF AIR QUALITY PERMIT APPLICATION

Freeport-McMoRan Tyrone Inc. announces its application to the New Mexico Environment Department for an air quality permit for the **modification** of its **mine** facility. The expected date of application submittal to the Air Quality Bureau is **April 3, 2020.**

The exact location for the facility known as, **Tyrone Mine** is at latitude 32 deg, 40 min, 34.6 sec and longitude -108 deg, 23 min, 36.8 sec. The approximate location of this facility is **4.6 miles southwest of Tyrone, NM in Grant County.**

The proposed **revision** consists of updating emissions associated with mine operations and adding engines.

The estimated maximum quantities of any regulated air contaminants will be as follows in pound per hour (pph) and tons per year (tpy).

These reported emissions could change slightly during the course of the Department's review:

Pollutant	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	8,200 tpy
PM $_{10}$	1,020 pph	2,140 tpy
PM $_{2.5}$	100 pph	230 tpy
Sulfur Dioxide (SO_2)	30 pph	30 tpy
Nitrogen Oxides (NO_x)	860 pph	320 tpy
Carbon Monoxide (CO)	5,230 pph	2,050 tpy
Volatile Organic Compounds (VOC)	50 pph	50 tpy
Total sum of all Hazardous Air Pollutants (HAPs)	10 pph	30 tpy
Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO_2e	N/A	45,000 tpy

The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.

The owner and/or operator of the Facility is:

Freeport-McMoRan Tyrone Inc.
P.O. Box 571, Tyrone, NM 88065

If you have any comments about the construction or operation of this facility, and you want your comments to be made as part of the permit review process, you must submit your comments in writing to this address: Permit Programs Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 87505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.nm.gov/aqb/permit/aqb_draft_permits.html. Other comments and questions may be submitted verbally.

With your comments, please refer to the company name and facility name, or send a copy of this notice along with your comments. This information is necessary since the Department may have not yet received the permit application. Please include a legible return mailing address. Once the Department has completed its preliminary review of the application and its air quality impacts, the Department's notice will be published in the legal section of a newspaper circulated near the facility location.

Attencion
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CLASSIFIED AD RATES:
Up to 25 words -- $3.85 per day or $19.25 per week, plus 8 percent tax. 10c per word per day for each additional word over 25. Payment must must be made before ad is published.
CLASSIFIED AD DEADLINE:
Noon the day before publication on Monday through Friday. The deadline for Monday is noon Friday. PLEASE CHECK YOUR CLASSIFIED AD THE FIRST DAY!
The Silver City Daily Press is not responsible for more than ONE INCORRECT DAY, OR OMISSION OF COPY FOR MORE THAN ONE DAY. Request for corrections must be made within 24 hours of the first publication day by calling 388-1526.
DISPLAY AD RATES & DEADLINES:
Display open rate is $8.40 per column inch per day, plus tax. Payment must must be made before ad is published. Display deadline is 2 p.m. the day before publication.
NO REFUNDS ON CLASSIFIED OR DISPLAY ADS OR SUBSCRIPTIONS.

...

PUBLISHER'S NOTICE:
All real estate advertised in this newspaper is subject to the Federal Fair Housing Act of 1968 which makes it illegal to advertise any preference, limitation, or discrimination based on race, color, religion, sex or national origin or intention to make any such preference, limitation or discrimination. This newspaper will not knowingly accept any advertising for real estate which is in violation of the law. Our readers are informed that all dwellings advertised in this newspaper are available on an equal opportunity basis.

FOR SALE

White porcelain pedestal sink/faucet, twin bed, with head & foot boards, treadmill, 55 gal. fish tank, pine dining table, extends 109 inches, 5 chairs, china cabinet, small chest freezer, 2 boats, 4 solar panels 45 watt. Call 575-519-8281 or 575-590-4295.
Mr14-2tp

Whirlpool heavy duty clothes dryer, 4 settings, works well, $50.00. Call 575-519-9138.
Mr13-6p

Wedgewood 1920s gas range. Clean, works, in good shape. $350.00
Call 575-519-9138.
Mr13-6p

EZY PAWN
WE BUY GOLD AND SILVER
CALL 575-538-4335
F19-tfnc

MANUFACTURED HOMES

2 bedrooms, 2 full baths, all thermal-pane windows, antique marble fireplace included, 1,035 square footage, on a 1/3 acre lot. Has 2 sheds, 10'x20' & 12'x16'. Nice concrete patio with white vinyl fence. Asking $120,000. Call 575-654-6408 or 575-388-4384.
Mr7-15tp

1987 Silver mobile home, 2 bedroom, 1 bath, needs work. Lot 100x50, water, sewer, electric & gas. Lot is surveyed.405 Swan St. Make offer. Call 575-534-9447.
Mr6-10tp

AUTOS

HOMES

PAUL RICHARDSON
575-538-1657 - Cell
THINGS ARE SELLING!
18 Pioneer Rd.
$300,000
106 Victoria St.
$154,000
Wind Canyon Lot
w/well + elec. $45,000
42 Cygnet, Adobe 3/3/2
Superlative!! $386,000
114 Valle de Uvas
3/2, Mimbres
$94,000
40 Acres in town
$74,880
608 Combs Cir., 3/2
$185,000
Penjamo Bar
$50,000
Keystone Real Estate
532 Hwy 180 W.
Silver City, NM 88061
575-313-1523 - Office
A11-tfnc

COMMERCIAL FOR RENT

TWO PRIME SPACES IN HISTORIC DOWNTOWN:
3,000 square foot Shop, bathroom,heat/AC. 3 phase, **1,000 square foot Garage** with office, remote opener.
409 N Arizona St.
Call 303-579-6033.
Mr11dh

RETAIL SPACE:
- Office Space for Rent, 900 square feet - $450.00 per month. **First Month Rent Free.**
- Work Shop for Rent, 1,000 square feet - $475 per month. With office and restroom.
Call 575-313-4703.
F21-tfnc

FOR RENT

Manhattan Apartments,
located at
5064 Hwy 152
has for rent:

2 bedroom, 2 bath apartment, $496.00 mo. $300.00 deposit,
2 bedroom, 1 bath apartment, $415.00 mo. $300.00 deposit.

Tenants pay all utilities.
Call 575-537-3162.
Mr11,16c

FOR RENT

Storage units for rent in Bayard. All sizes. Call 575-313-0714.
Mr6-10tp

---

1 bedroom apartment for rent in Bayard.
Call 575 388-3830.
F21tfnc

---

2 bedroom, 1 1/2 bath recently remodeled mobile home on private property on the outskirts of Silver City. No smokers, no HUD, no pets - $750.00 per month, $750.00 deposit.
Call Lisa - 575-590-7780.
F11-tfnc

HELP WANTED

City of Bayard

Part-time Librarian

The City of Bayard is accepting applications for a part-time position of Librarian Assistant for 30 hours a week. Seeking individual with strong clerical and exceptional customer service skills who is interested in learning, or has prior knowledge of library operations. Applicants should be comfortable with information technology and proficient in Word, and should be able to plan and implement a variety of children's activities. Must have a high school diploma/GED; some college preferred. Successful candidates will be required to take and pass a pre-employment physical exam, drug/alcohol test, and background check prior to commencing employment.

Additional inquiries related to the job duties should be directed to the Office of the Clerk at 575 537-3327. Applications may be picked up at the Bayard City Hall, 800 Central Avenue in Bayard, New Mexico. Position will be open until filled. Final selection will be made at the Council's discretion. The City of Bayard is an equal opportunity employer who reserves the right to reject any and all applications not advantageous to the City of Bayard.
Mr14,16c

NOW HIRING!!!
Southwest Disposal, a Waste Connections company, has an immediate opening for a CDL Class B Driver at our Bayard, NM operation! $2500 SIGN ON BONUS
Previous waste experience would be a huge plus!
Requirements:
Possess a satisfactory driving record.
Possess a valid Class A or B CDL license.
Must have a minimum of two years truck driving experience.
https://www.wasteconnections.com/employment
Mr10-5tp

SERVICES

FIRST DAY AD
Personal Assistance for Everyday People.
Care for children, pets and home. Assistance with business, errands & health matters. Excellent References. Graduate Degree.
Call Gabe 575-313-9851.
Mr16-3tp

MIKE'S GUITAR SHOPPE
Sales and Service
910 N. Hudson Street
(10th & Hudson)
Call 575-390-0385
D23-tfnc

WESTERN MECHANICAL
Appliance Repairs by Western Mechanical
Call Jesus Polanco
575-388-3830
Mr27-tfnc

NOTICES

FIRST DAY AD
NOTICE OF DISPOSAL
of personal property stored at:
Stagecoach Mini Storage
22 Ridge Road
Silver City, NM 88061
Belonging to:
EARSEYE ROSS
BOBBIE MISQUEZ-GONZALEZ
CHRISTOPHER ALVARADO
TYLER MORRISON
ANDREW ARROYO

will be disposed of at 10:00am on **Monday, March 31st.**
THIS IS NOT AN AUCTION!!!!
Mr16,23-2tc

ROOFING/ CONSTRUCTION

RIO BEND CONSTRUCTION
GRANITE INSTALLED
CALL US FOR ALL YOUR BUILDING NEEDS
575-534-7888.
F19-tfnc

ROMO CONSTRUCTION
New construction, remodeling, concrete, masonry, plaster and stucco, roofing, manufactured home site prep and repairs. **Call 575-519-9326 or 575-537-6307**
ALONSO ROMO
Jy6-Jy10,2020

MASTERCRAFT METALS
Standing Seam Roofing.
Protect your largest investment with a lifetime roof guaranteed not to leak and a company that stands behind its work. Materials only or with installation.
The Only Metal Roof Approved For Low Slope Applications.
Free Estimates -
575-388-8800.
www.mastercraftmetals.com
Ap23-tfnc

YARD SERVICES

Douglas Yard Service
Remove or plant trees. Plant flowers, weed eating, haul trash, trim hedges, some remodeling.
Call Mikell at
575-654-5364.
Mr13-5p

YARD SERVICES

Legal

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The standard and maximum operating schedule of the facility will be continuous – 7 days a week, 52 weeks per year.
The owner and/or operator of the Facility is:
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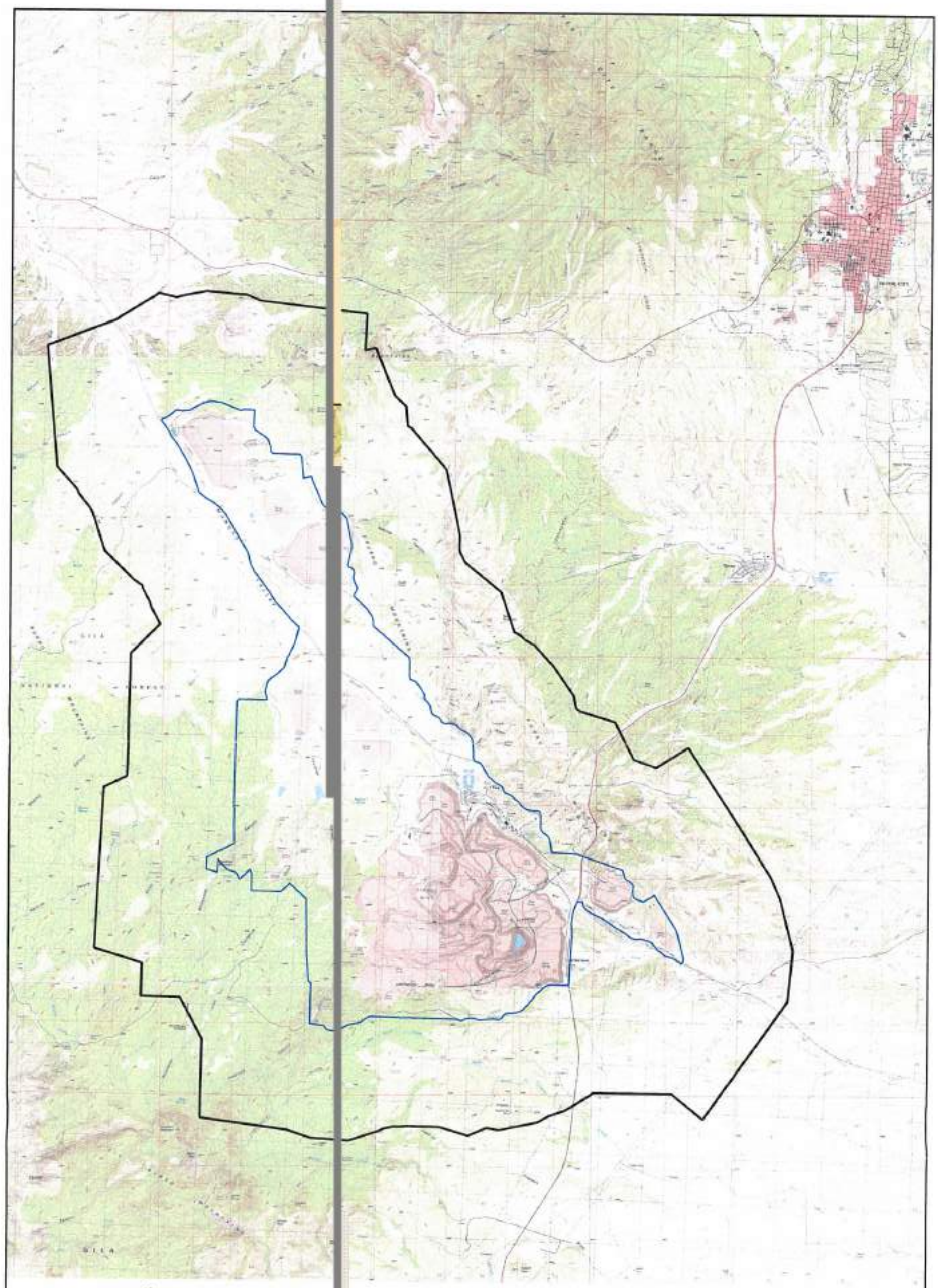
M16


Legend
Public Notice 1.5 Mile Boundary
Property Boundary
FREEPORT-McMoRAN COPPER & GOLD
Public Notice Property Boundary

Section 10

Written Description of the Routine Operations of the Facility

---

A written description of the routine operations of the facility. Include a description of how each piece of equipment will be operated, how controls will be used, and the fate of both the products and waste generated. For modifications and/or revisions, explain how the changes will affect the existing process. In a separate paragraph describe the major process bottlenecks that limit production. The purpose of this description is to provide sufficient information about plant operations for the permit writer to determine appropriate emission sources.

Mining/Reclamation Activities:

Mine operations begin with drilling, blasting and loading copper bearing ore or waste rock within the active areas of the open-pit mine. Drilling is performed with electric mobile drills. Blast holes are drilled to a depth of approximately 53 feet and are filled with blasting agents to a depth of approximately 31 feet. The remaining top 22 feet are filled with stemming material, which is a sand and gravel mixture. Blast holes are drilled on an approximate 24 to 30 feet spacing. Once the rock is blasted, electric shovels and/or loaders are moved into place to load haul trucks that deliver rock to stockpiles for leaching, or waste. For the purposes of this permit application, we have estimated the mine will mine a daily maximum of 400,000 tons per day of rock for the foreseeable future.

Reclamation is done under the multi-year reclamation plan approved by the New Mexico Environment Department and the New Mexico Energy, Minerals and Natural Resources Department – Mining and Minerals Division. Reclamation activities entail the crushing and screening of material; then loading, hauling and grading of material for erosion control, land contouring, and other reclamation purposes.

Leaching:

Collected ore is delivered to stockpiles where a slightly acidic solution called raffinate is sprinkled on its surface. The solution percolates through the copper bearing ore, dissolving copper minerals contained in it. The resulting copper-laden solution, referred to in the mining industry as pregnant leach solution (PLS), exits the bottom of the stockpile where it is collected and pumped to storage ponds. The PLS is gravity fed to the SX/EW plant for further processing.

SX/EW Plant:

The SX/EW Plant consists of a series of ten mixer-settler tanks followed by a series of two electrowinning (EW) tankhouses. A process flow diagram of the SX/EW process is provided in Section 4. The SX/EW Plant has two circuits of mixer-settler tanks with a flow capacity of approximately 32,000 gallons per minute (gpm). In the SX tanks, PLS is mixed vigorously with an equal volume of an organic solution that consists of approximately 90 percent diluent, which is a highly refined petroleum-based solvent. It is also mixed with 10 percent extraction reagent, which is a specialty chemical that selectively extracts copper from aqueous solutions under specific conditions.

Once the PLS and organic solution are sufficiently mixed, settling occurs. During this process, the less-dense organic solution extracts copper ions while the now barren leach solution settles to the bottom of the tank. The organic solution, now called "loaded," since it contains copper ions, floats to the top of the tank and is pumped to the next component of the plant. The settled solution, again, called raffinate, since it is barren of copper, is sent to an organic recovery tank to recycle any carryover organic solution back to the extraction tanks. The raffinate is sent back to the leach stockpiles for another leach cycle.
The loaded organic solution is mixed with a strong aqueous solution of sulfuric acid, called electrolyte, which strips copper ions from the organic solution. The mixed solutions are sent to a settling tank where the copper-rich electrolyte solution settles to the bottom and the organic solution floats to the top. The organic solution is recycled back to the extraction process. The copper-rich electrolyte solution is pumped to the EW tankhouse where it is routed through a series of tanks, or cells. Insoluble lead plates are hung in the cells and serve as an anode. Copper "starter sheets" are placed in the cells as cathodes. An electric current in the solution causes the copper ions from the electrolyte solution to plate onto the cathodes. Once the sheets contain enough copper, they are removed from the EW cells and shipped to off-site facilities for further processing into copper products. The remaining "lean" electrolyte solution is pumped back to the SX/EW Plant and the entire process is repeated.

Crusher/Screening Plants:
Routine operations for the Tyrone Mine include the periodic use of portable crushing and/or screening plants for reclamation purposes or to support mining activities, such as road base. Crushing and/or screening activities are operated by a contractor under a GCP.

Exempt Sources:
Exempt sources at the Tyrone mine comprise of emission sources, such as natural gas or propane-fired water heaters, space heaters, small engines for welders, generators, portable pumps, and mixing tanks. A comprehensive list of sources is provided in Table 2-B.

The Tyrone mine site and related facilities rely on power purchased from PNM Electric. During unavoidable loss of commercial power, a power plant is available to provide backup power. The power plant consists of ten (10) Nordberg compression-ignition internal combustion engines, combusting dual-fuel – a mixture of mostly natural gas and diesel – to initiate ignition. The only exception is the Engine 15, which runs on diesel only. Each engine drives a 2MW (approximate) generator that provides power to the mine and related facilities. The Nordberg engines each operate less than 500 hours per year.

Alternate Operating Scenario:
Freeport also uses the alternate operating scenario (AOS) from NSR 2448-M4, which allows Freeport-McMoRan Tyrone Inc. to utilize a mining plan originally authorized by NSR Permit NSR 2448-M2, but had been superseded by NSR Permit 2448-M3. Under this mine plan, the mining rate at the Main Pit is 300,000 tpd but the mining rate at the other pit (Gettysburg) is reduced to 0 tpd. In this revision Freeport is requesting to list all scenarios from NSR 2448-M4 as AOS's.

Section 11
Source Determination

Source submitting under 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC

Sources applying for a construction permit, PSD permit, or operating permit shall evaluate surrounding and/or associated sources (including those sources directly connected to this source for business reasons) and complete this section. Responses to the following questions shall be consistent with the Air Quality Bureau's permitting guidance, Single Source Determination Guidance, which may be found on the Applications Page in the Permitting Section of the Air Quality Bureau website.

Typically, buildings, structures, installations, or facilities that have the same SIC code, that are under common ownership or control, and that are contiguous or adjacent constitute a single stationary source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes. Submission of your analysis of these factors in support of the responses below is optional, unless requested by NMED.

A. Identify the emission sources evaluated in this section (list and describe)**:** See Table 2-A in Section 2 of this application.

B. Apply the 3 criteria for determining a single source:

SIC Code: Surrounding or associated sources belong to the same 2-digit industrial grouping (2-digit SIC code) as this facility, OR surrounding or associated sources that belong to different 2-digit SIC codes are support facilities for this source.

☑ **Yes** ☐ **No**

Common Ownership or Control: Surrounding or associated sources are under common ownership or control as this source.

☑ **Yes** ☐ **No**

Contiguous or Adjacent: Surrounding or associated sources are contiguous or adjacent with this source.

☑ **Yes** ☐ **No**

C. Make a determination:

☑ The source, as described in this application, constitutes the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes. If in "A" above you evaluated only the source that is the subject of this application, all "**YES**" boxes should be checked. If in "A" above you evaluated other sources as well, you must check **AT LEAST ONE** of the boxes "**NO**" to conclude that the source, as described in the application, is the entire source for 20.2.70, 20.2.72, 20.2.73, and 20.2.74 NMAC applicability purposes.

☐ The source, as described in this application, **does not** constitute the entire source for 20.2.70, 20.2.72, 20.2.73, or 20.2.74 NMAC applicability purposes (A permit may be issued for a portion of a source). The entire source consists of the following facilities or emissions sources (list and describe):

There are no other industrial facilities outside the Tyrone Mine property boundary that could be considered part of the Tyrone Mine stationary source for air quality permitting purposes.

Section 12

Section 12.A
PSD Applicability Determination for All Sources

(Submitting under 20.2.72, 20.2.74 NMAC)

A PSD applicability determination for all sources. For sources applying for a significant permit revision, apply the applicable requirements of 20.2.74.AG and 20.2.74.200 NMAC and to determine whether this facility is a major or minor PSD source, and whether this modification is a major or a minor PSD modification. It may be helpful to refer to the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

A. This facility is:

- ☑ **a minor PSD source before and after this modification (if so, delete C and D below).**
- ☐ **a major PSD source before this modification. This modification will make this a PSD minor source.**
- ☐ **an existing PSD Major Source that has never had a major modification requiring a BACT analysis.**
- ☐ **an existing PSD Major Source that has had a major modification requiring a BACT analysis**
- ☐ **a new PSD Major Source after this modification.**

B. **This facility [is or is not] one of the listed 20.2.74.501 Table I – PSD Source Categories. The "project" emissions** for this modification are **[significant or not significant]. [Discuss why.] The "project" emissions listed below [do or do not] only result from changes described in this permit application, thus no emissions from other [revisions or modifications, past or future] to this facility. Also, specifically discuss whether this project results in "de-bottlenecking", or other associated emissions resulting in higher emissions. The project emissions (before netting) for this project are as follows [see Table 2 in 20.2.74.502 NMAC for a complete list of significance levels]:**

a. **NOx: XX.X TPY**
b. **CO: XX.X TPY**
c. **VOC: XX.X TPY**
d. **SOx: XX.X TPY**
e. **PM: XX.X TPY**
f. **PM10: XX.X TPY**
g. **PM2.5: XX.X TPY**
h. **Fluorides: XX.X TPY**
i. **Lead: XX.X TPY**
j. **Sulfur compounds (listed in Table 2): XX.X TPY**
k. **GHG: XX.X TPY**

The Tyrone Mine is not a PSD major source as potential emissions from non-fugitive sources are less than 250 tons per year.

Section 13

Determination of State & Federal Air Quality Regulations

This section lists each state and federal air quality regulation that may apply to your facility and/or equipment that are stationary sources of regulated air pollutants.

Not all state and federal air quality regulations are included in this list. Go to the Code of Federal Regulations (CFR) or to the Air Quality Bureau's regulation page to see the full set of air quality regulations.

Required Information for Specific Equipment:
For regulations that apply to specific source types, in the 'Justification' column **provide any information needed to determine if the regulation does or does not apply**. **For example**, to determine if emissions standards at 40 CFR 60, Subpart IIII apply to your three identical stationary engines, we need to know the construction date as defined in that regulation; the manufacturer date; the date of reconstruction or modification, if any; if they are or are not fire pump engines; if they are or are not emergency engines as defined in that regulation; their site ratings; and the cylinder displacement.

Required Information for Regulations that Apply to the Entire Facility:
See instructions in the 'Justification' column for the information that is needed to determine if an 'Entire Facility' type of regulation applies (e.g. 20.2.70 or 20.2.73 NMAC).

Regulatory Citations for Regulations That Do Not, but Could Apply:
If there is a state or federal air quality regulation that does not apply, but you have a piece of equipment in a source category for which a regulation has been promulgated, you must **provide the low level regulatory citation showing why your piece of equipment is not subject to or exempt from the regulation. For example** if you have a stationary internal combustion engine that is not subject to 40 CFR 63, Subpart ZZZZ because it is an existing 2 stroke lean burn stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, your citation would be 40 CFR 63.6590(b)(3)(i). **We don't want a discussion of every non-applicable regulation, but if it is possible a regulation could apply, explain why it does not. For example,** if your facility is a power plant, you do not need to include a citation to show that 40 CFR 60, Subpart OOO does not apply to your non-existent rock crusher.

Regulatory Citations for Emission Standards:
For each unit that is subject to an emission standard in a source specific regulation, such as 40 CFR 60, Subpart OOO or 40 CFR 63, Subpart HH, include the low level regulatory citation of that emission standard. Emission standards can be numerical emission limits, work practice standards, or other requirements such as maintenance. **Here are examples:** a glycol dehydrator is subject to the general standards at 63.764C(1)(i) through (iii); an engine is subject to 63.6601, Tables 2a and 2b; a crusher is subject to 60.672(b), Table 3 and all transfer points are subject to 60.672(e)(1)

Federally Enforceable Conditions:
All federal regulations are federally enforceable. All Air Quality Bureau State regulations are federally enforceable except for the following: affirmative defense portions at 20.2.7.6.B, 20.2.7.110(B)(15), 20.2.7.11 through 20.2.7.113, 20.2.7.115, and 20.2.7.116; 20.2.37; 20.2.42; 20.2.43; 20.2.62; 20.2.63; 20.2.86; 20.2.89; and 20.2.90 NMAC. Federally enforceable means that EPA can enforce the regulation as well as the Air Quality Bureau and federally enforceable regulations can count toward determining a facility's potential to emit (PTE) for the Title V, PSD, and nonattainment permit regulations.

INCLUDE ANY OTHER INFORMATION NEEDED TO COMPLETE AN APPLICABILITY DETERMINATION OR THAT IS RELEVENT TO YOUR FACILITY'S NOTICE OF INTENT OR PERMIT.

EPA Applicability Determination Index for 40 CFR 60, 61, 63, etc: http://cfpub.epa.gov/adi/

Table for STATE REGULATIONS:

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)
20.2.1 NMAC	General Provisions	Yes	Facility	General Provisions apply to Notice of Intent, Construction, and Title V permit applications.
20.2.3 NMAC	Ambient Air Quality Standards NMAAQS	Yes	Facility	20.2.3 NMAC is a State Implementation Plan (SIP) approved regulation that limits the maximum allowable concentration of Total Suspended Particulates, Sulfur Compounds, Carbon Monoxide and Nitrogen Dioxide. The facility is subject to this regulation.
20.2.7 NMAC	Excess Emissions	Yes	Facility	If your entire facility or individual pieces of equipment are subject to emissions limits in a permit or numerical emissions standards in a federal or state regulation, this applies. This regulation is listed as applicable in NSR Permit 2448-M4.
20.2.33 NMAC	Gas Burning Equipment - Nitrogen Dioxide	No	N/A	This facility does not have new gas burning equipment having a heat input of greater than 1,000,000 million British Thermal Units per year per unit. This regulation does not apply. Note: "New gas burning equipment" means gas burning equipment, the construction or modification of which is commenced after February 17, 1972.
20.2.34 NMAC	Oil Burning Equipment: NO_2	No	N/A	This facility does not have oil burning equipment having a heat input of greater than 1,000,000 million British Thermal Units per year per unit, therefore this regulation does not apply.
20.2.35 NMAC	Natural Gas Processing Plant – Sulfur	No	N/A	This regulation could apply to existing (prior to July 1, 1974) or new (on or after July 1, 1974) natural gas processing plants that use a Sulfur Recovery Unit to reduce sulfur emissions. This facility does not operate a sulfur recovery unit. This regulation does not apply.
20.2.37 and 20.2.36 NMAC	Petroleum Processing Facilities and Petroleum Refineries	N/A	N/A	**These regulations were repealed by the Environmental Improvement Board. If you had equipment subject to 20.2.37 NMAC before the repeal, your combustion emission sources are now subject to 20.2.61 NMAC.**
20.2.38 NMAC	Hydrocarbon Storage Facility	No	N/A	This regulation could apply to storage tanks at petroleum production facilities, processing facilities, tanks batteries, or hydrocarbon storage facilities. This facility is not covered under this regulation. This regulation does not apply.
20.2.39 NMAC	Sulfur Recovery Plant - Sulfur	No	N/A	This regulation could apply to sulfur recovery plants that are not part of petroleum or natural gas processing facilities. This facility does not contain a sulfur recovery plant. This regulation does not apply.
20.2.61.109 NMAC	Smoke & Visible Emissions	Yes	Stationary Combustion Equipment	This regulation applies to Stationary Combustion Equipment, such as engines, boilers, heaters, and flares unless your equipment is subject to another state regulation that limits particulate matter such as 20.2.19 NMAC (see 20.2.61.109 NMAC). Facility stationary combustion equipment are subject to this regulation.
20.2.70 NMAC	Operating Permits	Yes	Facility	This regulation applies as the facility's potential to emit (PTE) is 100 tpy or more of any regulated air pollutant other than HAPs; and/or a HAPs PTE of 10 tpy or more for a single HAP or 25 or more tpy for combined HAPs. This facility is permitted under Title V Permit P147R2.
20.2.71 NMAC	Operating Permit Fees	Yes	Facility	If subject to 20.2.70 NMAC and your permit includes numerical ton per year emission limits, you are subject to 20.2.71 NMAC and normally applies to the entire facility.
20.2.72 NMAC	Construction Permits	Yes	Facility	This applies as the facility's potential emission rate (PER) is greater than 10 pph and greater than 25 tpy for any pollutant subject to a state or federal ambient air quality standard. This facility is permitted under NSR Permit 2448-M4.

STATE REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION: (You may delete instructions or statements that do not apply in the justification column to shorten the document.)
20.2.73 NMAC	NOI & Emissions Inventory Requirements	Yes	Facility	All facilities that are a Title V Major Source as defined at 20.2.70.7.R NMAC, are subject to Emissions Inventory Reporting. This facility is a Title V major source. This regulation applies.
20.2.74 NMAC	Permits – Prevention of Significant Deterioration (PSD)	No	N/A	This facility is a stationary source not listed in Table 1 of this Part (20.2.74.501 NMAC) and which emits or has the potential to emit stack emissions of less than two hundred fifty (250) tons per year of any regulated pollutant. This regulation therefore does not apply.
20.2.74.302 NMAC	Prevention of Significant Deterioration (PSD) CONTROL TECHNOLOGY REQUIREMENTS	Yes	PPG-1, 3, 4, 7, 8, 11-15	Only this portion of 20.2.74 NMAC applies to the Nordberg engines at the facility (units PPG-1, 3, 4, 7, 8, 11-15) as historical BACT requirements apply to these engines.
20.2.75 NMAC	Construction Permit Fees	Yes	Facility	This regulation applies if you are submitting an application pursuant to 20.2.72, 20.2.73, 20.2.74, and/or 20.2.79 NMAC. If this is a 20.2.72, 20.2.74, and/or 20.2.79 NMAC application it is subject to 20.2.75.10, 11 permit fee, and 11.E annual fees. This regulation applies.
20.2.77 NMAC	New Source Performance	Yes	Units subject to 40 CFR 60	This is a stationary source which is subject to the requirements of 40 CFR Part 60. This regulation applies as 40 CFR 60 Subparts IIII and JJJJ apply.
20.2.78 NMAC	Emission Standards for HAPS	No	Units Subject to 40 CFR 61	This facility does not emit hazardous air pollutants which are subject to the requirements of 40 CFR Part 61. This regulation does not apply.
20.2.79 NMAC	Permits – Nonattainment Areas	No	Facility	This facility is not located within a non-attainment area. This regulation does not apply.
20.2.80 NMAC	Stack Heights	No	N/A	Stacks at this facility follow good engineering practice.
20.2.82 NMAC	MACT Standards for source categories of HAPS	Yes	Units Subject to 40 CFR 63	This regulation applies to all sources emitting hazardous air pollutants, which are subject to the requirements of 40 CFR Part 63. This regulation applies as 40 CFR 63 Subparts A, ZZZZ, and CCCCCC apply.

Table for Applicable FEDERAL REGULATIONS:

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
40 CFR 50	NAAQS	Yes	Facility	This applies if you are subject to 20.2.70, 20.2.72, 20.2.74, and/or 20.2.79 NMAC.
NSPS 40 CFR 60, Subpart A	General Provisions	Yes	Units subject to 40 CFR 60	Applies if any other Subpart in 40 CFR 60 applies. This regulation applies as 40 CFR 60 Subparts IIII and JJJJ apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR60.40a, Subpart Da	Subpart Da, Performance Standards for Electric Utility Steam Generating Units	No	N/A	Establishes PM, SO_2 and NOx emission limits/standards of performance for electric utility steam generating units. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR60.40b Subpart Db	Performance Standards for Industrial-Commercial-Institutional Steam Generating Units	No	N/A	(a) The affected facility to which this subpart applies is each steam generating unit that commences construction, modification, or reconstruction after June 19, 1984, and that has a heat input capacity from fuels combusted in the steam generating unit of greater than 29 MW (100 million Btu/hour). This facility does not contain the affected source. This regulation does not apply.
40 CFR 60.40c, Subpart Dc	Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units	No	N/A	Applicability: facility has steam generating units for which construction, modification or reconstruction is commenced after June 9, 1989 and that have a maximum design heat input capacity of 29 MW (100 MMBtu/hr) or less, but greater than or equal to 2.9 MW (10 MMBtu/hr). This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60, Subpart Ka	Standards of Performance for **Storage Vessels for Petroleum Liquids** for which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and **Prior** to July 23, 1984	No	N/A	Except as provided in paragraph (b) of this section, the affected facility to which this subpart applies is each storage vessel with a storage capacity greater than 151,416 liters (40,000 gallons) that is used to store petroleum liquids for which construction is commenced after May 18, 1978. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60, Subpart Kb	Standards of Performance for **Volatile Organic Liquid Storage Vessels** (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced **After** July 23, 1984	No	N/A	Except as provided in paragraph (b) of this section, the affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (m3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60.330 Subpart GG	**Stationary Gas Turbines**	No	N/A	The provisions of this subpart are applicable to the following affected facilities: All stationary gas turbines with a heat input at peak load equal to or greater than 10.7 gigajoules (10 million Btu) per hour, based on the lower heating value of the fuel fired. This facility does not contain the affected source. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR 60, Subpart KKK	Leaks of VOC from **Onshore Gas Plants**	No	N/A	Affected Facility with Leaks of VOC from Onshore Gas Plants. Any affected facility under paragraph (a) of this section that commences construction, reconstruction, or modification after January 20, 1984, is subject to the requirements of this subpart. The group of all equipment (each pump, pressure relief device, open-ended valve or line, valve, compressor, and flange or other connector that is in VOC service or in wet gas service, and any device or system required by this subpart) except compressors (defined in § 60.631) within a process unit is an affected facility. A compressor station, dehydration unit, sweetening unit, underground storage tank, field gas gathering system, or liquefied natural gas unit is covered by this subpart if it is located at an onshore natural gas processing plant. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR Part 60 Subpart LL	Standards of performance for metallic mineral processing	No	N/A	The provisions of this subpart are applicable to the following affected facilities in metallic mineral processing plants: Each crusher and screen in open-pit mines; each crusher, screen, bucket elevator, conveyor belt transfer point, thermal dryer, product packaging station, storage bin, enclosed storage area, truck loading station, truck unloading station, railcar loading station, and railcar unloading station at the mill or concentrator with the following exceptions. This facility does not operate an affected facility under this subpart. This facility does not have a crusher or screen in the open-pit mine area and does not have a concentrator, mill, or conveyor belts in its process. This regulation does not apply.
NSPS 40 Part 60 Subpart OOO	Standards of Performance for **Nonmetallic Mineral Processing Plants**	No	N/A	This regulation establishes standards for the following affected facilities in fixed or portable nonmetallic mineral processing plants: each crusher, grinding mill, screening operation, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading station is an applicable unit. Tyrone does not have any units that apply to this regulation; therefore, this regulation does not apply.
NSPS 40 CFR Part 60 Subpart LLL	Standards of Performance for **Onshore Natural Gas Processing**: SO_2 Emissions	No	N/A	The facility is not a natural gas processing plant, including a sweetening unit followed by a sulfur recovery unit. This regulation does not apply.
NSPS 40 CFR Part 60 Subpart OOOO	Standards of Performance for Crude Oil and Natural Gas Production, Transmission, and Distribution for which construction, modification or reconstruction commenced after August 23, 2011 and before September 18, 2015	No	N/A	The rule applies to "affected" facilities that are constructed, modified, or reconstructed after Aug 23, 2011 (40 CFR 60.5365): gas wells, including fractured and hydraulically refractured wells, centrifugal compressors, reciprocating compressors, pneumatic controllers, certain equipment at natural gas processing plants, sweetening units at natural gas processing plants, and storage vessels. This facility does not contain the affected source. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR Part 60 Subpart OOOOa	Standards of Performance for Crude Oil and Natural Gas Facilities for which Construction, Modification or Reconstruction Commenced After September 18, 2015	No	N/A	This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60 Subpart IIII	Standards of performance for Stationary Compression Ignition Internal Combustion Engines	Yes	OP-4, OP-7, OP-8, ENV-120, ENV-123, SD-1, SD-2, SX/EW Fire Water Pump	The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE) and other persons as specified in paragraphs (a)(1) through (4) of this section. This facility contains several CI ICE which commenced construction after July 11, 2005 and were manufactured after April 1, 2006.
NSPS 40 CFR Part 60 Subpart JJJJ	Standards of Performance for Stationary Spark Ignition Internal Combustion Engines	Yes	Generac Emergency Generators, IPG	The provisions of this subpart are applicable to manufacturers, owners, and operators of stationary spark ignition (SI) internal combustion engines (ICE) as specified in paragraphs (a)(1) through (6) of this section. The Generac Emergency Generators (units Generac Emergency Generator 1 through 4) and unit IPG are subject to NSPS JJJJ.
NSPS 40 CFR 60 Subpart TTTT	Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units	No	N/A	This subpart establishes emission standards and compliance schedules for the control of greenhouse gas (GHG) emissions from a steam generating unit, IGCC, or a stationary combustion turbine that commences construction after January 8, 2014 or commences modification or reconstruction after June 18, 2014. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60 Subpart UUUU	Emissions Guidelines for Greenhouse Gas Emissions and Compliance Times for Electric Utility Generating Units	No	N/A	This subpart establishes emission guidelines and approval criteria for State or multi-State plans that establish emission standards limiting greenhouse gas (GHG) emissions from an affected steam generating unit, integrated gasification combined cycle (IGCC), or stationary combustion turbine. This facility does not contain the affected source. This regulation does not apply.
NSPS 40 CFR 60, Subparts WWW, XXX, Cc, and Cf	Standards of performance for Municipal Solid Waste (MSW) Landfills	No	N/A	This facility is not a municipal solid waste landfill. This regulation does not apply
NESHAP 40 CFR 61 Subpart A	General Provisions	No	Units Subject to 40 CFR 61	Applies if any other Subpart in 40 CFR 61 applies. As no subparts apply, this regulation does not apply.
NESHAP 40 CFR 61 Subpart E	National Emission Standards for **Mercury**	No	N/A	The provisions of this subpart are applicable to those stationary sources which process mercury ore to recover mercury, use mercury chlor-alkali cells to produce chlorine gas and alkali metal hydroxide, and incinerate or dry wastewater treatment plant sludge. This facility does not contain the affected activity. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NESHAP 40 CFR 61 Subpart V	National Emission Standards for **Equipment Leaks** (Fugitive Emission Sources)	No	N/A	The provisions of this subpart apply to each of the following sources that are intended to operate in volatile hazardous air pollutant (VHAP) service: pumps, compressors, pressure relief devices, sampling connection systems, open-ended valves or lines, valves, connectors, surge control vessels, bottoms receivers, and control devices or systems required by this subpart. VHAP service means a piece of equipment either contains or contacts a fluid (liquid or gas) that is at least 10 percent by weight of VHAP. VHAP means a substance regulated under this subpart for which a standard for equipment leaks of the substance has been promulgated. Benzene is a VHAP (See 40 CFR 61 Subpart J). Link to 40 CFR 61 Subpart V This facility does not contain the affected source. This regulation does not apply.
MACT 40 CFR 63, Subpart A	General Provisions	Yes	Units Subject to 40 CFR 63	This regulation applies as 40 CFR 63 Subparts A, ZZZZ, and CCCCCC apply.
MACT 40 CFR 63.760 Subpart HH	**Oil and Natural Gas Production Facilities**	No	N/A	This subpart applies to the owners and operators of the emission points, specified in paragraph (b) of this section that are located at oil and natural gas production facilities that meet the specified criteria in paragraphs (a)(1) and either (a)(2) or (a)(3) of this section. This facility is not an oil or natural gas production facility. This regulation does not apply.
MACT 40 CFR 63 Subpart HHH	National Emission Standards for Hazardous Air Pollutants From Natural Gas Transmission and Storage Facilities	No	N/A	This subpart applies to owners and operators of natural gas transmission and storage facilities that transport or store natural gas prior to entering the pipeline to a local distribution company or to a final end user (if there is no local distribution company), and that are major sources of hazardous air pollutants (HAP) emissions as defined in §63.1271. This facility does not contain the affected source. This regulation does not apply.
MACT 40 CFR 63 Subpart DDDDD	National Emission Standards for Hazardous Air Pollutants for Major Industrial, Commercial, and Institutional Boilers & Process Heaters	No	N/A	This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from industrial, commercial, and institutional boilers and process heaters located at major sources of HAP. This facility does not contain the affected source. This regulation does not apply.
MACT 40 CFR 63 Subpart UUUUU	National Emission Standards for Hazardous Air Pollutants Coal & Oil Fire Electric Utility Steam Generating Unit	No	N/A	This subpart establishes national emission limitations and work practice standards for hazardous air pollutants (HAP) emitted from coal- and oil-fired electric utility steam generating units (EGUs) as defined in §63.10042 of this subpart. This facility does not contain the affected source. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
MACT 40 CFR 63 Subpart ZZZZ	National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (**RICE MACT**)	Yes	PPG-1, 3, 4, 7, 8, 11, 12, 13, 14, 15 ENV-101, ENV-111, ENV-117, ENV-122, ENV-123, Generac Emergency Generators, GO Generator Backup E1-128, SX/EW Fire Water Pump, OP-2, OP-4, OP-7, OP-8, EMP-1, EMP-2, ENV-120, SD-1, SD-2, IPG	You are subject to this subpart if you own or operate a stationary RICE at a major or area source of HAP emissions. This facility contains the affected RICE sources listed here.
MACT 40 CFR 63 Subpart CCCCCC	National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Dispensing Facilities	Yes	SPCC-TYR-061 (GDF1) SPCC-TYR-119 (GDF2)	This subpart establishes national emission limitations and management practices for hazardous air pollutants (HAP) emitted from the loading of gasoline storage tanks at gasoline dispensing facilities (GDF). This subpart also establishes requirements to demonstrate compliance with the emission limitations and management practices. The affected source to which this subpart applies is each GDF that is located at an area source. The affected source includes each gasoline cargo tank during the delivery of product to a GDF and also includes each storage tank. The gasoline dispensing units at this facility are subject. Per the regulation, because each GDF has a monthly throughput of less than 10,000 gallons of gasoline, the requirements in §63.11116 apply.
40 CFR 64	**Compliance Assurance Monitoring**	No	N/A	The facility does not operate any pollutant-specific emissions unit that uses a control device to achieve compliance with a standard and the unit has potential pre-control device emissions of the applicable regulated air pollutant that are equal to or greater than 100 percent of the amount required for the source to be classified as a major source. As such, a CAM plan is not required.
40 CFR 68	**Chemical Accident Prevention**	No	N/A	This regulation applies to an owner or operator of a stationary source that has more than a threshold quantity of a regulated substance in a process, as determined under §68.115. This facility is not subject.
Title IV – Acid Rain 40 CFR 72	**Acid Rain**	No	N/A	See 40 CFR 72.6. This may apply if your facility generates commercial electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.
Title IV – Acid Rain 40 CFR 73	**Sulfur Dioxide** Allowance Emissions	No	N/A	See 40 CFR 73.2. This may apply if your facility generates commercial electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.
Title IV-Acid Rain 40 CFR 75	**Continuous Emissions Monitoring**	No	N/A	See 40 CFR 75.2. This may apply if your facility generates commercial electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.
Title IV – Acid Rain 40 CFR 76	**Acid Rain** Nitrogen Oxides **Emission Reduction Program**	No	N/A	See 40 CFR 76.1. This may apply if your facility generates commercial electric power or electric power for sale. The facility does not engage in the regulated activities. This regulation does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
Title VI – 40 CFR 82	Protection of **Stratospheric Ozone**	Yes	N/A	This regulation applies under the following citation: **(82.150)** if you service, maintain, or repair appliances, dispose of appliances, refrigerant reclaimers, **if you are an owner or operator of an appliance**, if you are a manufacturer of appliances or of recycling and recovery equipment, if you are an approved recycling and recovery equipment testing organization, and/or if you sell or offer for sell or purchase class I or class I refrigerants.

Section 14

Operational Plan to Mitigate Emissions

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

☐ **Title V Sources** (20.2.70 NMAC)**:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies** defining the measures to be taken to mitigate source emissions during startups, shutdowns, and emergencies as required by 20.2.70.300.D.5(f) and (g) NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☑ **NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Source Emissions During Malfunction, Startup, or Shutdown** defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown as required by 20.2.72.203.A.5 NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☑ **Title V** (20.2.70 NMAC)**, NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has established and implemented a Plan to Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work practice standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept on site or at the nearest field office to be made available to the Department upon request. This plan should not be submitted with this application.

Freeport-McMoRan Tyrone Inc. maintains the required operational plan to mitigate emissions.

Section 15

Alternative Operating Scenarios

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Alternative Operating Scenarios: Provide all information required by the department to define alternative operating scenarios. This includes process, material and product changes; facility emissions information; air pollution control equipment requirements; any applicable requirements; monitoring, recordkeeping, and reporting requirements; and compliance certification requirements. Please ensure applicable Tables in this application are clearly marked to show alternative operating scenario.

Construction Scenarios: When a permit is modified authorizing new construction to an existing facility, NMED includes a condition to clearly address which permit condition(s) (from the previous permit and the new permit) govern during the interval between the date of issuance of the modification permit and the completion of construction of the modification(s). There are many possible variables that need to be addressed such as: Is simultaneous operation of the old and new units permitted and, if so for example, for how long and under what restraints? In general, these types of requirements will be addressed in Section A100 of the permit, but additional requirements may be added elsewhere. Look in A100 of our NSR and/or TV permit template for sample language dealing with these requirements. Find these permit templates at: https://www.env.nm.gov/aqb/permit/aqb_pol.html. Compliance with standards must be maintained during construction, which should not usually be a problem unless simultaneous operation of old and new equipment is requested.

In this section, under the bolded title "Construction Scenarios", specify any information necessary to write these conditions, such as: conservative-realistic estimated time for completion of construction of the various units, whether simultaneous operation of old and new units is being requested (and, if so, modeled), whether the old units will be removed or decommissioned, any PSD ramifications, any temporary limits requested during phased construction, whether any increase in emissions is being requested as SSM emissions or will instead be handled as a separate Construction Scenario (with corresponding emission limits and conditions, etc.

Freeport uses the alternate operating scenario (AOS) from NSR 2448-M4, which allows Freeport-McMoRan Tyrone Inc. to utilize a mining plan originally authorized by NSR Permit NSR 2448-M2, but had been superseded by NSR Permit 2448-M3. Under this mine plan, the mining rate at the Main Pit is 300,000 tpd but the mining rate at the other pit (Gettysburg) is reduced to 0 tpd. In this revision, Freeport is requesting to have all scenarios listed in NSR 2448-M4 as AOS's. Please see below for NSR Permit # PSD2448-M4 Tables 108.A.1 Allowable Mining Operating and Throughput Limits and Table 108.A.1a: Alternate Mining Rates from NSR 2448-M2 as reference.

Table 108.A.1: Allowable Mining Operating and Throughput Limits

Permit ID	Emissions Source Description	Activity Location Description	Operating Schedule	Material[1] Throughput	Units
Mine Fugitives	Blasting	N/A	Daylight	75,000	tons/yr
				400,000	lb/day
Normal Mining Rates from NSR 2448-M3					
Mine Fugitives	Hauling	Little Rock	24 hrs/day	100,000	tons/day
	Handling	Waste			
	Handling	Leach			
Mine Fugitives	Hauling	Copper Leach	24 hrs/day	60,000	tons/day
	Handling	Waste			
		Leach			

Table 108.A.1: Allowable Mining Operating and Throughput Limits

Permit ID	Emissions Source Description	Activity Location Description	Operating Schedule	Material[1] Throughput	Units
Mine Fugitives	Hauling	Copper Mountain	24 hrs/day	100,000	tons/day
	Handling	Leach			
		Waste			
Mine Fugitives	Hauling	Valencia	24 hrs/day	100,000	tons/day
	Handling	Leach			
		Waste			
Mine Fugitives	Hauling	Main Pit (Mohawk, Burro Chief, West Main)	24 hrs/day	120,000	tons/day
	Handling	Leach			
		Waste			
SP-7A Plants Fugitives	Material Hauling	SP-7A Plants	12 hrs/day	600	tons/hour

1 Material includes ore and waste rock. Waste rock includes overburden.

Table 108.A.1a: Alternate Mining Rates from NSR 2448-M2

Permit ID	Emissions Source Description	Activity Location Description	Operating Schedule	Material[1] Throughput	Units
Mine Fugitives	Hauling	Little Rock	24 hrs/day	300,000	tons/day
	Handling	Leach			
Mine Fugitives	Hauling	Little Rock	24 hrs/day	250,000	tons/day
	Handling	Waste			
Mine Fugitives	Hauling	Main Pit Mohawk Area	24 hrs/day	200,000	tons/day
	Handling	Leach			
Mine Fugitives	Hauling	Main Pit Mohawk Area	24 hrs/day	200,000	tons/day
	Handling	Waste			
Mine Fugitives	Hauling	Main Pit [2]	24 hrs/day	300,000	tons/day
	Handling	Leach			
Mine Fugitives	Hauling	Main Pit [2]	24 hrs/day	300,000	tons/day
	Handling	Waste			

1 Material includes ore and waste rock. Waste rock includes overburden.
2 Main Pit consists of these areas Burro Chief, West Main, and Valencia.

Section 16

Air Dispersion Modeling

1) Minor Source Construction (20.2.72 NMAC) and Prevention of Significant Deterioration (PSD) (20.2.74 NMAC) ambient impact analysis (modeling): Provide an ambient impact analysis as required at 20.2.72.203.A(4) and/or 20.2.74.303 NMAC and as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines found on the Planning Section's modeling website. If air dispersion modeling has been waived for one or more pollutants, attach the AQB Modeling Section modeling waiver approval documentation.
2) SSM Modeling: Applicants must conduct dispersion modeling for the total short term emissions during routine or predictable startup, shutdown, or maintenance (SSM) using realistic worst case scenarios following guidance from the Air Quality Bureau's dispersion modeling section. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions modeling requirements.
3) Title V (20.2.70 NMAC) ambient impact analysis: Title V applications must specify the construction permit and/or Title V Permit number(s) for which air quality dispersion modeling was last approved. Facilities that have only a Title V permit, such as landfills and air curtain incinerators, are subject to the same modeling required for preconstruction permits required by 20.2.72 and 20.2.74 NMAC.

What is the purpose of this application?	Enter an X for each purpose that applies
New PSD major source or PSD major modification (20.2.74 NMAC). See #1 above.	
New Minor Source or significant permit revision under 20.2.72 NMAC (20.2.72.219.D NMAC). See #1 above. **Note:** Neither modeling nor a modeling waiver is required for VOC emissions.	X
Reporting existing pollutants that were not previously reported.	
Reporting existing pollutants where the ambient impact is being addressed for the first time.	
Title V application (new, renewal, significant, or minor modification. 20.2.70 NMAC). See #3 above.	
Relocation (20.2.72.202.B.4 or 72.202.D.3.c NMAC)	
Minor Source Technical Permit Revision 20.2.72.219.B.1.d.vi NMAC for like-kind unit replacements.	
Other: i.e. SSM modeling. See #2 above.	
This application does not require modeling since this is a No Permit Required (NPR) application.	
This application does not require modeling since this is a Notice of Intent (NOI) application (20.2.73 NMAC).	
This application does not require modeling according to 20.2.70.7.E(11), 20.2.72.203.A(4), 20.2.74.303, 20.2.79.109.D NMAC and in accordance with the Air Quality Bureau's Modeling Guidelines.	

Check each box that applies:

☐ See attached, approved modeling **waiver for all** pollutants from the facility.
☐ See attached, approved modeling **waiver for some** pollutants from the facility.
☑ Attached in Universal Application Form 4 (UA4) is a **modeling report for all** pollutants from the facility.
☐ Attached in UA4 is a **modeling report for some** pollutants from the facility.
☐ No modeling is required.

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Trinity Consultants

March 20, 2020

Air Dispersion Modeling Protocol
Freeport-McMoRan Tyrone Inc
Tyrone Mine

Purpose of Modeling

Freeport-McMoRan Tyrone Inc (Tyrone) is preparing a significant permit revision application pursuant to 20.2.72.219.D.1.a NMAC for its Tyrone Mine. The proposed action will allow for mining and hauling activities associated with Gettysburg and Mohawk pits to increase to 200,000 tons per day. However, mining in these areas will not increase the overall facility-wide mining rate as they will be offset by a decrease in mining in other areas. Tyrone will also be adding four new pump engines to Little Rock Pit (Units OP-4, OP-7, EMP-1, and EMP-2) and one new pump engine to South Rim Pit (Unit ENV-117). Only the two worst-case scenario engines will be modeled for Little Rock Pit, as there will never be a scenario where more than two engines are running simultaneously. Tyrone is reducing the Indian Peak Generator (Unit IPG) to an emergency-use only generator; therefore, the unit will not be included in the model. Finally, Tyrone is requesting to maintain the reclamation activities from NSR Permit 2448-M4 along with the alternate mining rates from NSR 2448-M2.

Tyrone seeks to demonstrate compliance with the New Mexico Ambient Air Quality Standards (NMAAQS), the National Ambient Air Quality Standards (NAAQS), as well as the Prevention of Significant Deterioration (PSD) Class I and Class II Standards as applicable for NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$. The facility is located in the Air Quality Control Region 12 where the PSD minor source baseline dates have been triggered for NO_2, SO_2, and PM_{10}.

Facility Location and Description

The Tyrone mine is an open-pit copper mine located approximately 4.0 miles southwest of Tyrone, New Mexico in Grant County. Tyrone is located in UTM Zone 12 at 3,618,400 m N and 744,430 m E. The nearest Class I area is the Gila Wilderness at 37 km from the facility.

The primary purpose of the facility is to produce copper cathode using the Solvent Extraction – Electro-winning (SX/EW) process. Tyrone is a Minor source under the PSD rules as currently permitted and will remain a minor source after the proposed significant revision. This facility will also remain a major source for operating permit purposes under Title V (20.2.70 NMAC).

Proposed Mining Scenario

Tyrone seeks to update mining operating and throughputs limits for Mohawk and Gettysburg to 200,000 tons per day at each pit. Mining and hauling activities will be reduced in other areas to offset the overall facility mining rate. Table 1 below represents these updates to the "Normal Mining Rates from NSR 2448-M3" listed in Table 108.A.1 of the NSR 2448-M4 permit.

Table 1. Updates to Normal Mining Rates from NSR 2448-M3

Permit ID	Emissions Source Description	Activity Location Description	Operating Schedule	Material Throughput	Units
Mine Fugitives	Hauling	Mohawk	24 hrs/day	200,000	tons/day
	Handling	Leach			
		Waste			
Mine Fugitives	Hauling	Gettysburg	24 hrs/day	200,000	tons/day
	Handling	Leach			
		Waste			

Proposed Blasting Scenario
Blasting will remain unchanged from the currently permitted and approved rates represented in NSR 2448-M4. Table 2 below represents the current Table 108.A.1 from NSR 2448-M4.

Table 2. Blasting Rates from NSR 2448-M4

Permit ID	Emissions Source Description	Activity Location Description	Operating Schedule	Material Throughput	Units
Mine Fugitives	Blasting	N/A	Daylight	75,000	tons/yr
				400,000	lb/day

Model Input Options and Elevation Data
Dispersion modeling for this facility will be performed with the latest version of AERMOD (v18081). The model will be used to determine the impacts for NO_2, CO, SO_2, PM_{10} and $PM_{2.5}$, and will be executed for all applicable averaging periods in regulatory default mode.

The terrain will be incorporated into the modeling analysis through use of AERMAP with the most recent 7.5-minute and 1-degree DEM data currently available. A building downwash analysis using the latest version of BPIP will be used to account for potential effluent downwash due to any structures at the facility.

Receptor Grid Description
The boundary will be defined with 100-meter receptor spacing. In areas where high impacts are predicted, a fine grid with 100-meter spacing will extend to about 1,000 meters from the boundary. A medium grid with 500-meter spacing will extend to 10,000 meters from the facility center. A coarse grid with 1,000-meter spacing will extend to 30,000 meters from the facility center. If the radius of impact extends past 30,000 meters from the facility center, the grid will be extended to 50,000 meters. The elevations of facility sources, receptors and surrounding sources will be determined using the same method and most recent 7.5-minute DEM data currently available.

Elevations for surrounding sources will be preserved as provided by Eric Peters, Air Dispersion Modeler at the NMED Air Quality Bureau January 8, 2020.

Meteorological Data
The EPA AERMOD program requires meteorological data preprocessed with the AERMET program. Three additional variables are considered when preprocessing the surface and meteorological data for a site. These variables are:

- Surface roughness;
- Albedo; and
- Bowen Ratio.

The NMED has created meteorological data sets for use in AERMOD air dispersion modeling. The 2017 Deming meteorological data set obtained from the NMED will be used for this analysis. This meteorological station is located in terrain with similar surface roughness, albedo, and bowen ratio as the facility. Accordingly, we feel this data is representative of meteorological conditions at all parts of the facility.

Particle Depletion
The PM_{10} modeling will include the use of particle depletion parameters. By accounting for particle depletion, AERMOD is able to account for the gravitational dropout of portions of the PM_{10} plumes. Depletion parameters obtained from the NMED will be used. Particle depletion cannot be performed for $PM_{2.5}$.

Significance Analysis and Cumulative Impact Analysis (CIA)
The modeled ground-level concentrations will be compared to the corresponding significant impact levels (SILs) to determine whether the modeled ground-level concentrations at any receptor locations are greater than the SIL (i.e., "significant" receptors). If the significance analysis reveals that modeled ground-level concentrations for a particular pollutant and averaging period are greater than the applicable SIL, a Cumulative Impact Analysis (CIA) will be performed at the significant receptors.

If significant, the CIA will be performed including impacts from the facility sources and any surrounding sources within 25 km of the facility, as well as any sources within 50 km of the facility with emissions of 1,000 lb/hr or more. The inclusion of surrounding sources will follow the guidance shown in Table 6C: "Modeling the Design Value Summary (Default Modeling)" from the Modeling Guidelines[1].

If applicable, the monitors listed in Table 3 below will be used for background concentrations as they are nearest to the facility and most representative of the region.

Table 3. Background Monitors (if Applicable)

Pollutant	Location	Monitor ID
NO_2	Deming	7E
CO	Del Norte High School	350010023
SO_2	Hurley Smelter	7T
PM_{10}	Deming	7D
$PM_{2.5}$	Las Cruces	6Q

An inventory of surrounding sources was obtained from NMED on January 8, 2020. Adjustments to surrounding source parameters will be made per the guidance in Section 4.8.1 of the Modeling Guidelines and documented in the modeling report. Surrounding source locations and elevations will be preserved. For particulate modeling, sources within 10 km of the facility boundary will be retained. For gaseous modeling, sources within 25 km of the facility boundary will be retained.

PSD Increment Analysis
If the results of the ROI show an exceedance of the significance levels, PSD increment analysis will be conducted for the appropriate pollutants because the minor source baseline date has been established in the region. If required, the PSD increment analysis will be conducted including all PSD increment consuming and expanding sources within 25 km of the facility as well as any sources within 50 km of the facility with emissions of 1,000 lb/hr or more per Table 6C of the Modeling Guidelines.

The applicable minor source baseline date in AQCR 012 is August 10, 1995 for NO_2, SO_2, and PM_{10}. The $PM_{2.5}$ minor source baseline date has not been established.

Class I Areas Analysis
PSD Class I Increment analysis is required by the NMED as Tyrone is a PSD minor source within 50 km of a Class I area. The nearest Class I area is the Gila Wilderness at 37 km from the facility. There are no other Class I areas within 50 km of the facility.

[1] Mustafa, S., Peters, E., Raso, A., Zyla, R. (2019). *Air Dispersion Modeling Guidelines* (United States, New Mexico Environmental Department, New Mexico Air Quality Bureau).

The Class I SIL analysis will be performed for the 24-hour and annual PM_{10} averaging periods; annual NO_2 averaging period; and the annual, 24-hour, and 3-hour SO_2 averaging periods. The analysis will include the Tyrone facility sources and a group of receptors around the Gila Wilderness. The receptor locations and elevations will be obtained from the most recent version of MergeMaster provided by the NMED. The impacts will be determined at the Gila Wilderness receptors and will be compared to the Class I area SILs. If impacts at the Gila Wilderness are greater than the Class I SILs, further Class I modeling will be performed.

MacKenzie Russell

From: Peters, Eric, NMENV <eric.peters@state.nm.us>
Sent: Thursday, March 19, 2020 3:57 PM
To: MacKenzie Russell
Cc: Mustafa, Sufi A., NMENV
Subject: RE: [EXT] Modeling Protocol - Tyrone Mine

MacKenzie,

I have reviewed the modeling protocol for Tyrone Mine. The protocol contains the statement, “Tyrone is reducing the Indian Peak Generator (Unit IPG) to an emergency-use only generator; therefore, the unit will not be included in the model.” Is the emergency generator exempt from permitting after this change? If it is exempt from permitting, then it is exempt from modeling. Otherwise, it may need to be modeled unless there are other reasons not to include it.

I approve the remainder of the protocol.

Eric

Eric Peters, Air Dispersion Modeler
New Mexico Environment Department / Air Quality Bureau
525 Camino de Los Marquez - Suite 1 / Santa Fe, NM, 87505
Phone: 505-476-4327 / Fax: 505-476-4375
E-mail: eric.peters@state.nm.us
www.env.nm.gov

From: Mustafa, Sufi A., NMENV <sufi.mustafa@state.nm.us>
Sent: Friday, March 13, 2020 4:40 PM
To: Peters, Eric, NMENV <eric.peters@state.nm.us>
Subject: Fwd: [EXT] Modeling Protocol - Tyrone Mine

Eric
Please review this modeling protocol.
Thank you.
Sufi

Sent from my iPhone

Begin forwarded message:

From: MacKenzie Russell <MRussell@trinityconsultants.com>
Date: March 13, 2020 at 1:19:34 PM MDT
To: "Mustafa, Sufi A., NMENV" <sufi.mustafa@state.nm.us>
Cc: Adam Erenstein <AErenstein@trinityconsultants.com>, Mike Celente <MCelente@trinityconsultants.com>, "Astillero, Nina" <nastille@fmi.com>, "Parkey, Brian" <bparkey@fmi.com>, "West, Christopher" <cwest@fmi.com>
Subject: [EXT] Modeling Protocol - Tyrone Mine

Hi Sufi,

I hope this email finds you well. Please see the attached modeling protocol for the Tyrone Mine. Do not hesitate to reach out if you have any questions!

Thank you,
MacKenzie

.....
MacKenzie Russell
Consultant

Trinity Consultants
9400 Holly Avenue | Bldg 3 Suite 300 | Albuquerque, NM 87122

Office: **505-266-6611**
Email: MRussell@TrinityConsultants.com | Website: www.TrinityConsultants.com

Universal Application 4

Air Dispersion Modeling Report

Refer to and complete Section 16 of the Universal Application form (UA3) to assist your determination as to whether modeling is required. If, after filling out Section 16, you are still unsure if modeling is required, e-mail the completed Section 16 to the AQB Modeling Manager for assistance in making this determination. If modeling is required, a modeling protocol would be submitted and approved prior to an application submittal. The protocol should be emailed to the modeling manager. A protocol is recommended but optional for minor sources and is required for new PSD sources or PSD major modifications. Fill out and submit this portion of the Universal Application form (UA4), the "Air Dispersion Modeling Report", only if air dispersion modeling is required for this application submittal. This serves as your modeling report submittal and should contain all the information needed to describe the modeling. No other modeling report or modeling protocol should be submitted with this permit application.

16-A: Identification

1	Name of facility:	Tyrone Mine
2	Name of company:	Freeport-McMoRan Tyrone Inc.
3	Current Permit number:	NSR 2448-M4; P147-R2
4	Name of applicant's modeler:	MacKenzie Russell, Trinity Consultants
5	Phone number of modeler:	505-266-6611
6	E-mail of modeler:	MRussell@TrinityConsultants.com

16-B: Brief

1	Was a modeling protocol submitted and approved?	Yes☒	No☐
2	Why is the modeling being done?	Other (describe below)	
3	Describe the permit changes relevant to the modeling.		
	Freeport-McMoRan Tyrone Inc (Tyrone) is submitting a significant permit revision application pursuant to 20.2.72.219.D.1.a NMAC for its Tyrone Mine. The proposed action will allow for mining and hauling activities associated with Gettysburg and Mohawk pits to increase to 200,000 tons per day. However, mining in these areas will not increase the overall facility-wide mining rate as they will be offset by a decrease in mining in other areas. Tyrone will also be adding four new pump engines to Little Rock Pit (Units OP-4, OP-7, EMP-1, and EMP-2) and one new pump engine to South Rim Pit (Unit ENV-117). Only the two worst-case scenario engines will be modeled for Little Rock Pit, as there will never be a scenario where more than two engines are running simultaneously. Tyrone is reducing the Indian Peak Generator (Unit IPG) to an emergency-use only generator; therefore, the unit will not be included in the model as it is exempt pursuant to 20.2.72.202.B.3 NMAC. Finally,		

	Tyrone is requesting to maintain the mining and reclamation activities from NSR Permit 2448-M4 along with the alternate mining rates from NSR 2448-M2.		
4	What geodetic datum was used in the modeling?	WGS84	
5	How long will the facility be at this location?	Greater than one year.	
6	Is the facility a major source with respect to Prevention of Significant Deterioration (PSD)?	Yes☐	No☒
7	Identify the Air Quality Control Region (AQCR) in which the facility is located	012	
8	List the PSD baseline dates for this region (minor or major, as appropriate).		
	NO2	8/10/1995	
	SO2	8/10/1995	
	PM10	8/10/1995	
	PM2.5	Not established	
9	Provide the name and distance to Class I areas within 50 km of the facility (300 km for PSD permits).		
	Gila Wilderness; 37 km		
10	Is the facility located in a non-attainment area? If so describe below	Yes☐	No☒
	N/A		
11	Describe any special modeling requirements, such as streamline permit requirements.		
	N/A – There are no special modeling requirements.		

16-C: Modeling History of Facility

1. Describe the modeling history of the facility, including the air permit numbers, the pollutants modeled, the National Ambient Air Quality Standards (NAAQS), New Mexico AAQS (NMAAQS), and PSD increments modeled. (Do not include modeling waivers).

Pollutant	Latest permit and modification number that modeled the pollutant facility-wide.	Date of Permit	Comments
CO	NSR 2448-M3	June 2018	N/A
NO_2	NSR 2448-M3	June 2018	N/A
SO_2	NSR 2448-M3	June 2018	N/A
H_2S	N/A		
PM2.5	NSR 2448-M3	June 2018	N/A
PM10	NSR 2448-M3	June 2018	N/A
TSP	NSR 2448-M3	June 2018	N/A
Lead	N/A		
Ozone (PSD only)	N/A		
NM Toxic Air Pollutants (20.2.72.402 NMAC)	N/A		

16-D: Modeling performed for this application

For each pollutant, indicate the modeling performed and submitted with this application.
Choose the most complicated modeling applicable for that pollutant, i.e., culpability analysis assumes ROI and cumulative analysis were also performed.

Pollutant	ROI	Cumulative analysis	Culpability analysis	Waiver approved	Pollutant not emitted or not changed.
CO	☐	☒	☐	☐	☐
NO_2	☐	☒	☐	☐	☐
SO_2	☒	☐	☐	☐	☐
H_2S	☐	☐	☐	☐	☒
PM2.5	☐	☒	☐	☐	☐
PM10	☐	☒	☐	☐	☐
TSP	☐	☐	☐	☐	☒
Lead	☐	☐	☐	☐	☒
Ozone	☐	☐	☐	☐	☒
State air toxic(s) (20.2.72.402 NMAC)	☐	☐	☐	☐	☒

16-E: New Mexico toxic air pollutants modeling – N/A

1 List any New Mexico toxic air pollutants (NMTAPs) from Tables A and B in 20.2.72.502 NMAC that are modeled for this application. - This facility does not emit NMTAPs requiring modeling.

2 List any NMTAPs that are emitted but not modeled because stack height correction factor. Add additional rows to the table below, if required.

Pollutant	Emission Rate (pounds/hour)	Emission Rate Screening Level (pounds/hour)	Stack Height (meters)	Correction Factor	Emission Rate/ Correction Factor

16-F: Modeling options

1	Was the latest version of AERMOD used with regulatory default options? If not explain below.	Yes☒	No☐
	The model was run in regulatory default mode on BREEZE AERMOD v18081.		

16-G: Surrounding source modeling

1	Date of surrounding source retrieval	January 8, 2020

2 If the surrounding source inventory provided by the Air Quality Bureau was believed to be inaccurate, describe how the sources modeled differ from the inventory provided. If changes to the surrounding source inventory were made, use the table below to describe them. Add rows as needed.

AQB Source ID	Description of Corrections

16-H: Building and structure downwash

1	How many buildings are present at the facility?	There are several buildings located at the facility.		
2	How many above ground storage tanks are present at the facility?	There are several above ground storage tanks located at the facility.		
3	Was building downwash modeled for all buildings and tanks? If not explain why below.		Yes☐	No☒
	Due to the expansive size of the facility and the location of the point sources relative to boundary receptors, any building downwash that may occur would have sufficient space to disperse prior to reaching the boundary.			
4	Building comments	N/A		

16-I: Receptors and modeled property boundary

1	"Restricted Area" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with a steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area. A Restricted Area is required in order to exclude receptors from the facility property. If the facility does not have a Restricted Area, then receptors shall be placed within the property boundaries of the facility. Describe the fence or other physical barrier at the facility that defines the restricted area.		
	The restricted area is defined by fencing, gates, and signs.		
2	Receptors must be placed along publicly accessible roads in the restricted area. Are there public roads passing through the restricted area?	Yes☒	No☐
3	Are restricted area boundary coordinates included in the modeling files?	Yes☒	No☐
4	Describe the receptor grids and their spacing. The table below may be used, adding rows as needed.		
	A very fine grid with 100 meter spacing was used in areas with anticipated highest impacts, expanding out to 800-1000 meters from the boundary. A fine grid with 500 meter spacing extends to 10,000 meters from the facility center. A coarse grid with 1,000 meter spacing extends to 30,000 meters unless otherwise specified. The coarse grid was extended to 50,000 meters for the NO_2 model to include the full extent of the ROI. The coarse grid was not extended to the north in the TSP SIL model based on the ROI to accommodate issues with the model running out of memory due to file size.		
5	Describe receptor spacing along the fence line.		
	Fenceline receptors were modeled with 100 meter spacing.		
6	Describe the PSD Class I area receptors.		
	PSD class I area receptors were obtained from the 2018 MergeMaster database provided by NMED for the Gila Wilderness.		

16-J: Sensitive areas

1	Are there schools or hospitals or other sensitive areas near the facility? If so describe below. This information is optional (and purposely undefined) but may help determine issues related to public notice.	Yes☐	No☒
	N/A		
3	The modeling review process may need to be accelerated if there is a public hearing. Are there likely to be public comments opposing the permit application?	Yes☐	No☒

16-K: Modeling Scenarios

1	Identify, define, and describe all modeling scenarios. Examples of modeling scenarios include using different production rates, times of day, times of year, simultaneous or alternate operation of old and new equipment during transition periods, etc. Alternative operating scenarios should correspond to all parts of the Universal Application and should be fully described in Section 15 of the Universal Application (UA3).											
	Reclamation truck traffic was modeled based on a 6 am to 6 pm operating schedule. Blasting combustion emissions were modeled during daylight hours as this activity only occurs during this time.											
2	Which scenario produces the highest concentrations? Why?											
	N/A – Only one scenario was modeled.											
3	Were emission factor sets used to limit emission rates or hours of operation? (This question pertains to the "SEASON", "MONTH", "HROFDY" and related factor sets, not to the factors used for calculating the maximum emission rate.)							Yes☐		No☒		
4	If so, describe factors for each group of sources. List the sources in each group before the factor table for that group. (Modify or duplicate table as necessary. It's ok to put the table below section 16-K if it makes formatting easier.) Sources:											
5	Hour of Day	Factor	Hour of Day	Factor								
	1		13									
	2		14									
	3		15									
	4		16									
	5		17									
	6		18									
	7		19									
	8		20									
	9		21									
	10		22									
	11		23									
	12		24									
	If hourly, variable emission rates were used that were not described above, describe them below.											
	N/A											

6	Were different emission rates used for short-term and annual modeling? If so describe below.	Yes☐	No☒
	N/A		

16-L: NO_2 Modeling

1	Which types of NO_2 modeling were used? Check all that apply.	
	☒	ARM2
	☐	100% NO_X to NO_2 conversion
	☐	PVMRM
	☐	OLM
	☐	Other:
2	Describe the NO_2 modeling.	
	NO_2 was modeled using default ARM2 parameters.	
3	Were default NO_2/NO_X ratios (0.5 minimum, 0.9 maximum or equilibrium) used? If not describe and justify the ratios used below.	Yes☒ No☐
	N/A	
4	Describe the design value used for each averaging period modeled.	
	1-hour: High eighth high Annual: One Year Annual Average	

16-M: Particulate Matter Modeling

1	Select the pollutants for which plume depletion modeling was used.	
	☐	PM2.5
	☒	PM10
	☐	None
2	Describe the particle size distributions used. Include the source of information.	
	The particle size information was obtained from NMED.	
3	Does the facility emit at least 40 tons per year of NO_X or at least 40 tons per year of SO_2? Sources that emit at least 40 tons per year of NO_X or at least 40 tons per year of SO_2 are considered to emit significant amounts of precursors and must account for secondary formation of PM2.5.	Yes☒ No☐
4	Was secondary PM modeled for PM2.5?	Yes☐ No☒
5	If MERPs were used to account for secondary PM2.5 fill out the information below. If another method was used describe below.	
	Secondary PM is only required for PSD major modifications that are significant for NOx and/or SOx. It is optional for minor sources, but allows use of high eighth high. This is not a PSD major modification, so we did not model secondary PM.	

16-N: Setback Distances

1	Portable sources or sources that need flexibility in their site configuration requires that setback distances be determined between the emission sources and the restricted area boundary (e.g. fence line) for both the initial location and future locations. Describe the setback distances for the initial location.
	N/A – No setback distance used.
2	Describe the requested, modeled, setback distances for future locations, if this permit is for a portable stationary source. Include a haul road in the relocation modeling.
	N/A

16-O: PSD Increment and Source IDs

1	The unit numbers in the Tables 2-A, 2-B, 2-C, 2-E, 2-F, and 2-I should match the ones in the modeling files. Do these match? If not, provide a cross-reference table between unit numbers if they do not match below.	Yes☐	No☒
	Mine Fugitives (Hauling) is represented by numerous road sources. Mining operation road sources have IDs such as RD1_001 for reach roadway. There are a total of 22 haul road segments and 7 reclamation road segments.		
2	The emission rates in the Tables 2-E and 2-F should match the ones in the modeling files. Do these match? If not, explain why below.	Yes☒	No☐
	N/A		
3	Have the minor NSR exempt sources or Title V Insignificant Activities" (Table 2-B) sources been modeled?	Yes☐	No☒
4	Which units consume increment for which pollutants?		
	The current and proposed engines will consume increment as well as the changes made to the material handling and hauling since August 1995.		
5	PSD increment description for sources. (for unusual cases, i.e., baseline unit expanded emissions after baseline date).	The baseline PM_{10} emissions used in this analysis are the same as those used in the modeling analysis submitted in 2018 as part of the application for NSR 2448-M3. To account for the difference in proposed operation compared to the operation in August 1995, the proposed operation was modeled at the full emission rate and the baseline sources were included with their negative emission rates.	
6	Are all the actual installation dates included in Table 2A of the application form, as required? This is necessary to verify the accuracy of PSD increment modeling. If not please explain how increment consumption status is determined for the missing installation dates below.	Yes☒	No☐
	N/A		

16-P: Flare Modeling – N/A

1	For each flare or flaring scenario, complete the following: N/A – No flares at this facility.			
	Flare ID (and scenario)	Average Molecular Weight	Gross Heat Release (cal/s)	Effective Flare Diameter (m)

16-Q: Volume and Related Sources

1	Were the dimensions of volume sources different from standard dimensions in the Air Quality Bureau (AQB) Modeling Guidelines? If not please explain how increment consumption status is determined for the missing installation dates below.	Yes☒	No☐
	Dimensions of volume sources were determined according to the truck sizes at the facility and guidance in Section 5.3.3 of the modeling guidelines.		
2	Describe the determination of sigma-Y and sigma-Z for fugitive sources.		
	Fugitive volume source parameters were determined according to guidance in Section 5.3.2 of the modeling guidelines.		
3	Describe how the volume sources are related to unit numbers. Or say they are the same.		
	Mine Fugitives (Hauling) is represented by numerous road sources. Mining operation road sources have IDs such as RD1_001 for reach roadway. There are a total of 22 haul road segments and 7 reclamation road segments.		
4	Describe any open pits.		
	There are two pits at the facility which were modeled with a 6 m release height as modeled with past permit applications.		
5	Describe emission units included in each open pit.		
	The pit sources (Gettysburg and Mohawk) include blasting and material handling emissions.		

16-R: Background Concentrations

1	Were NMED provided background concentrations used? Identify the background station used below. If non-NMED provided background concentrations were used describe the data that was used.	Yes☒	No☐
	CO: N/A		
	NO_2: N/A		
	PM2.5: Las Cruces Distric Office (350130025)		
	PM10: Deming (350029001)		
	SO_2: N/A		
	Other:		
	Comments: N/A		

2	Were background concentrations refined to monthly or hourly values? If so describe below.	Yes☐	No☒
	N/A		

16-S: Meteorological Data

1	Was NMED provided meteorological data used? If so select the station used. Deming We used the one-year Deming 2017 meteorological data set available on the NMED website. We feel that met station is located at a comparable terrain not far from the facility. Therefore, this data is representative of meteorological conditions at the facility.	Yes☒	No☐
2	If NMED provided meteorological data was not used describe the data set(s) used below. Discuss how missing data were handled, how stability class was determined, and how the data were processed.		
	N/A		

16-T: Terrain – N/A

1	Was complex terrain used in the modeling? If not, describe why below.	Yes☐	No☒
	N/A		
2	What was the source of the terrain data?		
	N/A		

16-U: Modeling Files

1 Describe the modeling files:

File name (or folder and file name)	Pollutant(s)	Purpose (ROI/SIA, cumulative, culpability analysis, other)
Tyrone_CO_SIL v0.2 2020-0317 MR	CO	ROI/SIA
Tyrone_CO_CIA v0.8 2020-0318 MR	CO	Cumulative
Tyrone_NO2_SIL v0.2 2020-0317 MR	NO2	ROI/SIA
Tyrone_NO2_CIA v0.6 2020-0318 MR	NO2	Cumulative
Tyrone_NO2_Class I v0.1 2020-0320 MR	NO2	ROI/SIA
Tyrone_PM2.5_SIL v0.2 2020-0318 MR	PM2.5	ROI/SIA
Tyrone_PM2.5_CIA v0.2 2020-0318 MR	PM2.5	Cumulative
Tyrone_PM10_SIL v0.3 2020-0309 MR	PM10	ROI/SIA
Tyrone_PM10_CIA v0.3 2020-0318 MR	PM10	Cumulative
Tyrone_PM10_Class I v0.1 2020-0320 MR	PM10	ROI/SIA
Tyrone_SO2_SIL v0.2 2020-0317 MR	SO2	ROI/SIA

16-V: PSD New or Major Modification Applications – N/A			
1	A new PSD major source or a major modification to an existing PSD major source requires additional analysis. Was preconstruction monitoring done (see 20.2.74.306 NMAC and PSD Preapplication Guidance on the AQB website)?	Yes☐	No☐
2	If not, did AQB approve an exemption from preconstruction monitoring?	Yes☐	No☐
3	Describe how preconstruction monitoring has been addressed or attach the approved preconstruction monitoring or monitoring exemption.		
	N/A		
4	Describe the additional impacts analysis required at 20.2.74.304 NMAC.		
	N/A		
5	If required, have ozone and secondary PM2.5 ambient impacts analyses been completed? If so describe below.	Yes☐	No☐
	N/A		

16-W: Modeling Results

1	If ambient standards are exceeded because of surrounding sources, a culpability analysis is required for the source to show that the contribution from this source is less than the significance levels for the specific pollutant. Was culpability analysis performed? If so describe below.	Yes☐	No☒
	N/A		
2	Identify the maximum concentrations from the modeling analysis. Rows may be modified, added and removed from the table below as necessary.		

Pollutant, Time Period and Standard	Modeled Facility Concentration (µg/m3)	Modeled Concentration with Surrounding Sources (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elevation (ft)
CO, 8-hr, NAAQS	1,820.92	1,821.06	-	1,821.06	10,303.6	17.7%	748567.40	3612853.90	1829.80
CO, 8-hr, NMAAQS					9,960.1	18.3%			
CO, 1-hr, NAAQS	14,563.27	14,564.04	-	14,564.04	40,069.6	36.3%	748567.40	3612853.90	1829.80
CO, 1-hr, NMAAQS					14,997.5	97.1%			
NO_2, Annual, NAAQS	2.17	2.64	-	2.64	99.66	2.6%	743711.20	3614460.70	1833.10
NO_2, Annual, NMAAQS					94.0	2.8%			
NO_2, Annual, PSD Class I	0.018	-	-	0.018	2.5	0.72%	768742.00	3657803.00	1891.14
NO_2, Annual, PSD Class II	2.17	2.64	-	2.64	25	10.6%	743711.20	3614460.70	1833.10
NO_2, 24-hr, NMAAQS	17.25	17.43	-	17.43	188.0	9.3%	749150.60	3613697.90	1815.39
NO_2, 1-hr, NAAQS	137.74	138.54	-	138.54	188.03	73.7%	748618.50	3612866.70	1829.80
$PM_{2.5}$, Annual, NAAQS	1.64	1.86	5.10	6.74	12	56.2%	743711.20	3614460.70	1833.10

Pollutant, Time Period and Standard	Modeled Facility Concentration (µg/m3)	Modeled Concentration with Surrounding Sources (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration (µg/m3)	Value of Standard (µg/m3)	Percent of Standard	Location		
							UTM E (m)	UTM N (m)	Elevation (ft)
$PM_{2.5}$, 24-hr, NAAQS	4.64	5.45	14.90	19.54	35	55.8%	743718.20	3614360.90	1833.49
PM_{10}, Annual, PSD Class I	0.074	0.074	-	0.074	4	1.85%	756401.00	3656289.00	1828.27
PM_{10}, Annual, PSD Class II	0.49	0.51	-	0.51	17	3.0%	747630.80	3617095.40	1790.27
PM_{10}, 24-hr, NAAQS	57.34	57.37	56.50	113.87	150	75.9%	748567.40	3612853.90	1829.80
PM_{10}, 24-hr, PSD Class I	1.48	1.49	-	1.49	8	18.6%	755967.00	3655904.00	1929.98
PM_{10}, 24-hr, PSD Class II	18.91	18.93	-	18.93	30	63.1%	749150.60	3614073.40	1834.27
SO_2, Annual, Significance	0.20	-	-	-	1	20.4%	745889.10	3612076.30	1944.06
SO_2, 24-hr, Significance	1.10	-	-	-	5	22.1%	745889.10	3612076.30	1944.06
SO_2, 3-hr, Significance	4.43	-	-	-	25	17.7%	745889.10	3612076.30	1954.44
SO_2, 1-hr, Significance	6.71	-	-	-	7.8	86.1%	745889.10	3612076.30	1954.44

16-X: Summary/conclusions

1	A statement that modeling requirements have been satisfied and that the permit can be issued.
	This modeling analysis has shown that the facility meets all applicable modeling standards. The permit can be issued.

Section 17

Compliance Test History

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Compliance Test History Table

Unit No.	Test Description	Test Date
PPG-1, 3, 7, 8, 11, 12, 13, 15	Tested in accordance with EPA test methods for NOx and CO as required by Title V permit P 147-R1M3	3/10/2014

Section 20

Other Relevant Information

Other relevant information. Use this attachment to clarify any part in the application that you think needs explaining. Reference the section, table, column, and/or field. Include any additional text, tables, calculations or clarifying information.

Additionally, the applicant may propose specific permit language for AQB consideration. In the case of a revision to an existing permit, the applicant should provide the old language and the new language in track changes format to highlight the proposed changes. If proposing language for a new facility or language for a new unit, submit the proposed operating condition(s), along with the associated monitoring, recordkeeping, and reporting conditions. In either case, please limit the proposed language to the affected portion of the permit.

No other relevant information is being submitted.

Section 22: Certification

Company Name: Freeport-McMoRan Tyrone Inc.

I, Erich J. Bower, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 23 day of March, 2020, upon my oath or affirmation, before a notary of the State of New Mexico.

*Signature

3/23/2020
Date

Erich J. Bower
Printed Name

President; General Manager
Title

Scribed and sworn before me on this 23 day of March, 2020.

My authorization as a notary of the State of New Mexico expires on the 12 day of December, 2021.

Notary's Signature

3/23/2020
Date

Jeanie B. Gutierrez
Notary's Printed Name

Official Seal
JEANIE B GUTIERREZ
Notary Public
State of New Mexico
My Comm. Expires 12/12/21

*For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC.