Permit Tracking Coversheet

ORIGINAL

	Facility AI Name			\boxtimes	Tempo Name OK Use name specified be	elow:
	Tyrone Mine					
	Company Name		☐ Tempo Nan	ne OK	☐ Application Name OK ☐ Owner/Operator Change	-
	Freeport-McMoRan Tyrone Inc					
	Airs #: 35-01	17-0	002Use portab	le Airs	# (777) for GCPs 2, 3, TC; Streamlines, etc.	Tech Serv Staff Date & Initials
Tech	AI Number: 527 Permit No.: PSD2448M5					
Services Staff	Al Type: Minin		pper Mine		gned To:	4/7/20
&	71	0			Joe Kimbrell	AEE
Assigning Manager					ment matrix): Joe Kimbrell	Supervisor
Manager	Activity Class:				Use tempo assist to delete actuals	Date & Initials
	NSR		_		cant Revision	AEE
		□ Re			ll address and Location-Cultural Window	pes
	User Group:	_	General Attributions:	ite for	☐ Changing permit type (end old User	TB
	AQB - NS	K	Not Requi	red	Group in MF and add new one.) ☐ Add end date to AQB user groups +	4/7/20
			Not Requi	ircu	All (permit being closed)	
	☐ Permittee & Co	onsulta	int info updated?		WAL Updated: ☐ Staff Assigned	Data Steward Date & Initials:
	-				☐ App Received Date 4/6/20	Date & initials.
Data	PRN or PRT				Outstanding invoice?	
Steward						_
	Fee: NSR Filing Fee \$500 and \$1 GRF, Invoice ID: Permit Fee type: NOI/NSR Filing Fee (\$500)					
	Check Amount: \$		Six Filmig Fee	(\$200)		
Admin Staff	Create: Folder &	& Inse	rt			Date & Initials:
2 days	Folder Color: Yel					
	☐ Provided mode	eling a	pplication & CD	to mod	eling manager.	Date & Initials:
Permit	☐ My current plan is to have emissions reviewed by:					
Specialist	☐ Requested date		odeling to be con	nplete:		
	☐ Permit due dat		- 1 - (1 - 1 -	- 20	If NSR action is Withdrawn or Denied:	Date & Initials:
Permit Specialist	days after ruled co		ue date: (based or	n 30	Take to Data Steward to discuss balance	
					due and invoicing options.	Date & Initials:
Data Steward (NSR only)	☐ Created permi	tting B	Balance Due Invo	ice and	Return to Staff	Date & Initials.
Permit				us perr	mit actions add "closed" task and enter	Date & Initials:
Specialist	issuance date	of this	action.		Date Completed & put in Mailbox:	Date & Initials:
GCP-O&G Int. Review	Assigned to:				Date Completed & put in Manoox.	
Notes Air 1	Pormit Contact:	Vine A	etillara nastill	lo@fm	i com 575.012.5207	
					ni.com, 575-912-5297	
	Conjorianis	010	THE IT, OFFLEND	HE INCH T	rinity consultants.com	

Mail Application To:

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



For Department use only:

Received

APR 0.6 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-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)
☐ 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/ streamling)
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

Section 1 – Facility Information

(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)

Sec	etion 1-A: Company Information	AI # if known (see 1 st 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): 1			
1		Plant NAIC code (6 dia	Plant NAIC code (6 digits): 212230		
a	Facility Street Address (If no facility street address, provide directions Tyrone Mine Road, Tyrone, NM 88065	from a prominent landmark)	: Highway 90 South,		
2	Plant Operator Company Name: Freeport-McMoRan Tyrone Inc.	Phone/Fax: 575-912-51	101 / 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: 02-952187-00-	4			



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



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Trinity Accounts

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:

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



For Department use only:

AIRS No.:

AI # if known (see 1st

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)

□ 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
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☑ 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/ streamling)
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

Section 1 – Facility Information

20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

Sec	tion 1-A: Company Information	3 to 5 #s of permit IDEA ID No.): 527	Updating Permit/NOI #: 2448-M4
1	Facility Name: Tyrone Mine	Plant primary SIC Code	e (4 digits): 1021
1		Plant NAIC code (6 dig	gits): 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: 575-912-51	01 / 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

	don't bi current ruemey 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 NMA□Yes □No ☑N/A	C) or the capacity increased since 8/31/1972?	
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	a Current Hourly: N/A Daily: 480,000 tons rock Annually: 175,200,000 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

		<u> </u>			
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 meter	s, to nearest 10 meter	s): 744,430 m E	UTM E (in meters, to nearest 10 meters):	744,430 m E
b	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 o	ode of nearest Ne	ew Mexico town: Tyrone, I	NM 88065	
4			om nearest NM town (attacl 4 miles the facility will be o	n a road map if necessary): From Tyron the right.	one, NM, head south on NM
5	The facility is 4	.5 miles southwe	st of Tyrone.		
6	Status of land a	t facility (check o	one): 🗹 Private 🗆 Indian/P	ueblo 🗹 Federal BLM 🗹 Federal F	Forest Service Other: State
7		acility is propose		a ten (10) mile radius (20.2.72.203 perated: Municipalities: Silver City,	
8	closer than 50	2.72 NMAC applications only : Will the property on which the facility is proposed to be constructed or operated be ser than 50 km (31 miles) to other states, Bernalillo County, or a Class I area (see w.env.nm.gov/aqb/modeling/class1areas.html)? ☑ Yes ☐ No (20.2.72.206.A.7 NMAC) If yes, list all with corresponding tances in kilometers: Gila Wilderness Area, 37 km			
9	Name nearest C	Class I area: Gila V	Wilderness Area		
10	Shortest distance	ce (in km) from fa	acility boundary to the bour	ndary 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	"Restricted Ar continuous wal that would requ within the prop				
13	☐ Yes ☑ No A portable stati one location or	onary source is no that can be re-ins	ot a mobile source, such as stalled at various locations,	ortable stationary source as defined in automobile, but a source that can such as a hot mix asphalt plant that is	be installed permanently at smoved to different job sites.
14			inction with other air regul nit number (if known) of th	ated parties on the same property? ne other facility? N/A	⊠ No □ Yes

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 (hours/day): 24	$(\frac{\text{days}}{\text{week}}): 7$	$(\frac{\text{weeks}}{\text{year}})$: 52	(<u>hours</u>): 8,760	
2	Facility's maximum daily operating schedule (if les	s 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 or	ne year? ☑ Yes ☐ No			

Section 1-F: Other Facility Information

~ • • •	because II o die I demoj imormadon				
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 of N/A	r 1a above? □ Yes [No If Yes, provide the 1c & 1d info below:		
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	g 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? \square Major ($\square \ge 10$ tpy of any OR \square Minor ($\square \le 10$ tpy of any OR)		<u> </u>		
5	Is any unit exempt under 20.2.72.202.B.3 NMAC? ☑ Yes □ No				
	If yes, include the name of company providing commercial electric power to the facility: PNM				
a	Commercial power is purchased from a commercial utility site for the sole purpose of the user.	company, which spe	cifically does not include power generated on		

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	e (Title V))	Phone: (575) 912-5101
a	R.O. Title: President; General Manager		
b	R. O. Address: Hwy 90 South, Tyrone Mine Road, Tyrone, NM 88	065	
2	Alternate Responsible Official (20.2.70.300.D.2 NMAC): Ronald Gerdes	-	
a	A. R.O. Title: Manager, Operations	A. R.O. e-mail: <u>rgerdes@fmi.com</u>	
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 <u>copy</u> should be printed in book form, 3-hole punched, and <u>must be double sided</u>. 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.
- 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 Con	ntact 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.

					Manufact- urer's Rated	Requested Permitted	Date of Manufacture ²	Controlled by Unit #	Source Classi		RICE Ignition Type (CI, SI,	Dowler de
Unit Number ¹	Source Description	Make	Model#	Serial #	Capacity ³ (Specify Units)	Capacity ³ (Specify Units)	Date of Construction/ Reconstruction ²	Emissions vented to Stack#	fication Code (SCC)	For Each Piece of Equipment, Check One	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) ☐ New/Additional ☐ To be Removed ☐ Replacement Unit ☐ 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) ☐ New/Additional ☐ To Be Modified ☐ To be Removed ☐ Replacement Unit ☐ 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) □ New/Additional □ To Be Modified □ To be Removed □ Replacement Unit □ 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) □ New/Additional □ To Be Modified □ To be Removed □ Replacement Unit □ 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) □ New/Additional □ To Be Modified □ To be Removed □ Replacement Unit □ To be Replaced 	N/A	N/A
ENV-101	Engine for Water Pump	John Deere	4050TF25 0	T04045T780502	125 hp	125 hp	7/23/1998 1/25/2000	N/A ENV-101	20200102	 ☑ Existing (unchanged) □ New/Additional □ To Be Modified □ To be Removed □ Replacement Unit □ To be Replaced 	CI	N/A
ENV-111	Engine for Water Pump	John Deere	4050TF25 0	117368-5	125 hp	125 hp	5/16/2001 12/8/2004	N/A ENV-111	20200102	 ☑ Existing (unchanged) ☐ New/Additional ☐ To be Removed ☐ Replacement Unit ☐ 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) ☐ New/Additional ☐ To be Removed ☐ Replacement Unit ☐ 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) ☐ New/Additional ☐ To be Removed ☐ Replacement Unit ☐ 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) □ New/Additional □ Replacement Unit □ To be Replaced 	N/A	N/A
Mine Fugitives	Handling	N/A	N/A	N/A	N/A	N/A	1/2/2001	N/A	30388801	□ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit	N/A	N/A
(Handling) Mine							1/2/2001	N/A N/A		☐ To Be Modified ☐ To be Replaced ☐ Existing (unchanged) ☐ To be Removed		
Fugitives (Hauling)	Hauling	N/A	N/A	N/A	N/A	N/A		N/A	30388801	□ 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) □ New/Additional □ Replacement Unit □ 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	N/A	N/A

					Manufact- urer's Rated	Requested Permitted	Date of Manufacture ²	Controlled by Unit #	Source Classi			RICE Ignition	
Unit Number ¹	Source Description	Make	Model #	Serial #	Capacity ³ (Specify Units)	Capacity ³ (Specify Units)	Date of Construction/ Reconstruction ²	Emissions vented to Stack#	fication Code (SCC)	For Each Piece of Equ	aipment, Check One	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	30388801	□ New/Additional □	To be Removed Replacement Unit 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	□ New/Additional □	To be Removed Replacement Unit 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)☐ New/Additional	To be Removed Replacement Unit 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	□ New/Additional□ To Be Modified	To be Removed Replacement Unit 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	✓ New/Additional □ □ To Be Modified □	To be Removed Replacement Unit 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	✓ New/Additional □ □ To Be Modified □	To be Removed Replacement Unit To be Replaced To be Removed	CI	N/A
EMP-1	Diesel Engine	Caterpillar	C7	7AS10507	190 hp	190 hp	4/21/1998 TBD	N/A EMP-1	20200102	✓ New/Additional □ □ To Be Modified □	Replacement Unit To be Replaced To be Removed	CI	N/A
EMP-2	Diesel Engine	Caterpillar	3126	BEJ08982	200 hp	200 hp	1/12/2005 TBD 10/22/2002	N/A EMP-2 N/A	20200102	✓ New/Additional □ □ To Be Modified □	Replacement Unit To be Replaced To be Removed	CI	N/A
ENV-117	Diesel Engine	John Deere	4045TF27 5	PE4045T236464	350 hp	350 hp	TBD 9/2/2010	ENV-117 N/A	20200102	✓ New/Additional □ □ To Be Modified □	Replacement Unit To be Replaced To be Removed	CI	N/A
SD-1	Diesel Engine	Caterpillar	C9	CLJ00001	225 hp	225 hp	12/16/2010 5/25/2012	SD-1 N/A	20200102	□ New/Additional □	Replacement Unit To be Replaced To be Removed	CI	N/A
SD-2	Diesel Engine	Caterpillar	C9	JSC25024	225 hp	225 hp	2/1/2013 12/30/2013	SD-2 N/A	20200102	□ New/Additional□ To Be Modified	Replacement Unit To be Replaced To be Removed	CI	N/A
IPG	LPG Engine Diesel Cold Start	Generac Ford-New	OHVI	8609506	18.8 hp	18.8 hp	2/13/2014 1/1/1967	IPG N/A	20201012	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐	Replacement Unit To be Replaced To be Removed	SI	N/A
CE-1	Compressor Engine Natural Gas/Diesel	Holland	N/A FSG-1316-	544593-T26KK	100 hp	100 hp	7/11/2005 1/1/1967	CE-1 N/A	20200102	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐	Replacement Unit To be Replaced To be Removed	CI	N/A
PPG-1	Generator Engine Natural Gas/Diesel	Nordberg	HSC FSG-1316-	10301202	3,090 hp	3,090 hp	7/11/2005 1/1/1967	PPG-1 N/A	20200402	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐	Replacement Unit To be Replaced To be Removed	SI/CI	N/A
PPG-3 PPG-4	Generator Engine Natural Gas/Diesel	Nordberg Nordberg	HSC FSG-1316-	10301207	3,090 hp	3,090 hp	7/11/2005 1/1/1967	PPG-3 N/A	20200402	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐	Replacement Unit To be Replaced To be Removed Replacement Unit	SI/CI SI/CI	N/A N/A
PPG-7	Generator Engine Natural Gas/Diesel	Nordberg	HSC FSG-1316-	10301208	3,090 hp	3,090 hp	7/11/2005 1/1/1967	PPG-4 N/A	20200402	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐	To be Removed Replacement Unit	SI/CI	N/A
PPG-8	Generator Engine Natural Gas/Diesel	Nordberg	HSC FSG-1316-	10301211	3,090 hp	3,090 hp	7/11/2005 1/1/1971	PPG-7 N/A	20200402	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐	To be Replaced To be Removed Replacement Unit	SI/CI	N/A
PPG-11	Generator Engine Natural Gas/Diesel	Nordberg	HSC FSG-1316-	10301283	3,090 hp	3,090 hp	7/11/2005	PPG-8 N/A	20200402	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐	To be Replaced To be Removed Replacement Unit	SI/CI	N/A
PPG-12	Generator Engine Natural Gas/Diesel Generator Engine	Nordberg	HSC FSG-1316- HSC	10301304	3,090 hp	3,090 hp	7/11/2005	PPG-11 N/A	20200402	☐ To Be Modified ☐ ☐ Existing (unchanged) ☐ ☐ New/Additional ☐	To be Replaced To be Removed Replacement Unit	SI/CI	N/A
PPG-13	Natural Gas/Diesel Generator Engine	Nordberg	FSG-1316- HSC	10301305	3,090 hp	3,090 hp	7/11/2005 1/1/1972 7/11/2005	PPG-12 N/A PPG-13	20200402	☑ Existing (unchanged) □ New/Additional □	To be Replaced To be Removed Replacement Unit 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	7/11/2005 1/1/1972 7/11/2005	N/A PPG-14	20200402	☑ Existing (unchanged)☐ New/Additional	To be Removed Replacement Unit 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) ☐ New/Additional ☐	To be Removed Replacement Unit 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 (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-	6000 11.11 11	Advanced Pacific	N/A	2,000	20.2.72.202.B.2 NMAC	Unknown	☑ Existing (unchanged) ☐ To be Removed
261	6000 weight lube oil	Tank Manufacturing, Inc.	N/A	gal	IA List Item #5	Sep-16	 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	Diesel Tank	Linkmoven	N/A	300	20.2.72.202.B.2 NMAC	Unknown	☑ Existing (unchanged)☐ New/Additional☐ Replacement Unit
264	Diesei Talik	Unknown	N/A	gal	IA List Item #5	Aug-17	☐ To Be Modified ☐ To be Replaced
Generac	Generac Guardian Series	Generac	5872	14,000	20.2.72.202.B.3 NMAC	6/9/2014	✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
Emergency Generator 1 Generac	5872	Generae	E897264613305	W	IA List Item #7	7/25/2015	☐ To Be Modified ☐ To be Replaced
Generac Emergency	Generac Guardian Series	Generac	5872	14,000	20.2.72.202.B.3 NMAC	8/7/2015	✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
Generator 2	5872	Generae	E922169515155	W	IA List Item #7		☐ To Be Modified ☐ To be Replaced
Generac Emergency	Generac Guardian Series	Generac	6462	16,000	20.2.72.202.B.3 NMAC	10/2015	✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
Generator 3	6462	Generae	9001396	W	IA List Item #7		☐ To Be Modified ☐ To be Replaced
Generac Emergency	Generac Guardian Series	Generac	6462	16,000	20.2.72.202.B.3 NMAC	1/1/2016	✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
Generator 4	6462	Generae	9972091	W	IA List Item #7	5/2016	☐ To Be Modified ☐ To be Replaced
IPG	Indian Peak Generator	Generac	OHVI	18.8	20.2.72.202.B.3 NMAC	7/24/2018	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
	moran reak ocherator	Generae	3003527048	hp	IA List Item #7	10/2018	☐ To Be Modified ☐ To be Replaced
GO Generator	One of Control	On an Canad/Faul	LRG-425I6005A	97	20.2.72.202.B.3 NMAC	1/8/1999	✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
Backup E1- 128	Onan Genset	Onan Genset/Ford	1494610899	hp	IA List Item #7		□ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
SX/EW Fire	Comming Fire Water Down	Commin s	Cummins	122	20.2.72.202.A.4 NMAC	1/29/2000	☑ Existing (unchanged) ☐ To be Removed
Water Pump	Cummins Fire Water Pump	Cummins	73388396	hp	IA List Item #7		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SX Tankhouse	Emergency Generator for		CAT	67	20.2.72.202.B.3 NMAC	6/12/2006	☐ Existing (unchanged) ☐ To be Removed
Generator	Tankhouse Control Room	Caterpillar	CATODG60CT3700362	hp	IA List Item #7	5/28/2019	✓ New/Additional□ Replacement Unit□ To Be Modified□ To be Replaced
Maintenance A	rea						
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	550	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
001			N/A	gal	IA List Item #8		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Safety Kleen - Petroleum Based Solvent Storage	Unknown	N/A	500	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
002	Tank	CIMILO WII	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Motor Oil Storage Tank	Unknown	N/A	550	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
003	1.10tol Oli bioluge lulik	Challown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Power drive Fluid Storage	Unknown	N/A	550	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
004	Tank	Chkhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced

Unit Number	Course Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
Omt Number	Source Description	Manufacturei	Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction ²	For Each Flece of Equipment, Check Onc
SPCC-TYR-	Power drive Fluid Storage	Unknown	N/A	550	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
005	Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Power drive Fluid Storage	Unknoven	N/A	550	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ New/Additional☐ Replacement Unit
006	Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Power drive Fluid Storage	Unknown	N/A	550	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
007	Tank	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Hand Oil Stone on Toule	I Index access	N/A	5,000	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
012	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 15W-40 Motor Oil	I I also a serve	N/A	132	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
014	Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 10W Motor Oil	I I a lan a arm	N/A	132	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
015	Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 30W Motor Oil	TT 1	N/A	132	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
016	Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	II 10310	TT 1	N/A	215	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
017	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	II 10310	TT 1	N/A	215	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
018	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-		** 1	N/A	215	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
019	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To be Replaced
SPCC-TYR-	II 10310	TT 1	N/A	95	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
020	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-		** 1	N/A	75	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
021	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	75	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
022	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	215	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
023	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	215	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
024	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	150	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
166	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	215	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
167	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Safety Kleen - Petroleum		N/A	460	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
177	Based Solvent Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

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

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
			Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item#1.a)	Date of Installation /Construction ²	
SPCC-TYR-	Hand Oil Storage Touls	Linksows	N/A	95	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
201	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	175	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
205	Osed Off Storage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Lube Gear Oil Tank	Unknown	N/A	2,000	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
263	Lube Geal On Talik	Chkhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
owerhouse Ar	ea Tanks						lest to the second
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	120000	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
027			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	120000	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
028			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	20000	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
029			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	15000	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
030	Lube On Storage Tank	Chkhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	800	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
031	Diesei Storage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diagol Storage Touls	Linknoven	N/A	800	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)□ To be Removed□ New/Additional□ Replacement Unit
033	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-	D' 1 (1 T 1	11.1	N/A	800	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
034	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-	D: 10 T 1	** 1	N/A	800	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
037	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-	D: 10 T 1	** 1	N/A	800	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
038	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	800	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
041	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	800	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
042	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-			N/A	800	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
043	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	800	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
044	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit

Unit Number Source Description	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc	
Omt Number	Source Description	Wantiacturer	Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction ²	For Each Freet of Equipment, Check One	
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	800	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
045	Dieser Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500 (approx.)	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit	
046	Lube Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500 (approx.)	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit	
048	Lube On Storage Tank	Chriown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500 (approx.)	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
049	Lube Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500 (approx.)	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
052	Lude On Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500 (approx.)	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
053	Lude On Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Luba Oil Stanga Tank	Unknown	N/A	1,500 (approx.)	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit	
056	Lube Oil Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Luba Oil Stanga Tank	Unirnoven	N/A	1100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
058	Lube Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	270	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
059	Osed Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Luba Oil Stanga Tank	Unknown	N/A	1000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit	
209	Lube Oil Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
210	Lude Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit	
211	Lube Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit	
212	Lude Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
213	Lude Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit	
214	Lube Off Storage Talik	UIIKIIOWII	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Luba Oil Stance Teel	I Indra or	N/A	110	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
215	Lube Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced	
SPCC-TYR-	Luba Oil Stance Text	I Indra ov	N/A	110	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit	
216	Lube Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced 	

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	•		Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction ²	,
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
217	Lude Oil Storage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ Replacement Unit
218	Lude Oil Stolage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
219	Lude Oil Stolage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ Replacement Unit
220	Lude Oil Stolage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
Drum Storage	Lube Oil Storage Tank	Unknown	N/A	55 (30 Drums)	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ Replacement Unit
Area W	Lude Oil Storage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Linksows	N/A	500000	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
025	Diesei Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	D'and Games Tank	11.1	N/A	225000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
026	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-	0.10	***	N/A	55	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
255	Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
Lube Shop Arc	ea Tanks						
SPCC-TYR-	Unleaded gasoline Storage	Unknown	N/A	20,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
061	Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Red Dyed Diesel Storage	Unknown	N/A	40,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
062	Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Red Dyed Diesel Storage	Unknown	N/A	50,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
063	Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	2,000	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
065	Dieser Storage Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	10,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
066	Osea On Storage Tank	Chinown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 15W-40 Motor Oil	Unknown	N/A	300	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
073	Storage Tank	Chkhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel No. 2 Storage Tank	Unknown	N/A	300	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
074	Diesel 140. 2 Stolage Tallk	Chkhowh	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	15W-40 Motor Oil Storage	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
075	Tank	UIKIIOWII	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 30 Motor Oil Storage	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
076	Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
Cint i vamoei	Source Description	Manufacturer	Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item#1.a)	Date of Installation /Construction ²	For Each Freet of Equipment, Check One
SPCC-TYR-	SAE 10 Motor Oil Storage	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
077	Tank	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 60 Motor Oil Storage	Unknown	N/A	2,000	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
078	Tank	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 15W-40 Storage Tank	Unknown	N/A	1,100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
079	SAE 13 W-40 Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	CAE 10W Storage Tenls	Linkmoven	N/A	575	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
080	SAE 10W Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	CAE 20W Ctamas Taula	I I a lan a same	N/A	575	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
081	SAE 30W Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	SAE 30 Engine Oil Storage	I I a lan a same	N/A	450	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
082	Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-	SAE 10W Power drive	II	N/A	450	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
083	Fluid Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	Oily water Storage Tank	Unknown	N/A	10,000 (estimated)	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
084	, .		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
086	Osed Oil Stolage Talik	Chrhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	215	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
087	Osed Oil Stolage Talik	Chrhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	215	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
088	Osed Oil Stolage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	525	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
089	Osed Oil Stolage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 15W-40 Storage Tank	Unknown	N/A	2,700	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
093	SAL 13 W-40 Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 10 W Storage Tank	Unknown	N/A	2,700	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
094	SAE 10 W Storage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	SAE 30W Storage Tank	Unknove	N/A	2,700	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
095	SAE 50W Storage Tank	Unknown	N/A	gal	IA List Item #5		□ To Be Modified □ To be Replaced
SPCC-TYR-	Diagal Storage Tenle	Linknove	N/A	40,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
096	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diggal Stamps To 1	I Indian are	N/A	40,000	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
097	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced

Unit Number	Source Description	Manufacturer -	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
	2000 C 1000 F		Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item#1.a)	Date of Installation /Construction ²	
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	55	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
104	Osed On Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	12,000	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
133	Dieser Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	55	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
165	Osed On Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Megaplex XD5 #2 Grease	Linkmorren	N/A	1,050	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
174	Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Megaplex XD5 #2 Grease	I I alm a see	N/A	333	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
204	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
SPCC-TYR-	Com O'l Stance Toul	II.l.	N/A	55	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
230	Gear Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-	II IO'IG TI	TT 1	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
231	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	II. 1000 F. 1	T. 1	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
232	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional□ To Be Modified□ To be Replaced
SPCC-TYR-	II 10'10' T 1	TT 1	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
233	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	II 10310	T. 1	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
234	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	T. 1: 0'10; T. 1	TT 1	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
236	Turbine Oil Storage Tank	Unknown -	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	15 40 O'1 G	TT 1	N/A	70	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
237	15-40 Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	15 40 O'1 G	TT 1	N/A	70	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
244	15-40 Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	Head Oil Stames Toul	I In 1-1-1-1-1	N/A	70	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
245	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
SPCC-TYR-	Hand Oil Channer Trans	I I a lange a service	N/A	70	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
246	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced
SPCC-TYR-	H-1010 T 1	TI-l-	N/A	70	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
247	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		 □ New/Additional □ To Be Modified □ To be Replaced
SPCC-TYR-	Interview made	TT1	N/A	150	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
250	Lube oil Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
	-		Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction ²	
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	250	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
251	Lude Off Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	150	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
252	Lude Off Storage Tank	Olikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
Orum Storage	ATF and Lube Oil Storage	Unknown	N/A	55 (2) drums	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
Area X	Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
Orum Storage	Used Oil Storage Tank	Unknown	N/A	55 (2 drums)	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
Area G	Osed Oil Stolage Talik	Olikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
Orum Storage	Turbine Oil Storage Tank	Unknown	N/A	55	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ New/Additional☐ Replacement Unit
Area F	Turbine On Storage Tank	Olikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
Orum Storage	Used Oil Storage Tank	Unknown	N/A	55	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
Area O	Osed Oil Stolage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Head Oil Storage Tenls	Unknown	N/A	538	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ New/Additional☐ Replacement Unit
184	Used Oil Storage Tank	Olikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Oil Stanga Tank	Unknown	N/A	70	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
235	Oil Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	500	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
238	Dieser Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	500	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
239	Dieser Storage Talik	Olikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	500	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
240	Dieser Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	300	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ New/Additional☐ Replacement Unit
241	Diesei Stolage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	300	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)☐ To be Removed☐ New/Additional☐ Replacement Unit
242	Diesei Stolage Talik	UIIKIIUWII	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
agazine Area	Tanks					1	TO Printer (continued) of Table 2
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	9500	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
090			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced ☐ Existing (unchanged) ☐ To be Removed
SPCC-TYR- 091	Diesel Storage Tank	Unknown	N/A	1000	20.2.72.202.B.(2) NMAC		☐ New/Additional ☐ Replacement Unit
U91			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced

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

Unit Number	Source Description	Manufacturer	Model 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	Date of Manufacture /Reconstruction ² Date of Installation	For Each Piece of Equipment, Check O			
~~~~			N/A		Item#1.a)	/Construction ²	☑ Existing (unchanged) ☐ To be Removed			
SPCC-TYR- 142	Reagent Mix Storage Tank	Unknown	N/A N/A	Approx. 127,500	20.2.72.202.B.(2) NMAC  IA List Item #5		□ New/Additional □ Replacement Unit □ To Be Modified □ To be Replaced			
SPCC-TYR-	December Min Change Touls	Unleading	N/A	Approx. 127,500	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed			
143	Reagent Mix Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul><li>□ New/Additional</li><li>□ To Be Modified</li><li>□ To be Replaced</li></ul>			
SPCC-TYR-	Reagent Mix Storage Tank	Unknown	N/A	Approx. 118,000	20.2.72.202.B.(2) NMAC		<ul><li>☑ Existing (unchanged)</li><li>☐ To be Removed</li><li>☐ New/Additional</li><li>☐ Replacement Unit</li></ul>			
144	Reagent with Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
SPCC-TYR-	Reagent Mix Storage Tank	Unknown	N/A	Approx. 127,500	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit			
145	Reagent Mix Storage Tank	Chikhowh	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
SPCC-TYR-	Reagent Mix Storage Tank	Unknown	N/A	Approx. 127,500	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit			
146	Reagent Mix Storage Tank	Chanown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
SPCC-TYR-	Reagent Mix Storage Tank	Unknown	N/A	Approx. 127,500	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit			
147	Reagent Mix Storage Tank	Chanown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
SPCC-TYR-	Reagent Mix Storage Tank	Unknown	N/A	Approx. 118,000	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit			
148	Reagent Mix Storage Tank	Chanown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
SPCC-TYR-	Reagent Mix Storage Tank	Unknown	N/A	Approx. 118,000	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit			
149	Trougent Min Storage Tunk		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
Orum Storage	Super Hydraulic Oil	Unknown	N/A	55	20.2.72.202.B.(2) NMAC		<ul><li>☑ Existing (unchanged)</li><li>☐ To be Removed</li><li>☐ New/Additional</li><li>☐ Replacement Unit</li></ul>			
Area H	Storage Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
Orum Storage	Lube Oil Storage Tank	Unknown	N/A	55	20.2.72.202.B.(2) NMAC		<ul><li>☑ Existing (unchanged)</li><li>☐ To be Removed</li><li>☐ New/Additional</li><li>☐ Replacement Unit</li></ul>			
Area R	-	2	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
Orum Storage	Super Hydraulic Oil, Used Oil, 90W Motor Oil, 10W	Unknown	N/A	55 (7 drums)	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit			
Area I	Motor Oil Storage Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
Drum Storage	Used Oil and Motor Oil	Unknown	N/A	55	20.2.72.202.B.(2) NMAC	✓ Existing (unchanged)  □ New/Additional				
Area K	Storage Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			
SPCC-TYR-	Organic Recovery Storage	Unknown	N/A	500	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit			
249 Tank	Tank		N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced			

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Fool Piece of	Equipment, Check Onc
Omt Number	Source Description	Manufacturer	Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item#1.a)	Date of Installation /Construction ²	FOR Each Flece of	<b>Е</b> дипринент, Спеск Опс
Other Areas/T	ransformers					•		
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	12000	20.2.72.202.B.(2) NMAC		<ul><li>☑ Existing (unchanged)</li><li>□ New/Additional</li></ul>	<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
137A	Dieser Storage Tank	Chinowh	N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
Drum Storage Area M	Grease, used oil, transformers, used	Unknown	N/A	55 (50 - 150 drums)	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged)  □ New/Additional	☐ To be Removed☐ Replacement Unit
7 11 Ctt 111	absorbents Storage Tank		N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
T1-T129	Transformer oil Storage	Unknown	N/A	varies	20.2.72.202.B.(2) NMAC		<ul><li>✓ Existing (unchanged)</li><li>☐ New/Additional</li></ul>	<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
	Tank		N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
SPCC-TYR-	Megaplex XD5 #2 Storage	Unknown	N/A	540	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	<ul><li>☐ To be Removed</li><li>☐ Replacement Unit</li></ul>
103	Tank	Chinown	N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
SPCC-TYR-	Polyurea Grease #2 Storage	Unknown	N/A	620	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ New/Additional	<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
172	Tank	Chrhown	N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
SPCC-TYR-	Discal Stance Touls	Links	N/A	164	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	☐ To be Removed☐ Replacement Unit
188	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
SPCC-TYR-	O'1 W . G	T. 1	N/A	2000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)	☐ To be Removed
203	Oily Water Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional☐ To Be Modified	<ul><li>□ Replacement Unit</li><li>□ To be Replaced</li></ul>
SPCC-TYR-	Head Oil Stone on Touls	I Indonesia	N/A	213	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	☐ To be Removed
243	Used Oil Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified	<ul><li>□ Replacement Unit</li><li>□ To be Replaced</li></ul>
SPCC-TYR-	O'le Weter Change Toule	I I 1	N/A	20000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	☐ To be Removed
248	Oily Water Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified	<ul><li>□ Replacement Unit</li><li>□ To be Replaced</li></ul>
SPCC-TYR-	Discal Stance Touls	I I a language	N/A	200	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)	☐ To be Removed
254	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional☐ To Be Modified	<ul><li>□ Replacement Unit</li><li>□ To be Replaced</li></ul>
SPCC-TYR-	Discal Storage Tenls	Unknown	N/A	200	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	☐ To be Removed☐ Replacement Unit
256	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	200	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	☐ To be Removed☐ Replacement Unit
257	Diesei Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified	☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	200	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	☐ To be Removed☐ Replacement Unit
258	Dieser Storage Talik	UlikilOWII	N/A	gal	IA List Item #5		☐ New/Additional ☐ To Be Modified	☐ To be Replaced
SPCC-TYR-	Discal Store at Taul	I Index	N/A	200	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ New/Additional	☐ To be Removed
260	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ To Be Modified	<ul><li>□ Replacement Unit</li><li>□ To be Replaced</li></ul>
SPCC-TYR-	Carron Stores Trul	I Il	N/A	625	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)	☐ To be Removed
262	Circase Storage Lank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional☐ To Be Modified	<ul><li>Replacement Unit</li><li>To be Replaced</li></ul>

Unit Number	Source Description	Manufacturer -	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
	2		Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction ²	
Misc.	Transformer oil Storage	TT 1	N/A	Varies	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
Γransformers	Tank	Unknown	N/A	-	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
lobile Service	Tanks						
SPCC-TYR-	Gasoline Storage Tank	Unknown	N/A	110	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
126	Gasonne Storage Tank	Chkhowh	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Gasoline Storage Tank	Unknown	N/A	100	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
150	Gasonne Storage Tank	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diagal Storage Touls	Unknown	N/A	100	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
151	Diesel Storage Tank	UIIKIIOWII	N/A	gal	IA List Item #5		<ul><li>□ New/Additional</li><li>□ To Be Modified</li><li>□ To be Replaced</li></ul>
SPCC-TYR-	Discal Character Total	I I alan a a a a a	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
152	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	100	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
153	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	175	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
154	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	200	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
155	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
156	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-			N/A	200	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
157	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul><li>□ New/Additional</li><li>□ To Be Modified</li><li>□ To be Replaced</li></ul>
SPCC-TYR-			N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
158	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul><li> □ New/Additional</li><li> □ To Be Modified</li><li> □ To be Replaced</li></ul>
SPCC-TYR-			N/A	100	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed
159	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
SPCC-TYR-		+	N/A	100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
160	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul><li>□ New/Additional</li><li>□ To Be Modified</li><li>□ To be Replaced</li></ul>
SPCC-TYR-			N/A	100	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed
161	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul> <li>□ New/Additional</li> <li>□ To Be Modified</li> <li>□ To be Replaced</li> </ul>
SPCC-TYR-			N/A	100	20.2.72.202.B.(2) NMAC		☐ To Be Modified ☐ To be Replaced ☐ Existing (unchanged) ☐ To be Removed
162	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional □ Replacement Unit
SPCC-TYR-			N/A	100	20.2.72.202.B.(2) NMAC		☐ To Be Modified ☐ To be Replaced ☐ Existing (unchanged) ☐ To be Removed
163	Diesel Storage Tank	Unknown	N/A		IA List Item #5		☐ New/Additional ☐ Replacement Unit
		-	N/A	gal 250	20.2.72.202.B.(2) NMAC		☐ To Be Modified ☐ To be Replaced ☐ Existing (unchanged) ☐ To be Removed
SPCC-TYR- 164	Diesel Storage Tank	Unknown	N/A N/A		IA List Item #5		☐ New/Additional ☐ Replacement Unit
		-		gal			☐ To Be Modified ☐ To be Replaced ☐ Existing (unchanged) ☐ To be Removed
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	200	20.2.72.202.B.(2) NMAC		☐ New/Additional ☐ Replacement Unit
170	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5		□ New/Additional □ Replacement □ To Be Modified □ To be Replace

Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
Cint Number	Source Description	Manufacturer	Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction ²	For Each Fiete of Equipment, Check One
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	200	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
171	Diesei Storage Talik	Clikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	200	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
173	Dieser Storage Tank	Chkhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Gasoline Storage Tank	Unknown	N/A	105	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
176			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Gasoline Storage Tank	Unknown	N/A	105	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
178		0	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	500	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
185			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	130	20.2.72.202.B.(2) NMAC		✓ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
186			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
ervice Vehicles	S		27/4	1000	20.2.72.202.D.(2) NIMAG	I	✓ Existing (unchanged) □ To be Removed
LS 3	Misc. Storage Tank	Unknown	N/A	1000	20.2.72.202.B.(2) NMAC		□ New/Additional □ Replacement Unit
			N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
LS 5	Misc. Storage Tank	Unknown	N/A	1400	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit
133	wise. Storage Tank	Chkhown	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
1.0.0	M. G. T. I	TT 1	N/A	900	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
LS 8	Misc. Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	1000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
LS 15	Misc. Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul> <li>□ New/Additional</li> <li>□ To Be Modified</li> <li>□ To be Replaced</li> </ul>
			N/A	1400	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
FM 8	Misc. Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul> <li>□ New/Additional</li> <li>□ To Be Modified</li> <li>□ To be Replaced</li> </ul>
T C 1 c	) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	** 1	N/A	1000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed
LS 16	Misc. Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul><li>□ New/Additional</li><li>□ To Be Modified</li><li>□ To be Replaced</li></ul>
1.0.17	Mr. G. T. I	TT 1	N/A	1000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) ☐ To be Removed
LS 17	Misc. Storage Tank	Unknown	N/A	gal	IA List Item #5		<ul> <li>□ New/Additional</li> <li>□ To Be Modified</li> <li>□ To be Replaced</li> </ul>
10.22	Current Steware Toule	I I a lan o a a a	N/A	75	20.2.72.202.B.(2) NMAC		<ul><li>✓ Existing (unchanged)</li><li>☐ To be Removed</li><li>☐ New/Additional</li><li>☐ Replacement Unit</li></ul>
LS 23	Grease Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
FM19	Cranco Hand Oil Luba	Unknown	N/A	1500	20.2.72.202.B.(2) NMAC		<ul><li>☑ Existing (unchanged)</li><li>☐ To be Removed</li><li>☐ New/Additional</li><li>☐ Replacement Unit</li></ul>
FIVI19	Grease, Used Oil, Lube	UlikilOWII	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
1.04	Discal Feed 9	I I	N/A	90	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
LS4	Diesel Fuel Storage	Unknown	N/A	gal	IA List Item #5		<ul> <li>□ New/Additional</li> <li>□ To Be Modified</li> <li>□ To be Replaced</li> </ul>
1 021	Diagal Fuel Starges	Links	N/A	2750	20.2.72.202.B.(2) NMAC		☐ Existing (unchanged) ☐ To be Removed
LS21	Diesel Fuel Storage	Unknown	N/A	gal	IA List Item #5		✓ 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 E	Equipment, Check Onc
CDCC TVD			N/A	1500	20.2.72.202.B.(2) NMAC	Construction	☐ Existing (unchanged) ☐	☐ To be Removed
SPCC-TYR- 268	Diesel Fuel Storage	Unknown	N/A	gal	IA List Item #5		✓ New/Additional	☐ Replacement Unit☐ To be Replaced
	Diesel, Oil, and Grease		N/A	1000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged)	☐ To be Removed
REC20	Storage	Unknown	N/A	gal	IA List Item #5			<ul><li>□ Replacement Unit</li><li>□ To be Replaced</li></ul>
Out of Service	Tanks							<u> </u>
SPCC-TYR-		Unknown	N/A	800	20.2.72.202.B.(2) NMAC			☐ To be Removed☐ Replacement Unit
032	Diesel Storage Tank	Unknown	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	800	20.2.72.202.B.(2) NMAC			<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
035	Diesel Storage Talik	Clikilowii	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	800	20.2.72.202.B.(2) NMAC		U ( U )	<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
036	Diesel Storage Talik	Clikilowii	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	800	20.2.72.202.B.(2) NMAC			<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
039	Diesei Storage Talik	Ulikilowii	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	800	20.2.72.202.B.(2) NMAC			<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
040	Diesei Storage Talik	Clikilowii	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC		U ( U )	<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
047	Lube Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC			<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
050	Lube Off Storage Talik	Clikilowii	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC			<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
051	Lube Off Storage Tallk	Ulikilowii	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC			<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
054	Lube On Storage Tallk	UlikilUWII	N/A	gal	IA List Item #5			☐ To be Replaced
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,500	20.2.72.202.B.(2) NMAC			<ul><li>□ To be Removed</li><li>□ Replacement Unit</li></ul>
055 Lube Oil St	Luce Oil Storage Tallk	UlikilUwii	N/A	gal	IA List Item #5			☐ To be Replaced

Treeport Mewi	okan Tyrone inc.			i yrone win	ic		April 2020, Revision 0
Unit Number	Source Description	Manufacturer	Model No.	Max Capacity	List Specific 20.2.72.202 NMAC Exemption (e.g. 20.2.72.202.B.5)	Date of Manufacture /Reconstruction ²	For Each Piece of Equipment, Check Onc
Cint Number	Source Description	Manuacturei	Serial No.	Capacity Units	Insignificant Activity citation (e.g. IA List Item #1.a)	Date of Installation /Construction ²	For Each Freet of Equipment, Check One
SPCC-TYR-	Lube Oil Storage Tank	Unknown	N/A	1,100	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
057	Lude Off Storage Tank	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Oily Water Storage Tank	Unknown	N/A	20,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
121	Ony water Storage Tank	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Storage Tank	Unknown	N/A	700	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
125	Diesei Storage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Used Oil Storage Tank	Unknown	N/A	10,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
194	Osed Oil Stolage Talik	Ulikilowii	N/A	gal	IA List Item #5		☐ To Be Modified ☐ To be Replaced
SPCC-TYR-	Diesel Fuel Additive	Unknown	N/A	1,000	20.2.72.202.B.(2) NMAC		☑ Existing (unchanged) □ To be Removed □ New/Additional □ Replacement Unit
202	Storage Tank	Unknown	N/A	gal	IA List Item #5		☐ 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 Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s) ¹	Efficiency (% Control by Weight)	Method used to Estimate Efficiency
Water application and other method(s) approved by NMED to	N/A	PM ₁₀ , PM _{2.5}	Mine Fugitives (Hauling)	88.8%	NMED guidance; WRAP guidance
control fugitive dust			SP-7a Fugitives	80%	NMED guidance
	Control Equipment Description	Control Equipment Description  Date Installed  Water application and other method(s) approved by NMED to	Water application and other method(s) approved by NMED to  N/A  PM.: PM.: PM.:	Control Equipment Description  Date Installed Controlled Pollutant(s)  Controlling Emissions for Unit Number(s)  Number(s)  Mine Fugitives (Hauling)  PM ₁₀ , PM _{2.5}	Control Equipment Description  Date Installed Controlled Pollutant(s)  Controlling Emissions for Unit Number(s)  Weight)  Water application and other method(s) approved by NMED to control fucitive dust  Only PM ₁₀ , PM _{2.5} Controlling Emissions for Unit Number(s)  Mine Fugitives (Hauling)  88.8%

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.	N(	Ox	C	0	V	OC	SO	Ox	PM	$I^{1,2}$	PM	110 ¹	PM	2.5 ¹	Н	$_2$ S	Le	ead
Unit No.	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	0.50	1.50	0.21	0.90	0.027	0.12	0.00049	0.0022	0.019	0.004	0.019	0.064	0.019	0.004	-	_	-	_
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	ı	=	ı	-
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	ı	-	1	-
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	-	-	1	-
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)	-	-	ŀ	-	0.33	1.46	1	1	ŀ	-	1	-	ŀ	-	1	-	1	-
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	ı	-	-	-
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	-	-	-	-

¹Condensable 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).

SX/EW   C   C   C   C   C   C   C   C   C	Unit No.	NO	Ox	C	O	V	OC	SO	Ox	PM	1,2	PM	10 ¹	PM	2.5 ¹	Н	$_{2}S$	Le	ead
SXEW-2   No.   N	Omt No.	lb/hr	ton/yr	lb/hr	ton/yr		_ <u> </u>	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
SXEW-3   C	SX/EW-1	-	-	-	-	5.15	22.54	-	-	-	-	-	-	-	-	-	-	-	-
SXTEW-4	SX/EW-2	-	-	-	-	-	-	-	-	1.82	7.98	1.82	7.98	-	-	-	-	-	-
B-748   B-951   B-756   B-75	SX/EW-3	-	-	-	-	0.95	4.15	-	-	-	-	-	-	-	-	-	-	-	-
B-951   0.56   1.56   0.21   0.90   0.027   0.12   0.0049   0.002   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.084   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019   0.019	SX/EW-4	-	-	-	-	0.32	1.39	-	-	-	-	-	-	-	-	-	-	-	-
B-951   S	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	_	_	_	
ENV-111	B-951	0.50	1.50	0.21	0.70	0.027	0.12	0.00012	0.0022	0.017	0.001	0.017	0.001	0.019	0.001				
FNV-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   0.31   0.000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.031   0.0000   0.0000   0.0000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.00000   0.0000000   0.000000   0.0000000   0.000000   0.0000000   0.0000000   0.0000000   0.00000000	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-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   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.031   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.0070   0.	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	-	-	-	-
Mine Fugitives (Blastings)   H4-00   Off-50   S.251.00   S.251.0	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	-	-	-	-
Mine Fugitive (Hauding)   Mark Pugitive (H	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				
(Handling)	Ŭ	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	-	-	-	-
Chauling   Chauling	_	-	-	-		-	-	-		1.39	6.10	0.53	2.34	0.080	0.35	-	-	-	-
(Stockpiles)	_	-	-	-	-	-	-	-	-	1,758.37	7,103.43	448.14	1,810.40	44.81	146.32	-	-	-	-
(GDF1)	_	-	-	-	-	-	-	-	-	46.43	203.34	21.96	96.18	3.33	14.56	-	-	-	-
CGDF2    C	SPCC-TYR-061 (GDF1)	-	-	-	-	1.82	7.96	-	-	-	-	-	-	-	-	-	-	-	-
Chandling   C	SPCC-TYR-119 (GDF2)	-	-	-	-	0.33	1.46	-	-	-	-	-	-	-	-	-	-	-	-
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         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         -         - <t< td=""><td>SP-7A Fugitives (Handling)</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>31.00</td><td>67.90</td><td>9.20</td><td>20.20</td><td>1.00</td><td>2.20</td><td>-</td><td>-</td><td>-</td><td>-</td></t<>	SP-7A Fugitives (Handling)	-	-	-	-	-	-	-	-	31.00	67.90	9.20	20.20	1.00	2.20	-	-	-	-
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         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.34         0.078         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.036         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.062         0.27         0.062         0.27         0.062         <	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-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         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.36         0.082         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.04         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062 <td>OP-8</td> <td>1.34</td> <td>5.86</td> <td>1.22</td> <td>5.34</td> <td>0.074</td> <td>0.33</td> <td>0.44</td> <td>1.91</td> <td>0.070</td> <td>0.31</td> <td>0.070</td> <td>0.31</td> <td>0.070</td> <td>0.31</td> <td>-</td> <td>-</td> <td>=</td> <td>-</td>	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	-	-	=	-
OP-7         0.99         4.35         0.91         4.01         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.052         0.23         0.040         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         1.73         0.40         0.40         0.62         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.15         0.67	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	-	-	-	-
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       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       1.73       0.40       0.62       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.062       0.27       0.063       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       <	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				
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         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.062         0.27         0.063         0.67         0.15         0.67         0.15         0.67         0.15         0.67         0.15         0.67         0.13         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070<	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				
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       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.15       0.67       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.31       0.070       0.01       0.020       0.10	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				
SD-1         1.34         5.86         1.22         5.34         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.31         0.070         0.010         0.20         0.10         0.20         0.10         0.20         0.10         0.20         0.10         0.20         0.10	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				
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 0.20 0.10 0.20 0.10	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				
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     0.20     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     -     -     -     -     -     -	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	-	-	-	-
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	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	-	_	-	_
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	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	-	_	-	_
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		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	_	-	-	-

¹Condensable 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 scenduled 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/agb/permit/agb_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.	N	Ox	C	<b>O</b>	V	OC	SO	Ox	P	$M^2$	PM	110 ²	PM	2.5 ²	Н	$_{2}S$	Le	ead
Omt 140.	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
T																		
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.

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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.

	Serving Unit	N	Ox	C	О	V	OC	SO	Ox	P	$\mathbf{M}^1$	PM	I10	PM	[2.5	□ H ₂ S or	r 🗆 Lead
Stack No.	Number(s) from Table 2-A	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	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	_	_
Bon	B-951	0.30	1.50	0.21	0.50	0.027	0.12	0.00047	0.0022	0.017	0.004	0.017	0.004	0.017	0.004		_
	Totals:		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	Serving Unit Number(s)	Orientation (H-Horizontal	Rain Caps	Height Above	Temp.	Flow	Rate	Moisture by	Velocity	Inside Diameter (ft)	
Number	from Table 2-A	V=Vertical)	(Yes or No)	Ground (ft)	<b>(F)</b>	(acfs)	(dscfs)	Volume (%)	(ft/sec)		
Boil	B-951, B-748	V	Yes	35.1	400.7	2.6	-	-	31.2	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	1	-	108.3	2.26	
PPG-3	PPG-3	V	Yes	60.7	830.9	435.8	1	-	108.3	2.26	
PPG-4	PPG-4	V	Yes	60.7	830.9	435.8	1	-	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	1	-	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	0.0040	0.020	-	-	6.57555E-00	3.00/32E-03	-	-										
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)	1	ı	-	-	-	-	ı	-										
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.

	Fuel Type (low sulfur Diesel,	Fuel Source: purchased commercial,		Speci	fy Units		
Unit No.	ultra low sulfur diesel, Natural Gas, Coal,)	pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other	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
	eration of Nordberg Engines	1 4101440 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1	10,,000 200 gui	10010 gui	10,202 8	3.331273	1,,11
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
•	n of Nordberg Engines	B with a transmission	127 000 Dt /1	150 1	12.2621	0.050/	DT/A
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.

					Vanor	Average Stor	age Conditions	Max Storag	ge Conditions
Tank No.	SCC Code	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/lb*mol)	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)	Cap	acity	Diameter (M)	Vapor Space	Co (from Ta	olor ble VI-C)	Paint Condition (from Table	Annual Throughput	Turn- overs
			LK below)	LK below)	(bbl)	$(M^3)$		( <b>M</b> )	Roof	Shell	VI-C)	(gal/yr)	(per year)
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, W	elded Tank Seal Type	Seal Type, Rive	ted Tank Seal Type	Roof, Shell Color	Paint Condition
<b>FX</b> : 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	
Note: $1.00 \text{ bbl} = 0.159 \text{ M}$	$1^3 = 42.0 \text{ gal}$				BL: Black	
					OT: Other (specify)	

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

	Materi	al Processed		N	<b>Iaterial Produced</b>		
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

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 equip	ment.				

## **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 - F	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  $\square$  By checking this box, the applicant acknowledges the total CO2e emissions are less than 75,000 tons per year.

are less than 7.		CO ₂ ton/yr	N ₂ O ton/yr	CH ₄ ton/yr	SF ₆ ton/yr	PFC/HFC ton/yr ²					<b>Total GHG</b> Mass Basis ton/yr ⁴	Total CO ₂ e ton/yr ⁵
Unit No.	GWPs ¹	1	298	25	22,800	footnote 3						
SX/EW-1	mass GHG	-	-	-	-	-					-	
SA/EW-1	CO ₂ e	-	-	-	-	-						-
SX/EW-2	mass GHG	-	-	-	-	-					-	
511,21, 2	CO ₂ e	-	-	-	-	-						-
SX/EW-3	mass GHG	-	-	-	-	-					-	
	CO ₂ e	-	-	-	-	-						-
SX/EW-4	mass GHG CO ₂ e	-	=	-	-	-					-	
	mass GHG	1525.00	0.015	0.073	-	-					1525.1	-
B-748/B-951	CO ₂ e	1525.00	4.34	1.82	-	-					1323.1	1531.2
	mass GHG	587.05	3.26E-06	0.37	-						587.4	1331.2
ENV-101	CO2e	587.05	0.00097	9.31	_	-					307.4	596.4
	mass GHG	587.05	3.26E-06	0.37	-	-					587.4	220.1
ENV-111	CO ₂ e	587.05	0.00097	9.31	-	-						596.4
ENIV 100	mass GHG	587.05	3.26E-06	0.37	-	-					587.4	
ENV-122	CO2e	587.05	0.00097	9.31	-	-						596.4
ENV-123	mass GHG	1064.05	8.63E-03	0.043	-	-					1064.1	
EIVV-123	CO2e	1064.05	2.57	1.08	-	-						1067.7
Mine Fugitives	mass GHG	15700.71	0.13	0.64	-	-					15701.5	
(Blasting)	CO ₂ e	15,700.71	37.96	15.92	-	-						15754.6
Mine Fugitives	mass GHG	-	-	-	-	-					-	
(Handling)	CO2e	-	-	-	-	-						-
Mine Fugitives	mass GHG	-	-	-	-	-					-	
(Hauling)	CO ₂ e	-	-	-	-	-						-
Mine Fugitives	mass GHG	-	-	-	-	-					-	
(Stockpiles)	CO2e	-	-	-	-	-						-
SPCC-TYR-		-	-	-	-	-					-	
061 (GDF1)		-	-	-	-	-						-
SPCC-TYR- 119 (GDF2)	CO2e	-	=	-	-	-				-	-	_
SP-7A	mass GHG	-	-	-	-	-					-	-
Fugitives (Handling)	CO ₂ e	-	-	-	-	-						-
OP-2	mass GHG	95.63	0.00078	0.0039	-	-					95.6	
<u> </u>	CO2e	95.63	0.23	0.097	-	-						96.0
OP-8	mass GHG	1,214.81	0.0099	0.049	-	-					1214.9	40.00
	CO ₂ e	1,214.81	2.94	1.23	-	-					1110 -	1219.0
ENV-120	mass GHG	1113.58	0.0090	0.045	-	-					1113.6	11177 4
	CO2e	1113.58	2.69	1.13	-	-						1117.4

		CO ₂ ton/yr	N ₂ O ton/yr	CH ₄ ton/yr	SF ₆	PFC/HFC ton/yr²					<b>Total GHG</b> Mass Basis ton/yr ⁴	Total CO ₂ e ton/yr ⁵
Unit No.	GWPs ¹	1	298	25	22,800	footnote 3						
OP-4	mass GHG CO ₂ e	827.60 827.60	0.0067 2.00	0.034	-	-					827.6	830.4
OP-7	mass GHG CO ₂ e	794.49 794.49	0.0064 1.92	0.032 0.81	-	-					794.5	797.2
EMP-1	mass GHG CO ₂ e	898.53 898.53	0.0073 2.17	0.036 0.91	-	-					898.6	901.6
EMP-2	mass GHG CO ₂ e	945.82 945.82	0.0077 2.29	0.038 0.96	-	-					945.9	949.1
ENV-117	mass GHG CO ₂ e	1,655.19 1,655.19	0.013 4.00	0.067 1.68	-	-					1655.3	1660.9
SD-1	mass GHG CO ₂ e	1,484.77 1,484.77	0.012 3.59	0.060 1.51	-	-					1484.8	1489.9
SD-2	mass GHG CO2e	1,484.77 1,484.77	0.012 3.59	0.060 1.51	-	-					1484.8	1489.9
CE-1	mass GHG CO2e	882.37 882.37	0.0072 2.133	0.036 0.89	-	-					882.4	885.4
PPG- 1,3,4,7,8,11-	mass GHG	5,668.15	0.046	0.23	-	-					5668.4	
15	CO ₂ e	5,668.15	13.70	5.75	-	-						5687.6
Total	mass GHG CO ₂ e										37,119.5	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 CO₂e 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**

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The <u>Application Summary</u> 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.

<u>Startup, Shutdown, and Maintenance (SSM)</u> 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.

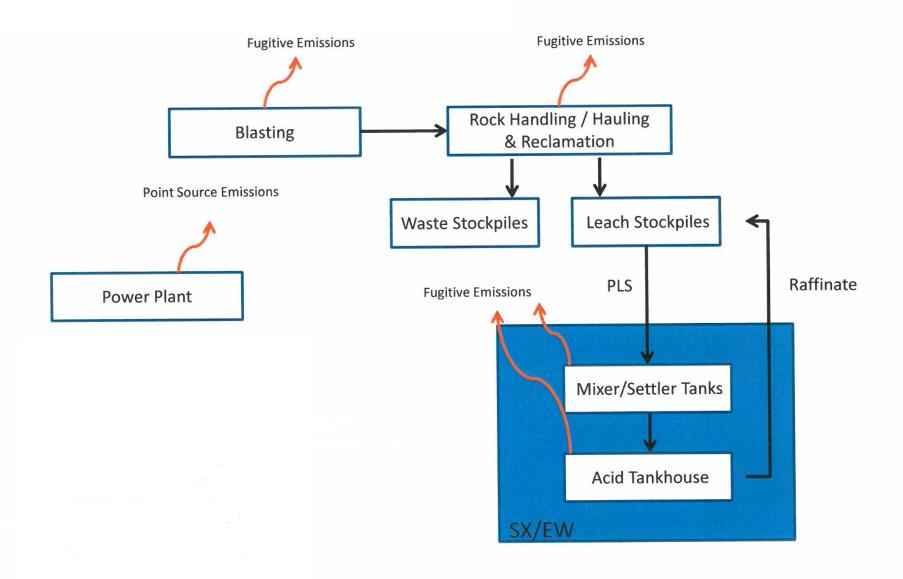
## **Section 4**

## **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.

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A process flow sheet is attached.





**NSR Revision** 

Figure 1: Tyrone Mine Process Flow Diagram

## **Section 5**

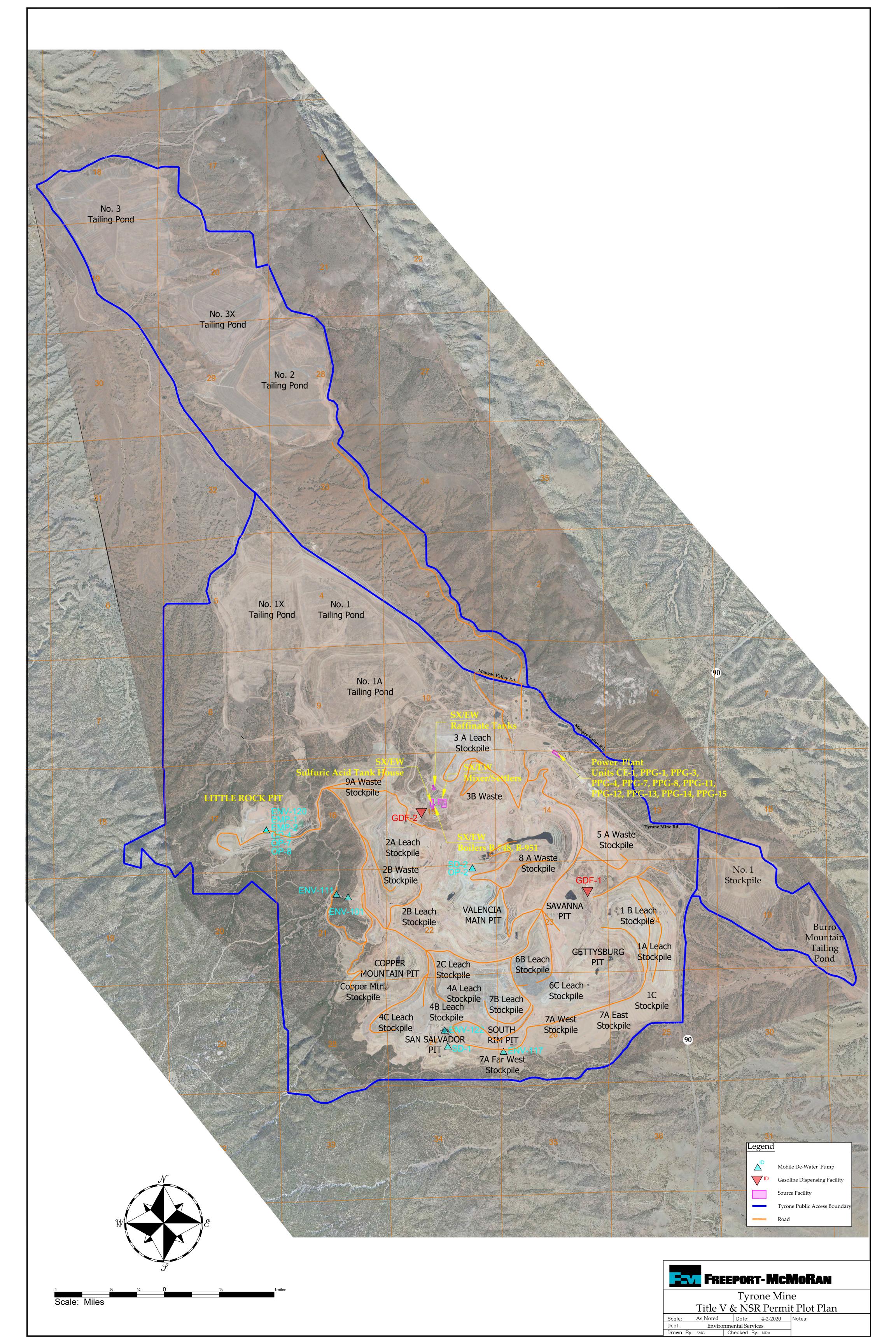
## **Plot Plan Drawn To Scale**

A <u>plot plan drawn to scale</u> 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.

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A plot plan is attached.

Form-Section 5 last revised: 8/15/2011 Section 5, Page 1 Saved Date: 3/19/2020



## **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.

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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 SO₂ emissions are based on a diesel sulfur content of 15 ppm assuming complete conversion to SO₂. 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.

¹NMED memo: "Department Accepted Values for: Aggregate Handling, Storage Pile, and Haul Road Emissions" ²Western 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, SO₂, and VOC emissions are based on AP-42 Table 3.3-1 for unit EMP-1. SO₂ 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)

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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 (CO₂), nitrous oxide (N₂O), methane (CH₄), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆).

### **Calculating GHG Emissions:**

- 1. Calculate the ton per year (tpy) GHG mass emissions and GHG CO₂e 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 CO₂e 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 CO₂e 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  $\Box$  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 <u>Mandatory Green House Gas Reporting</u> 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 CO₂ 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**

Officoritioned Emissions	NO	ЭX	С	Ю.	V	oc	sc	)2	T	SP	PN	/110	PIV	12.5	Total	HAP	Ethylb	enzene	Tolu	uene	Xyle	enes	CO₂e	CO ₂	CH ₄	N ₂ O
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	0.06	4.56	0.24	0.00	0.007	0.40	404504	2.465.02	0.040	0.004	0.040	0.004	0.040	0.004	4 605 00	0.000	-	-	0.075.06	2 675 25	-	-	4 504 46	4505.0	0.070	0.045
B-951 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
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	_	-				1.09E-03		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	_	_				1.09E-03		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
	1440	67.50	2 254 2	1 524 00			0.20	0.14	402.02	125 54	254.07	CE 20	14.40	2 77									15 754 6	15 700 71	0.64	0.12
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									1.39	6.10	0.53	2.34	0.08	0.35												
(Handling)	-	-	_	-	_	-	_	-	1.39	0.10	0.55	2.34	0.08	0.55	_	-	_	-	-	-	-	-	_	_	-	-
	_	_	_	_	_	_	_	_	15 699 69	63,423.50	4,001.27	16,164.32	400.13	1,306.43	_	_	_	_	l <u>.</u>	_	_	_	_	_	_	_
Mine Fugitives (Hauling)									13,033.03	05,425.50	7,001.27	10,104.32	400.13	1,500.45												
Mine Fugitives	_	_	_	_	_	_	_	_	46.43	203.34	21.96	96.18	3.33	14.56	_	_	_	_	_	_	_	_	_	_	_	_
(Stockpiles)												55.25	0.00													
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	-	-			3.82E-05		95.96	95.63	3.88E-03	
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			2.12E-03		1214.81	0.049	9.86E-03
ENV-120 OP-4	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	-	-				1.95E-03 1.45E-03		1113.58	0.045 0.034	9.03E-03
OP-4 OP-7	1.03	4.53	0.95	4.17	0.054	0.24	0.34	1.49	0.082	0.36 0.23	0.082	0.36	0.082 0.052	0.36 0.23	3.97E-03 3.81E-03	0.017 0.017	-	-				1.45E-03 1.39E-03		827.60 794.49	0.034	6.71E-03 6.45E-03
EMP-1	0.99 5.57	4.35 24.40	0.91 1.20	4.01 5.26	0.052 0.45	0.23 1.98	0.33 0.37	1.43 1.61	0.052 0.40	1.73	0.052 0.40	0.23 1.73	0.032	1.73	4.31E-03	0.017	_	-				1.57E-03		898.53	0.032	7.29E-03
EMP-2	1.95	8.54	1.09	3.20 4.77	0.43	0.45	0.37	1.70	0.40	0.27	0.40	0.27	0.40	0.27	4.51E-03 4.53E-03	0.019	_	_				1.65E-03		945.82	0.038	7.29L-03 7.67E-03
ENV-117	3.97	17.40	0.49	2.15	0.10	0.45	0.68	2.97	0.002	0.27	0.15	0.67	0.002	0.67	7.93E-03	0.020	_	_				2.89E-03		1655.19	0.067	0.013
SD-1	1.34	5.86	1.22	5.34	0.070	0.31	0.08	1.91	0.13	0.31	0.13	0.31	0.13	0.31	7.11E-03	0.033	_	_				2.60E-03		1484.77	0.060	0.013
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 7.11E-03	0.031	_	_				2.60E-03		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		0.23	0.046
Total	678.30		3,522.88	1,622.41	40.09	49.44	18.15	23.34		63,843.56	4,300.37			1336.38	3.61	14.20	0.88	3.85	0.77	3.11	1.43			37,116.65		0.29
Total w/o Fugitives ²			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		1	21,415.94		0.16
1 2 121 11, 2 1 20																							,	,		

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**

Controlled Emissions	NC	ОХ	С	0	VC	oc	SC	02	T:	SP	PIV	110	PM	2.5	Total	НАР	Ethylbe	enzene	Tolu	iene	Xyle	enes	CO ₂ e	CO ₂	CH ₄	N ₂ O
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	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	0.26	4.50	0.24	0.00	0.027	0.42	4 0 4 5 0 4	2.465.02	0.040	0.004	0.040	0.004	0.040	0.004	4 625 02	0.000	-	-	0.275.00	2 675 05	-	-	4 524 2	4525.0	0.073	0.045
B-951 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
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
	1440	67.50	2 251 2	1 524 00			0.20	0.14	482.83	125 54	251.07	CE 20	14.40	3.77									15 754 50	15 700 71	0.64	0.12
Mine Fugitives (Blasting)	144.0	67.50	3,251.2	1,524.00	-	-	0.29	0.14	402.03	125.54	251.07	65.28	14.48	3.77	_	-	-	-	_	-	-	-	15,754.56	15,700.71	0.64	0.13
Mine Fugitives	_	_	_	_	_	_	_	_	1.39	6.10	0.53	2.34	0.08	0.35	_	_	_	_	_	_	_	_	_	_	_	_
(Handling)	_	_	_	_	_		_	_	1.55	0.10	0.55	2.34	0.08	0.55		_	_	_					_			
	_	_	_	_	_	_	_	_	1,758.37	7,103.43	448.14	1,810.40	44.81	146.32	_	_	-	_	_	_	_	_	_	_	_	_
Mine Fugitives (Hauling)									1,730.07	7,100.10	1.0.1	1,010110	11.02	110.02												
Mine Fugitives	_	_	_	_	-	_	-	-	46.43	203.34	21.96	96.18	3.33	14.56	_	-	-	-	_	_	_	_	_	_	_	-
(Stockpiles)																										
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	- 0.26	- 1 FO	- 0.20	1 22	-	-	-	- 0.20	31.00	67.90	9.20	20.20	1.00	2.20	4 505 04	-	-	-	- 405.00	- 2.40F.0F	2 025 05	- 1 C7E 04	-	05.63	- 3.88E-03	7 765 04
OP-2 OP-8	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	-	-			3.82E-05 4.85E-04		96.0	95.63	0.049	7.76E-04 9.86E-03
ENV-120	1.34 1.49	5.86 6.51	1.22 1.36	5.34 5.94	0.074 0.078	0.33 0.34	0.44 0.48	1.91 2.12	0.070 0.078	0.31 0.34	0.078	0.31 0.34	0.070 0.078	0.31 0.34	5.34E-03	0.025 0.023	-	-	6.96E-05		4.85E-04 4.44E-04		1219.0 1117.4	1214.81 1113.58	0.049	9.03E-03
OP-4	1.49	4.53	0.95	4.17	0.078	0.34	0.48	1.49	0.078	0.34	0.078	0.34	0.078	0.34	3.97E-03	0.023	_	-			3.30E-04		830.44	827.60	0.043	6.71E-03
OP-7	0.99	4.35	0.91	4.01	0.054	0.24	0.34	1.43	0.05	0.30	0.05	0.23	0.05	0.30	3.81E-03	0.017	_	_			3.17E-04		797.22	794.49	0.034	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	0.017	_	_			3.59E-04		901.62	898.53	0.032	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	_	_			3.77E-04			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	-	-					1660.87		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	-	_					1489.9		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	-	_			5.93E-04			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		6.93E-04	-	-	-	-	-	-	885.39	882.37	0.036	7.16E-03
	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		0.23	0.046
			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		37,116.65		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.

Haul Road Emission Summary
Units: Mine Fugitives (Hauling)

				Uncontr	olled Emis	sions							
				Total En	nissions				Em	issions per '	Volume So	urce	
Road Number	Road Name	PM	2.5	PIV	110	T:	SP	PM	2.5	PN	110	T:	SP
		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

				Contro	lled Emiss	ions							
				Total Er	nissions			Emissions per Volume Source					
Road Number	Road Name	PM	12.5	PN	110	T:	SP	PM	2.5	PN	110	TS	SP.
		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

									Prop	osed 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 Efficency	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
38 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
SA 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	81	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
317	10.2	2000	7.22	Cat 769	7	285.71	730000	365	12	4380	-	39.5	39.5	4.22	2	8.44	35.61	155979.7	00.074	4.0	**
1A/1B	82	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
24/15	I/LE	5500	2.97	Cat 769	7	1142.86	2920000	365	12	4380		39.5	39.5	16.88	2	3.94	66.50	291260.8	00.074	4.0	30
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	
				Cat 769	7	285.71	730000	365	12	4380		39.5	39.5	4.22	2	0.76	3.21	14045.6			
P Plant	84	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	
Prant	104	3000	0.33	Cat 769	7	714.29	1825000	365	12	4380	-	39.5	39.5	10.55	2	0.66	6.96	30493.7	00.074	4.0	
Large Reclamation	85	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
cargo recommendon	10	3000	3.37	Cat 769	7	714.29	1825000	365	12	4380	-	39.5	39.5	10.55	2	6.74	71.10	311405.1	00.074	4.0	uu
2C4A7BS	86	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
2246783		23000		Cat 769	7	1428.57	3650000	365	12	4380		39.5	39.5	21.10	2	2.00	42.19	184810.1	22.074		
28 Reclamation	87	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
22.12.181180011	Ar	23000	2.79	Cat 769	7	1428.57	3650000	365	12	4380	-	39.5	39.5	21.10	2	1.58	33.33	146000.0	20.076	0	

3A Stockpile

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%									
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵					
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[Ib	/yr]					
	[Ib/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled					
Particulate Matter (PM 2.5)	0.37	0.37 0.45 73.19 8.20 20.67 2.32									
Particulate Matter (PM 10)	4.54	4.54 4.54 905.56 101.42 206.75 23.16									
Particulate Matter (TSD)	17 97	17 92	2552 11	207.05	911 71	90.96					

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 I	Maximum Fu	gitive Emissio	ons ⁶	Number of	Emissi	ons per Vo	lume Source	e ⁷
	Contro	ontrolled		rolled	volume sources	Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\text{ext}}$  = 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(AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

3B Stockpile

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%									
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵					
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[Ib	/yr]					
	[lb/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled					
Particulate Matter (PM 2.5)	0.37	0.37 0.45 62.31 6.98 17.60 1.97									
Particulate Matter (PM 10)	4.54	4.54 4.54 770.95 86.35 176.02 19.71									
Particulate Matter (TSD)	17 92	17 92	2024.05	229 70	600 62	77 25					

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 I	Maximum Fu	gitive Emissio	ons ⁶	Number of	Emissi	ions per Vo	lume Source	e ⁷
	Contro	ntrolled Ur		rolled	volume sources	Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\text{ext}}$  = 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(AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

3B to Mohawk1

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%									
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵					
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[Ib	/yr]					
	[lb/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled					
Particulate Matter (PM 2.5)	0.37	0.37 0.45 52.42 5.87 14.81 1.66									
Particulate Matter (PM 10)	4.54	4.54 4.54 648.58 72.64 148.08 16.58									
Doubleulate Metter (TCD)	17.03	17.02	2544.00	205.02	E01 00	6F 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							Emissions per Volume Source ⁷				
Contro	ntrolled Unc		rolled		Controlled		Uncontrolled				
[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]			
5.87	1.66	52.42	14.81	13	0.45	0.13	4.03	1.14			
72.64	16.58	648.58	148.08	13	5.59	1.28	49.89	11.39			
285.02	65.07	2544.80	581.00	13	21.92	5.01	195.75	44.69			
	Contro [tons/year] 5.87 72.64	Controlled           [tons/year]         [lb/hr]           5.87         1.66           72.64         16.58	Controlled         Uncontrolled           [tons/year]         [lb/hr]         [tons/year]           5.87         1.66         52.42           72.64         16.58         648.58	Controlled         Uncontrolled           [tons/year]         [lb/hr]         [tons/year]         [lb/hr]           5.87         1.66         52.42         14.81           72.64         16.58         648.58         148.08	Controlled   Uncontrolled   Number of volume sources   1.66   52.42   14.81   13   72.64   15.58   648.58   148.08   13	Controlled   Uncontrolled   Number of volume sources     Controlled	Controlled   Uncontrolled   Uncont	Controlled   Uncontrolled   Uncont			

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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

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%									
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Emission Rate ⁵						
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[Ib	/yr]					
	[Ib/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled					
Particulate Matter (PM 2.5)	0.37	0.37 0.45 52.42 5.87 14.81 1.66									
Particulate Matter (PM 10)	4.54	4.54 4.54 648.58 72.64 148.08 16.58									
Particulate Matter (TSP)	17.87	17.87	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	Emissi	Emissions per Volume Source ⁷		
	Contro	olled	Uncont	rolled		Control	led	Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

 $Where: E_{oxt} = annual emission factor extrapolated for annual natural mitigation (lb/VMT) \\ E = hourly emission factor (lb/VMT) \\ P = number of days in a year with at least 0.01 inches of precipitation \\$ (AP-42, Chapter 13.2.2, Equation 1a)

- 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)

  1-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.

- Emission Factors are trom Ar-42, Chapter 13.2.2, Unpayee Aloads, Venicles Traveling on unpayed surfaces at ind

  5-Annual Emission Rate = Annual Honorstrolled Emission Factor * Annual HWT + 2000

  5-Hourly Emission Rate = Hourly Uncontrolled Emissions of 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, Unpayed Roads, Table 13.2.2-2 (November 2006)

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%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	Hourly Emission Rate ⁵				
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[lb/yr]					
	[lb/VMT]	[Ib/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 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				ons ⁶	Number of	Emissi	ons per Vo	lume Source	27
	Contro	olled	Uncont	rolled		Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

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%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	Annual Emission Rate ⁵		Hourly Emission Rate ⁵				
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[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 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	Emissi	ons per Vo	lume Source	e ⁷		
	Contro	olled	Uncont	rolled		Controlled		Uncon	Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

8C Stockpile

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%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Emission Rate ⁵					
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[lb/yr]					
	[lb/VMT]	[Ib/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	17.87	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	Emissions per Volume Source ⁷			27
	Contro	olled	Uncont	rolled		Control		Unconf	rolled
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Truck type		Cat 793								
Average Truck Weight [tons]		220								
Hourly VMT [miles/hour] ¹		14.15								
Annual VMT [miles/year] ²	İ	123911.44								
Control Efficiency [%] ³		88.80%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Emission Rate ⁵					
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[Ib	[lb/yr]				
	[lb/VMT]	[Ib/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 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 I	Maximum Fu	gitive Emissio	ons ⁶	Number of	Emissi	ons per Vo	lume Source	e ⁷
	Contro	olled	Uncont	rolled	volume sources	Control	led	Unconf	trolled
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\text{ext}}$  = 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(AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

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

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%				
	Annual Uncontrolled Hourly Controlled Emission Annual Emission Rate ⁵ Hourly Emission Rate ⁵						
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵	
Criteria Pollutant	Annual Uncontrolled Emission Factor ⁴	Hourly Controlled Emission Factor ⁴	Annual Emi [tons/			ission Rate ⁵ /yr]	
Criteria Pollutant							
Criteria Pollutant Particulate Matter (PM 2.5)	Emission Factor ⁴	Factor ⁴	[tons/	year]	[16	/yr]	
	Emission Factor ⁴ [lb/VMT]	Factor ⁴ [Ib/VMT]	[tons/ Uncontrolled	year] Controlled	[lb Uncontrolled	/yr] Controlled	

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 I	Maximum F	ugitive Emissio	ons ⁶		Emissi	Emissions per Volume Source ⁷		
	Contro	olled	Uncontr	rolled	Number of volume sources	Control	lled	Uncon	trolled
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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)

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:

 $Where: E_{\rm ext} = \hbox{annual emission factor extrapolated for annual natural mitigation (lb/VMT)} \\ E = \hbox{hourly emission factor (lb/VMT)} \\ P = \hbox{number of days in a year with at least 0.01 inches of precipitation} \\$ (AP-42, Chapter 13.2.2, Equation 1a)

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)
2-Control Efficiency is eat 48.8%; see control efficiency page for more info.
4-Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, wehicles traveling on unpaved surfaces at industrial sites.
5-Annual Emission Rate - Annual Hourschilde Emission Factor * Annual VMT + 2000
5-Hourly Emission Rate = Hourly Uncontrolled Emissions Factor * Hourly VMT
6 Total Emission er und truck emissions operating on that road
7 Emission per Volume source - Total Emissions + Unweber 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)

Copper Mountain Waste

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%			
	Annual Uncontrolled Hourly Controlled Emission Annual Emission Rate ⁵ Hourly Emission Rate ⁵					
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵
Criteria Pollutant	Emission Factor ⁴	Hourly Controlled Emission Factor ⁴	Annual Emi [tons/			ission Rate ⁵ /yr]
Criteria Pollutant						
Criteria Pollutant Particulate Matter (PM 2.5)	Emission Factor ⁴	Factor ⁴	[tons/	year]	[16	/yr]
	Emission Factor ⁴ [lb/VMT]	Factor ⁴ [lb/VMT]	[tons/ Uncontrolled	year] Controlled	[lb Uncontrolled	/yr] Controlled

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 I	Maximum Fu	ugitive Emissio	ons ⁶	Number of	Emissi	ons per Vo	lume Source	e ⁷
	Contro	olled	Uncont	rolled	volume sources	Control	led	Unconf	trolled
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Main Pit/Mohawk 2 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%				
	Annual Uncontrolled Hourly Controlled Emission Annual Emission Rate ⁵ Hourly Emission Rate ⁵						
	Annual Oncontrolled	riourly controlled Lillission	Annual Emi	ssion kate	Hourly Em	ission Rate	
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	Annual Emi [tons/			/yr]	
Criteria Pollutant							
Criteria Pollutant Particulate Matter (PM 2.5)	Emission Factor ⁴	Factor ⁴	[tons/	year]	[16	/yr]	
	Emission Factor ⁴ [lb/VMT]	Factor ⁴ [lb/VMT]	[tons/ Uncontrolled	year] Controlled	[lb Uncontrolled	/yr] Controlled	

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 I	Maximum Fu	ugitive Emissio	ons ⁶	Number of	Emissi	ons per Vo	lume Source	27
	Contro	olled	Uncont	rolled	volume sources	Control	led	Uncont	rolled
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Freeport-McMoRan Tyrone Inc. Feb-20 Road Name

Road Number

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%			
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[lb	/yr]
Criteria Pollutant	Emission Factor ⁴ [lb/VMT]	Factor ⁴ [lb/VMT]	[tons/ Uncontrolled	year] Controlled	Uncontrolled	/yr] Controlled
Criteria Pollutant Particulate Matter (PM 2.5)						
	[lb/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled

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					Emissions per Volume Source ⁷			
	Contr	olled	Uncont	rolled	Number of	Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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)

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

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)
2-Control Efficiency is eat 48.8%; see control efficiency page for more info.
4-Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, wehicles traveling on unpaved surfaces at industrial sites.
5-Annual Emission Rate - Annual Hourschilde Emission Factor * Annual VMT + 2000
5-Hourly Emission Rate = Hourly Uncontrolled Emissions Factor * Hourly VMT
6 Total Emission er und truck emissions operating on that road
7 Emission per Volume source - Total Emissions + Unweber 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

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%							
	Annual Uncontrolled Hourly Controlled Emission Annual Emission Rate ⁵ Hourly Emission Rate ⁵								
						iission rate			
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/			/yr]			
Criteria Pollutant	Emission Factor ⁴ [Ib/VMT]								
Criteria Pollutant Particulate Matter (PM 2.5)		Factor ⁴	[tons/	year]	[16	/yr]			
	[Ib/VMT]	Factor ⁴ [Ib/VMT]	[tons/ Uncontrolled	year] Controlled	[lb Uncontrolled	/yr] Controlled			

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 [davs]		70	

Total Maximum Fugitive Emissions ⁶					Emissions per Volume Source ⁷				
	Contro	olled	Uncont	rolled	Number of	Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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)

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:

 $Where: E_{\rm ext} = \hbox{annual emission factor extrapolated for annual natural mitigation (lb/VMT)} \\ E = \hbox{hourly emission factor (lb/VMT)} \\ P = \hbox{number of days in a year with at least 0.01 inches of precipitation} \\$ (AP-42, Chapter 13.2.2, Equation 1a)

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)
2-Control Efficiency is eat 48.8%; see control efficiency page for more info.
4-Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, wehicles traveling on unpaved surfaces at industrial sites.
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 Hourschilde Emission Factor * Hourly VMT
6-Total Emission er under Surface AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)
4-Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

Road Name Road Numbe West 6D Stockpile 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%						
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵			
			[tons/year] [lb/yr]						
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[16	/yr]			
Criteria Pollutant	Emission Factor ⁴ [lb/VMT]	Factor ⁴ [lb/VMT]	[tons/ Uncontrolled	year] Controlled	[lb Uncontrolled	/yr] Controlled			
Criteria Pollutant Particulate Matter (PM 2.5)									
	[Ib/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled			

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	Emissions per Volume Source ⁷				
	Contro	olled	Uncont	rolled		Control	led	Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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:

Where: E = emission factor in lb/VMT
lb = pounds of pollutant
VMT = vehicle miles traveled
k = particle size multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

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

Road Number

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%							
	Annual Uncontrolled Hourly Controlled Emission Annual Emission Rate ⁵ Hourly Emission Rate ⁵									
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵				
Criteria Pollutant	Annual Uncontrolled Emission Factor ⁴	Hourly Controlled Emission Factor ⁴	Annual Emi [tons/			ission Rate ⁵ i/yr]				
Criteria Pollutant										
Criteria Pollutant Particulate Matter (PM 2.5)	Emission Factor ⁴	Factor ⁴	[tons/	year]	(IE	/yr]				
	Emission Factor ⁴ [lb/VMT]	Factor ⁴ [Ib/VMT]	[tons/ Uncontrolled	year] Controlled	[It	/yr] Controlled				

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					Emissions per Volume Source ⁷				
	Contro	olled	Uncontr	rolled	Number of	Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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:

 $Where: E_{\rm ext} = \hbox{annual emission factor extrapolated for annual natural mitigation (lb/VMT)} \\ E = \hbox{hourly emission factor (lb/VMT)} \\ P = \hbox{number of days in a year with at least 0.01 inches of precipitation} \\$ (AP-42, Chapter 13.2.2, Equation 1a)

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)
2-Control Efficiency is eat 48.8%; see control efficiency page for more info.
4-Emission factors are from AP-42, Chapter 13.2.2, Unpaved Roads, wehicles traveling on unpaved surfaces at industrial sites.
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 Hourschilde Emission Factor * Hourly VMT
6-Total Emission er under Surface AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)
4-Values for k, a, and b obtained from AP-42, Chapter 13.2.2, Unpaved Roads, Table 13.2.2-2 (November 2006)

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%						
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵			
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[16	[lb/yr]			
	[lb/VMT]	[Ib/VMT]	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	Emissions per Volume Source ⁷						
	Controlled		Uncontrolled			Controlled		Uncontrolled				
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Freeport-McMoRan Tyrone Inc. Feb-20

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%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵				
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[lb/yr]					
	[lb/VMT]	[Ib/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 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							

	ons ⁶	Number of	Emissions per Volume Source ⁷							
	Contr	olled	Uncont	rolled		Controlled		Uncontrolled		
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Emission Factors are trom Ar-42, Chapter 13.2.2, Unpayee Aloads, Venicles Traveling on unpayed surfaces at ind

5-Annual Emission Rate = Annual Honorstrolled Emission Factor * Annual HWT + 2000

5-Hourly Emission Rate = Hourly Uncontrolled Emissions of 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, Unpayed Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc. Feb-20

West Main Road 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%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	nission Rate ⁵			
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/year] [lb/yr]			/yr]			
	[lb/VMT]	[lb/VMT]	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 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 Fugitiv				ons ⁶		Emissions per Volume Source ⁷			
	Contr	olled	Uncont	rolled	Number of volume sources	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 multipler (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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Emission Factors are trom Ar-42, Chapter 13.2.2, Unpayee Aloads, Venicles Traveling on unpayed surfaces at ind

5-Annual Emission Rate = Annual Honorstrolled Emission Factor * Annual HWT + 2000

5-Hourly Emission Rate = Hourly Uncontrolled Emissions of 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, Unpayed Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc. Feb-20 Road Name Road Number 2B Stockpile 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%							
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵			
Criteria Pollutant	Emission Factor⁴	Factor ⁴	[tons/	year]	[lb/yr]				
	[Ib/VMT]	[Ib/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			
Destinulate Matter (TCD)	4.63	4.63	0.17	0.03	0.04	0.00			

Emission Factor Constants	28 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						Emissions per Volume Source ⁷				
	Contr	olled	Uncontrolled		Number of volume sources	Controlled		Uncontrolled		
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 e: E = emission factor in ID/VMT Ib = pounds of pollutant VMT = vehicle miles traveled k = particle size multiplier (Ib/VMT) a = empirical constant (unit less) b = empirical constant (unit less) s = surface sili 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

Freeport-McMoRan Tyrone Inc. Feb-20 Road Name Road Number Copper Mountain 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%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵			
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[lb/yr]				
	[lb/VMT]	[Ib/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			
Destinulate Matter (TCD)	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 Fu	ugitive Emissi	ons ⁶		Emissions per Volume Source ⁷				
	Contr	olled	Uncontrolled		Number of volume sources	Controlled		Uncontrolled		
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 e: E = emission factor in ID/VMT Ib = pounds of pollutant VMT = vehicle miles traveled k = particle size multiplier (Ib/VMT) a = empirical constant (unit less) b = empirical constant (unit less) s = surface sili 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

Freeport-McMoRan Tyrone Inc. Feb-20

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%							
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵			
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[Ib	/yr]			
	[lb/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled			
Particulate Matter (PM 2.5)	0.10	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	Emis	sions per V	olume Source	7
	Contro	olled	Uncontrolled			Control	lled	Unconti	rolled
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

 $Where: E_{oxt} = annual emission factor extrapolated for annual natural mitigation (lb/VMT) \\ E = hourly emission factor (lb/VMT) \\ P = number of days in a year with at least 0.01 inches of precipitation \\$ (AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Emission Factors are trom Ar-42, Chapter 13.2.2, Unpayee Aloads, Venicles Traveling on unpayed surfaces at ind

5-Annual Emission Rate = Annual Honorstrolled Emission Factor * Annual HWT + 2000

5-Hourly Emission Rate = Hourly Uncontrolled Emissions of 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, Unpayed Roads, Table 13.2.2-2 (November 2006)

Freeport-McMoRan Tyrone Inc. Feb-20

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%							
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵			
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[Ib	/yr]			
	[lb/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled			
Particulate Matter (PM 2.5)	0.10	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	Emissions per Volume Source ⁷				
	Contro	olled	Uncontrolled			Control	lled	Unconti	rolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 multipler (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:

Where:  $E_{\text{ext}}$  = 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(AP-42, Chapter 13.2.2, Equation 1a)

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)

1-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.

Emission Factors are trom Ar-42, Chapter 13.2.2, Unpayee Aloads, Venicles Traveling on unpayed surfaces at ind

5-Annual Emission Rate = Annual Honorstrolled Emission Factor * Annual HWT + 2000

5-Hourly Emission Rate = Hourly Uncontrolled Emissions of 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, Unpayed Roads, Table 13.2.2-2 (November 2006)

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

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%					
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵	Annual Uncontrolled	Hourly Controlled	Annual Emis	sion Rate ⁵	Hourly Emis	sion Rate ⁵
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[16	/yr]	Emission Factor ⁴	Emission Factor ⁴	[tons/y	/ear]	[lb/	yr]
	[Ib/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[Ib/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
Destinutes Master (TCD)	7.77	7 17	724 67	02.20	225 47	27.57	6 65	0 22	E10 76	EQ 10	202.00	22.02

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						Emissions per Volume Source ⁷				
	Contr	Controlled		rolled	Number of volume sources	Control	led	Uncontrolled		
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 Ib/VMT
Ib = pounds of pollutant
VMT = which emiles traveled
k = particle size multiplier (Ib/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface sit content, (8)
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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a )

1A/1B

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%						
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵	Annual Uncontrolled	Hourly Controlled	Annual Emis	sion Rate ⁵	Hourly Emis	ision Rate ⁵	
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[Ib	/yr]	Emission Factor ⁴	Emission Factor ⁴	[tons/	year]	[lb/s	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	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						Emis	sions per V	olume Source		
	Contr	Unconti	rolled	Number of volume sources	Controlled		Uncontrolled			
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 Ib/VMT b = pounds of pollutant VMT = which emiles traveled k = particle size multiplier (Ib/VMT) = empirical constant (unit less) b = empirical constant (unit less) b = empirical constant (unit less) W = mean vehicle weight, full vs. empty (tons)

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:

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/frip)

3 Annual Vehicle Miles Traveled = flourly Vehicle Miles Traveled (miles/hour) * Annual Operating Hours (hours/year)

3 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 Annual Emission Rate = Sansa Hourly 11.2 (page 48.8%)

5 Annual Emission Rate = Annual Uncontrolled Emission Factor * Annual VMT ± 2000

7 Hourly Emission Rate = Hourly Uncontrolled Emission Factor * Hourly WMT

6 Total Emission are the sum of all ruck emissions operating on that road

7 Emission per Volume source = Total Emissions * Number of Volume Sources

4 Values for X, 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 Road Number

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%										
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵	on Rate ⁵ Annual Uncontrolled Hourly Controlled Annual Emission Rate ⁵ Hourl				Hourly Emis	sion Rate ⁵
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	year]	[16	/yr]	Emission Factor ⁴ Emission Factor ⁴ [tons/year] [lb/yr]				yr]	
	[Ib/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[Ib/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 (TCD)	7 2 7	7 17	CC 1C	7.41	20.21	2.20	22.2	0.22	40.71	F 22	20.20	2.00

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 [davs]	70						

Total Maximum Fugitive Emissions ⁶						Emissions per Volume Source ⁷				
	Contr	olled	Unconti	rolled	Number of volume sources	Control	led	Unconti	rolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 Ib/VMT
Ib = pounds of pollutant
VMT = which emiles traveled
k = particle size multiplier (Ib/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface sit content, (8)
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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a )

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

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%			
	Annual Uncontrolled	ntrolled Hourly Controlled Emission Annual Emission Rate ⁵ Hourly Emission Rate ⁵ Annual Uncontrolled Hourly Controlled Annual Emission					Annual Emission Rate ⁵ Hourly Emission F		sion Rate ⁵			
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	/year]	[16	/yr]	Emission Factor ⁴ Emission Factor ⁴ [tons/year] [lb/yr]				yr]	
	[Ib/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 [davs]	70						

	Tot	Total Maximum Fugitive Emissions ⁶					Emissions per Volume Source ⁷				
	Contr	olled	Unconti	rolled	Number of volume sources	Control	led	Uncontr	olled		
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 Ib/VMT
Ib = pounds of pollutant
VMT = which emiles traveled
k = particle size multiplier (Ib/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface sit content, (8)
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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a )

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

Truck type			Cat 730				Cat 769					
Average Truck Weight [tons	i		30.9				39.5					
Hourly VMT [miles/hour]	•		90.88				71.10					
Annual VMT [miles/year]		398074.43						311405.06				
Control Efficiency [%]		88.80%										
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵	Annual Uncontrolled	Hourly Controlled	Annual Emis	sion Rate ⁵	Hourly Emis	sion Rate ⁵
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[16	/yr]	Emission Factor ⁴ Emission Factor ⁴ [tons/year] [lb/yr]				yr]	
	[lb/VMT]	[lb/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[Ib/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						

	Tot	Number of	Emissions per Volume Source ⁷						
	Contr	olled	Unconti	rolled	volume sources	Control	led	Unconti	rolled
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 Ib/VMT
Ib = pounds of pollutant
VMT = welchie miles traveled
k = particle size multiplier (Ib/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface silt content, (8)
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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a )

2C4A7BS

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

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								-		
Control Efficiency [%] ³		88.80%										
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ission Rate ⁵	Hourly Em	ission Rate ⁵	Annual Uncontrolled Hourly Controlled Annual Emission Rate ⁵ Hourly				Hourly Emis	sion Rate ⁵
Criteria Pollutant	Emission Factor ⁴	Factor ⁴	[tons/	/year]	[Ib	/yr]	Emission Factor ⁴ Emission Factor ⁴ [tons/year] [lb/yr]				yr]	
	[Ib/VMT]	[Ib/VMT]	Uncontrolled	Controlled	Uncontrolled	Controlled	[lb/VMT]	[Ib/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 80

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 [davs]	70						

	Total Maximum Fugitive Emissions Number of Emissions per Volume Source Number of											
		Contr	olled	Uncontr	olled		Control	led	Uncontr	olled		
Particulate Matter (PM 10) 24.847 11.346 221.848 101.301 27 0.92 0.42 8.22 3.75		[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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 (TSD) 07 403 44 547 070 401 207 474 27 27 2 C1 1 C5 22 24 14 72	Particulate Matter (PM 10)	24.847	11.346	221.848	101.301	27	0.92	0.42	8.22	3.75		
Farticulate Watter (13F) 97.492 44.517 870.401 397.471 27 3.01 1.03 32.24 14.72	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 Ib/VMT
Ib = pounds of pollutant
VMT = which emiles traveled
k = particle size multiplier (Ib/VMT)
a = empirical constant (unit less)
b = empirical constant (unit less)
s = surface sit content, (8)
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:

Where:  $E_{\rm ext}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a )

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

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%								
	Annual Uncontrolled	Hourly Controlled Emission	Annual Emi	ssion Rate ⁵	Hourly Em	ission Rate ⁵	Annual Uncontrolled	Hourly Controlled	Annual Emis	ssion Rate ⁵	Hourly Emis	ision Rate ⁵
Criteria Pollutant	Annual Uncontrolled Emission Factor ⁴	Hourly Controlled Emission Factor ⁴	Annual Emi [tons/			ission Rate ⁵ /yr]	Annual Uncontrolled Emission Factor ⁴	Hourly Controlled Emission Factor ⁴	Annual Emis (tons/		Hourly Emis	
Criteria Pollutant										year]		
Criteria Pollutant Particulate Matter (PM 2.5)	Emission Factor ⁴	Factor ⁴	[tons/	'year]	[It	/yr]	Emission Factor ⁴	Emission Factor ⁴	[tons/	year]	[lb/	yr]
	Emission Factor ⁴ [lb/VMT]	Factor ⁴ [lb/VMT]	[tons/ Uncontrolled	year] Controlled	[It Uncontrolled	/yr] Controlled	Emission Factor ⁴ [lb/VMT]	Emission Factor ⁴ [Ib/VMT]	[tons/	year] Controlled	[lb/ Uncontrolled	yr] Controlled

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 [davs]	70				

Total Maximum Fugitive Emissions ⁶				Numbered	Emis	Emissions per Volume Source ⁷			
	Contr	olled	Uncontrolled Number of			Controlled		Uncontrolled	
	[tons/year]	[lb/hr]	[tons/year]	[lb/hr]	volume sources	[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

Fuglitive 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 Ib/VMT b = pounds of pollutant VMT = which emiles traveled k = particle size multiplier (Ib/VMT) = empirical constant (unit less) b = empirical constant (unit less) b = empirical constant (unit less) W = mean vehicle weight, full vs. empty (tons)

 $\label{eq:Where: E_n} Where: E_n = hourly emission factor (lb/hr) \\ E = emission factor (lb/NhT) \\ d = average hourly daytime traffic rate, roundtrips per hour (h <math>^3$ )  $_1$  = longest hauf road length in miles (roundtrip)

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

Where:  $E_{\rm sac}$  = 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 (AP-42, Chapter 13.2.2, Equation 1a)

### **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 ft² Based on typical blast hole pattern

Diesel fuel usage: 1,846 gal/day Diesel fuel oil to ammonium nitrate blasting products ratio:

Diesel fuel usage: 1,384,615 gal/yr Diesel Fuel Density = 6.5 lb/gal

6%

	Emission Factor (lb/ton blasting	Fmission Rate *				
	agent) ¹	(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					
Citteria Fonutant	(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			

	Emission Factor	Emission Rate ⁶		
Pollutant	(lb/MMBtu) ⁵	(lb/day)	(ton/yr)	
CO ₂	162.712	41454.0	15545.3	
N ₂ O	0.00132	0.34	0.13	
CH ₄	0.0066	1.68	0.63	
CO₂e			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).

- SO₂ emissions are based on a diesel sulfur content of 15 ppm assuming complete conversion to SO₂.
- 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.

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

- 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. CO₂, N₂O, and CH₄ 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 ft² Based on typical blast hole pattern

Diesel fuel usage: 1,846 gal/day Diesel fuel oil to ammonium nitrate blasting products ratio:

Diesel fuel usage: 1,384,615 gal/yr Diesel Fuel Density = 6.5 lb/gal

6%

Criteria Pollutant	Emission Factor (lb/ton blasting		Emission Rate ²			
	agent) ¹	(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					
Citeria i oliutant	(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		

	Emission	Emission Rate ⁶		
Pollutant	Factor	(lb/day)	(ton/yr)	
	(lb/MMBtu)⁵	(ID/ day)	(tony yr)	
CO ₂	162.712	41454.0	15545.3	
N ₂ O	0.00132	0.34	0.13	
CH ₄	0.0066	1.68	0.63	
CO₂e			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).
- SO₂ emissions are based on a diesel sulfur content of 15 ppm assuming complete conversion to SO₂.
- 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.

$$E\left(\frac{lb}{year}\right) = EF\left(\frac{lb}{tonof\ blasting\ agent}\right) \times \left(blasting\ agent\frac{ton}{year}\right) = EF\left(\frac{lb}{tonof\ blasting\ agent}\right) \times \left(blasting\ agent\frac{ton}{year}\right) = \frac{1.9-1.}{1.9-1}$$

- 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 PM₁₀ emission factor for truck unloading of fragmented stone in Table 11.19.2-2. This table provides a PM₁₀ 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	Emiss	sion 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}/PM₁₀ Emission Factor ratio¹ 0.15 TSP/PM₁₀ 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]
nnual Operat	ing Hours	8,760	[hrs/year]
andling Insta	nces ³	3	
andling Insta	nces (Gettyshurg) 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.

		Emission Rates				
Parameter	Mining Area	[lb/day]	[ton/year]	[lb/hr]		
PM _{2.5}		0.00	0.00	0.000		
PM ₁₀	Copper Leach	0.00	0.00	0.00		
TSP		0.00	0.00	0.00		
PM _{2.5}		0.00	0.00	0.000		
PM ₁₀	Little Rock	0.00	0.00	0.00		
TSP		0.00	0.00	0.00		
PM _{2.5}		0.00	0.00	0.000		
PM ₁₀	Copper Mountain	0.00	0.00	0.00		
TSP		0.00	0.00	0.00		
PM _{2.5}		0.00	0.00	0.000		
PM ₁₀	Valencia	0.00	0.00	0.00		
TSP		0.00	0.00	0.00		
PM _{2.5}		1.44	0.26	0.060		
PM ₁₀	Mohawk	9.60	1.75	0.40		
TSP		25.08	4.58	1.05		
PM _{2.5}		0.48	0.088	0.020		
PM ₁₀	Gettysburg	3.20	0.58	0.13		
TSP		8.36	1.53	0.35		
PM _{2.5}		1.92	0.35	0.08		
PM ₁₀	Total	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 $_2$ s. A PM $_{10}$  emission factor is provided in Table 11.19.2-2. A PM $_{25}$  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

	Uncontrolled	Equat		Maximum		
	Emission Factor ¹	k ⁽²⁾	U ^{2,3}	M ⁴	Handling Steps	Mine Throughput
Pollutant	lb/ton		mph	%		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		

	Maximum	Weighted	TS	P	PI	M10	PM	2.5
Production Rate	ktpd	ktpd	lb/hr	tpy	lb/hr	tpy	lb/hr	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.

# AP-42, Chapter 13.2.4, Aggregate Handling and Storage Piles, Equation 1 Aggregate Handling Emission Factor Equation

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

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.

Apr-20

### **GASOLINE DISPENSING FACILITY VOC EMISSIONS**

Emission Ac		tual Usage Rate		Emission Tank Factor Working E		Tank Breathing	Breathing   Total Tank   Losses		Total VOC Emissions Loading + Tanks			
Unit	gals/day (ave.)	gals/month	gals/yr ⁽¹⁾	(lbs/10 ³ gal)	Losses (lb/yr)	Losses (lb/yr)	(lb/hr)	Losses (tons/yr)	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) =  $12.46 \times SPM/T$ 

### 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,  $^{\circ}$ R (80 $^{\circ}$ F + 460 = 540 $^{\circ}$ 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**

				HAP Emissions										
	VOC Emi	ssions ⁽¹⁾	Benzene		Hexane		Toluene		Xylene		Ethylbenzene		Total	HAP
Unit	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		HAP Mass fraction (2)										
Content	Benzene	Benzene Hexane Toluene Xylene Ethylbenzene										
Gasoline	0.049	0.040	0.25	0.15	0.030							

- (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. Apr-20

### 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.

			Chemi	cal Concentration	ı [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.

Apr-20

#### 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	ĺ
--------------------------------------	-------	-----------------	------------	--------	-----------------	---

Chemical Product	Percent									
SX-80	90%									
ACORGA M5774	10%									
Component	D cm ² /sec	MW g/gmole	Ci ppm	Ci g/m³	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

 $\overline{\text{DiffF} = (Ci - Ch)} \times D/H$ 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/m³, 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

			Conc	entration 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	()	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

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

Chemical Product	Percent									
Conosol 170ES	90%									
ACORGA M5774	10%									
Component	D	MW	Ci	Ci	Ch	Ch g/m ³	Diff F	Emission Rate	Emission Rate	Emission Rate
- vp	cm ² /sec	g/gmole	ppm	g/m³	ppm	g/iii	$g/m^2-s$	ton/yr-ft ²	lb/hr	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

 $\overline{\text{DiffF} = (Ci - Ch) \times D/H}$ 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/m³, 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

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

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

Chemical Product	Percent									
Conosol 170ES	95%									
ACORGA M5910	5%									
Component	D cm ² /sec	MW g/gmole	Ci ppm	Ci g/m³	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

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

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

Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
Conosol 170ES	50	50	50	50	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

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

Chemical Product	Percent									
SX-80	90%									
ACORGA M5910	10%									
	D	MW	Ci	Ci	Ch		Diff F	Emission	Emission	Emission
Component	cm ² /sec	g/gmole			_	Ch g/m ³	~/ ² ~	Rate	Rate	Rate
	cm /sec	g/ginoie	ppm	g/m³	ppm		g/m -s	ton/yr-ft ²	lb/hr	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

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/m³, 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

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

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

Chemical Product	Percent									
Escaid 110	95%									
ACORGA M5910	5%									
Component	D cm ² /sec	MW g/gmole	Ci ppm	Ci g/m³	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)

 $\rm Ci,\,g/m^3,\,calculated\,from\,ideal\,gas\,law.\,Conservative\,temperature\,of\,25.84\,deg.\,C\,used\,based\,on\,1995\,$  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

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
	7.98	TPY

1.82 lb/hr based on 8,760 hr/yr

### 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/m³	Ch ppm	Ch g/m³	Diff F g/m ² -s	Emission Rate ton/yr-ft ²	Emission Rate Ib/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

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

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

			Con					
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

#### Freeport-McMoRan Tyrone Inc. Feb-20

### 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
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Chemical Product	Percent									
SX-80	90%									
ACORGA M5774	10%									
Component	D cm²/sec	MW g/gmole	Ci ppm	Ci g/m³	Ch ppm	Ch g/m³	Diff F g/m ² -s	Emission Rate ton/yr-ft ²	Emission Rate Ib/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

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/m³, 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

Chemical	Benzene	Toluene	Ethylbenzene	Xylene	1,2,4 - tmb	1,3,5 - tmb	Other	Notes
SX-80	5.4	110	530	690	2100	830	Ο	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

### **ENV-101: Stormwater Pump Engine Emissions**

**Emission Factors** 

*PM:

HC:

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)

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

Source: 2014 Title V Permit Renewal Application

HC = 0.0025 (lb/hp-hr)

SO₂: Source: 2014 Title V Permit Renewal Application

 $SO_2 = 0.0021 \text{ (lb/hp-hr)}$ 

To convert from lb/MMBTU to lb/hp-hr:

* Tyrone uses the same emission factor for PM, PM₁₀, and PM_{2.5}

#### **HAPs Emission factors:**

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

(Emission Factor/1E06 BTU) * (7,000 BTU/ hp-hr) Pollutant **Emission Factors** Benzene 9.33E-04 lb/MMBTU 6.53E-06 lb/hp-hr 2.86E-06 lb/hp-hr Toluene 4.09E-04 lb/MMBTU Xylenes 2.85E-04 lb/MMBTU 2.00E-06 lb/hp-hr 3.91E-05 lb/MMBTU 2.74E-07 lb/hp-hr 1,3-Butadiene 8.26E-06 lb/hp-hr Formaldehyde 1.18E-03 lb/MMBTU 5.37E-06 lb/hp-hr Acetaldehyde 7.67E-04 lb/MMBTU 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:** 

Diesel						
Stationary Stormwater Pump Engine (Caterpillar)						
1						
	8,760					
	137,000					
	6					
	0.82					
	125					
	Diesel Combu	stion				
Emission	<b>Emission Rate</b>	Emission Rate				
Factor [lb/hr]	[lb/yr]	[ton/yr]				
3.875	33,945	16.973				
0.838	7,337	3.6683				
0.275	2,409	1.205				
0.313	2,738	1.369				
0.256	2,245	1.122				
8.16E-04	7.15	3.58E-03				
3.58E-04	3.13	1.57E-03				
2.49E-04	2.18	1.09E-03				
3.42E-05	0.30	1.50E-04				
1.03E-03	9.04	4.52E-03				
6.71E-04	5.88	2.94E-03				
8.09E-05	0.71	3.55E-04				
7.42E-05	0.65	3.25E-04				
1.47E-04	1.29	6.44E-04				
3.46E-03	30.34	1.52E-02				
134.03	1174104.00	587.05				
0.0054	744.81	0.37				
0.0011	0.007	3.26E-06				
	Emission Factor [lb/hr] 3.875 0.313 0.256  8.16E-04 3.58E-04 2.49E-05 1.03E-03 6.71E-04 8.09E-05 7.42E-05 1.47E-04 3.46E-03	Stationary Stormwater Pump   1   8,760   137,000   6   0.82   125				

^{1.} Actual annual hours of operation.

### **ENV-111: Stormwater Pump Engine Emissions**

**Emission Factors** 

HC:

NOx: Source: 2014 Title V Permit Renewal Application

> NOx =0.0310 (lb/hp-hr)

Source: 2014 Title V Permit Renewal Application CO:

CO =0.0067 (lb/hp-hr)

*PM: Source: 2014 Title V Permit Renewal Application

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

HC = 0.0025 (lb/hp-hr)

SO₂: Source: 2014 Title V Permit Renewal Application

> $SO_2 =$ 0.0021 (lb/hp-hr)

* Tyrone uses the same emission factor for PM, PM₁₀, and PM_{2.5}

#### **HAPs Emission factors:**

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

To convert from lb/MMBTU to lb/hp-hr:

(Emission Factor/1E06 BTU) * (7,000 BTU/ hp-hr)

Pollutant **Emission Factors** 9.33E-04 lb/MMBTU 6.53E-06 lb/hp-hr Benzene Toluene 4.09E-04 lb/MMBTU 2.86E-06 lb/hp-hr 2.85E-04 lb/MMBTU 2.00E-06 lb/hp-hr Xylenes 1,3-Butadiene 3.91E-05 lb/MMBTU 2.74E-07 lb/hp-hr 8.26E-06 lb/hp-hr Formaldehyde 1.18E-03 lb/MMBTU Acetaldehyde 7.67E-04 lb/MMBTU 5.37E-06 lb/hp-hr 6.48E-07 lb/hp-hr Acrolein 9.25E-05 lb/MMBTU Naphthalene 8.48E-05 lb/MMBTU 5.94E-07 lb/hp-hr 1.18E-06 lb/hp-hr Total Polycyclic Aromatic Hydrocarbons (PAHs) 1.68E-04 lb/MMBTU 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 40 CFR 98 Subpart C kg/MMBtu  $N_2O$ 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		8,76	0				
Fuel Heat Value (Btu/gal) (AP-42)		137,0	00				
Fuel Usage Rate (gal/hr)		6					
Heat Rate (MMBtu/hr)		0.82	2				
Capacity [hp]		125					
		iesel Combusti	on				
Criteria Pollutants	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		1					
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				

^{1.} Actual annual hours of operation.

#### **ENV-122: Stormwater Pump Engine Emissions**

**Emission Factors** 

*PM:

HC:

SO₂:

Source: 2014 Title V Permit Renewal Application NOx:

> 0.0310 (lb/hp-hr) NOx =

CO: Source: 2014 Title V Permit Renewal Application

0.0067 (lb/hp-hr)

Source: 2014 Title V Permit Renewal Application

PM =0.0022 (lb/hp-hr)

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

Source: 2014 Title V Permit Renewal Application

 $SO_2 =$ 0.0021 (lb/hp-hr)

#### **HAPs Emission factors:**

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

To convert from lb/MMBTU to lb/hp-hr: (Emission Factor/1E06 BTU) * (7,000 BTU/hp-hr)

Pollutant **Emission Factors** Benzene 9.33E-04 lb/MMBTU 6.53E-06 lb/hp-hr 4.09E-04 lb/MMBTU 2.86E-06 lb/hp-hr Toluene Xylenes 2.85E-04 lb/MMBTU 2.00E-06 lb/hp-hr 2.74E-07 lb/hp-hr 1,3-Butadiene 3.91E-05 lb/MMBTU Formaldehyde 1.18E-03 lb/MMBTU 8.26E-06 lb/hp-hr 7.67E-04 lb/MMBTU 5.37E-06 lb/hp-hr Acetaldehyde 9.25E-05 lb/MMBTU 6.48E-07 lb/hp-hr Acrolein 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:

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

Fuel	Diesel						
Equipment	Stationary Stormwater Pump Engine (Caterpillar)						
Number of Units	1						
Hours of Operation [hr/year] ¹		8,7	60				
Fuel Heat Value (Btu/gal) (AP-42)		137,	000				
Fuel Usage Rate (gal/hr)		$\epsilon$	)				
Heat Rate (MMBtu/hr)		0.8					
Capacity [hp]		12					
		esel Combusti	on				
Criteria Pollutants	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				

^{*} Tyrone uses the same emission factor for PM, PM₁₀, and PM_{2.5}

^{1.} Actual annual hours of operation.

## ENV-123 Diesel Pump

Unit Numbers:	ENV-123					
Source description:	Diesel Powere	ed Pump				
Engine Horsepower and RPM						
Sea level hp:	225	hp	Mfg data			
	3	%	Per 1,000 ft ab	ove 4,000 f	t	
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	00,20.	gy.	Gaisaiatsa			
	NOx ¹	CO1	PM ^{1,2}	SO ₂ 3		
	0.30	2.61	0.015	- 4	g/hp-hr	_ Tier 4 Final Standards
	0.50	2.01	0.013	0.00205	lb/hp-hr	AP-42 Table 3.3-1
	0.14	1.22	0.0070	0.00203	lb/hr	Hourly emission rate
	0.14	5.36	0.031	1.91		•
	0.61	5.36	0.031	1.91	tpy	Annual emission rate
	VOC1	Total HAPs ⁴	Formaldehyde	<b>!</b>		
	0.14		•	g/hp-hr	Tier 4 Final Stan	dards
	<del></del>	3.42E-03	1.18E-03	lb/MMBtu		
	0.066	0.0051	0.0018	lb/hr	Hourly emission	rate
	0.29	0.022	0.0077	tpy	Annual emission	
	CO ₂	CH₄	N₂O	CO ₂ e	_	
	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
		0.010	0.0020	243.77	lb/hr	
	242.93	0.010				

 $^{^1}$  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. Feb-20

#### 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}	Units	PTE (lbs/hr)	Emissions (lbs/yr)	Emissions (tpy)
						(EF/CF)			(1 boiler)	(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

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.

²Sulfur content = 0.18 grains/ 100ft³ 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 SQ = 0.1 sulfur content (AP-42 Table 1.5-1)

# OP-4 Diesel Pump

Unit Numbers:	OP-4					
Source description:	Diesel Powere	ed Pump				
Engine Horsepower and RPM						
Cooleyel by	175	h.m.	Mfm data			
Sea level hp:	175	hp	Mfg data			
E	3	%	Per 1,000 ft at	ove 4,000 t	t	
Elevation	5801	ft				
Derated hp:	165.54	hp				
Derated kW: Conversion Factor	123.45 0.0022	kW g/lb				
Conversion Factor	2000	lb/ton				
Conversion Factor	1.34	hp/kW				
Annual Hours of Operation	8760	hr	A.D. 40.0 "	0.0		
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	CO1	PM ^{1,2}	SO ₂ ³		
				SO ₂		
	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
	VOC1	Total HAPs	Formaldehyde			
	0.15	TOTALLIALS	Formalderiyue	_	Tier III Standards	_
	0.15	3.42E-03	1.18E-03	g/hp-hr lb/MMBtu	AP-42	S
	0.054	0.0040	0.0014	lb/hr	Hourly emission	rato
	0.24	0.0040	0.0060	tpy	Annual emission	
	0.24	0.017	0.0000	гру	Alliuai ellissioli	Tate
	CO2	CH₄	N ₂ O	CO ₂ e		
	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.

# OP-7 Diesel Pump

Unit Numbers:	OP-7					
Source description:	Diesel Powere	ed Pump				
Engine Horsepower and RPM						
Sea level hp:	168	hp	Mfg data			
Sea level lip.	3	%	Per 1,000 ft al	2010 4 000 9	F4	
Elevation	5801	ft	rei 1,000 it ai	JUVE 4,000 I	ı	
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	1 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		0 ,				
	NOx ¹	CO1	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
	\		1 –			
	VOC ¹	Total HAPs	Formaldehyde	_		
	0.15			g/hp-hr	Tier III Standard	S
		3.42E-03	1.18E-03	lb/MMBtu	AP-42	
	0.052 0.23	0.0038 0.017	0.0013 0.0057	lb/hr	Hourly emission	
	0.23	0.017	0.0057	tpy	Annual emission	rate
	CO2	CH₄	N ₂ O	CO ₂ e		
	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.

# EMP-1 Diesel Pump

Unit Numbers:	EMP-1					
Source description:	Diesel Powere	ed Pump				
Engine Horsepower and RPM						
Sea level hp:	190	hp	Mfg data			
	3	%	Per 1,000 ft a	bove 4,000 f	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	n 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		<u></u>
	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	Formaldehyd	e		
	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	CH₄	N ₂ O	CO ₂ e		
	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.

# EMP-2 Diesel Pump

Unit Numbers:	EMP-2					
Source description:	Diesel Powere	ed Pump				
·		·				
Engine Horsepower and RPM						
Sea level hp:	200	hp	Mfg data			
	3	%	Per 1,000 ft ab	ove 4,000 f	t	
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	, , , ,	3 .,				
	NOx ¹	CO1	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
	voo1	T-4-111AD-4	Es anno al delevede			
	VOC1	Total HAPS	Formaldehyde	-		
	0.25	2.425.02	4.405.00	g/hp-hr	Tier II Standards	
	0.103	3.42E-03 <b>0.0045</b>	1.18E-03 <b>0.0016</b>	lb/MMBtu lb/hr	AP-42	wat a
	0.45	0.020	0.0018	tpy	Hourly emission Annual emission	
	0.43	0.020	0.0000	ιρу	Allitual ettiissioti	iale
	CO2	CH₄	N ₂ O	CO ₂ e		
	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.

# ENV-117 Diesel Pump

Unit Numbers:	ENV-117					
Source description:	Diesel Powere	ed Pump				
Engine Horsepower and RPM						
Sea level hp:	350	hp	Mfg data			
	3	%	Per 1,000 ft al	oove 4,000 f	t	
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	,	37				
	NOx ¹	CO1	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
	VOC1	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	
	CO ₂	СН₄	N ₂ O	CO₂e		
	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 <b>1655.19</b>	0.015 <b>6.71E-02</b>	0.0031 <b>1.34E-02</b>	379.19 <b>1660.87</b>	lb/hr	

 $^{^1}$  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.

## 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**

NOx'	CO	PM ⁻	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
					, umagn cimecian rate
 CO ₂	CH₄	N ₂ O	CO ₂ e	_	
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

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					

 $^{^{2}}$  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

## 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**

Heat Rate

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

MMBtu/hr

Calculated

1.70

## **Emission Calculations**

NOx 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
	-				
VOC⁴	Total HAPs⁵	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	CH₄	N ₂ O	CO₂e		
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

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				

 $^{^{2}}$  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

#### Freeport-McMoRan Tyrone Inc. Feb-20

## 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

Per 1,000 ft above 4,000 ft 3.0 %

Elevation 5,801.0 ft 236.49 hp Derated hp: Conversion Factor 1.34 hp/kW 0.0022 g/lb Conversion Factor 2,000.00 lb/ton Conversion Factor Annual Hours of Operation 8,760.00 hr Fuel Rate 43.08 L/hr

Estimated

Fuel Rate 11.38 gal/hr

**Fuel Consumption** 

AP-42 Fuel heat value: 137,000.0 Btu/gal **Heat Rate** 1.56 MMBtu/hr Calculated

#### **Emission Calculations**

	NOx'	CO	PM²	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
	4	<b>-</b> 5	<b>-</b> .			
_	VOC ⁴	Total HAPs⁵	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	CH₄	N ₂ O	CO₂e		
	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

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				

 $^{^{2}}$  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

 $^{^{\}rm 4}$  Emission factor for VOC is assumed to be 5% of the EPA Tier 3 emission factor for NOx + NMHC

## 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

| 212.04 hp/kW | 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**

NOx 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
4	=				
 VOC⁴	Total HAPs⁵	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	CH₄	N₂O	CO ₂ e	_	
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

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				

 $^{^{2}}$  It is assumed that TSP = PM₁₀ = 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

# Freeport-McMoRan Tyrone Inc. Feb-20

## 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**

NOx ¹	СО	$PM^2$	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
VOC⁴	Total HAPs⁵	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
CO2	CH₄	N ₂ O	CO₂e		
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	7 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

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					

 $^{^{2}}$  It is assumed that TSP = PM₁₀ = 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

## 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

Nordberg Engines U						
Hours of Operation	3000	Maximum	annual hours	of operation	on for all engi	ines
Horsepower	3090	hp				
Fuel Usage	7,500	Btu/hp-hr	For dual fire	e scenario,	from US Dep	partment of Interior
Heat Rate	23.2	MMBtu/hr				
Number of engines	10					
Total Emissions						
Diesel						
	CO ₂	CH₄	N ₂ O	CO ₂ e	_	
	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	CH₄	N ₂ O	CO ₂ e		
	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						
	$CO_2$	CH₄	$N_2O$	CO ₂ e		
	5668.15	0.23	0.05	5687.60	tpy	

## Diesel Cold-Start Engine Unit CE-1

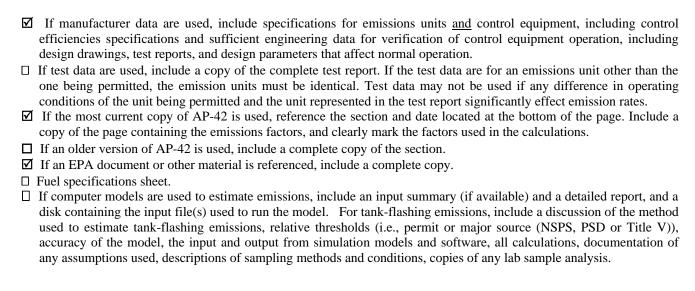
Hours of Operation	500	Maximum a	annual hours	of operation	on	
Horsepower	1000	hp				
Fuel Usage	158	gal/hr				
Fuel Heating Value	137000	Btu/gal				
Heat Rate	21.6	MMBtu/hr				
	CO ₂	CH₄	N ₂ O	CO ₂ e	_	
	73.96	0.003	0.0006		kg/MMBtu	40 CFR 98 Subpart C
	163.1	0.0066	0.0013		lb/MMBtu	
	882.37	0.036	0.0072	885.39	tpy	

	CO ₂	CH₄	$N_2O$	
GWP	1	25	298	Table A-1 of 40 CFR 98 Subpart A

## **Section 7**

## **Information Used To Determine Emissions**

<u>Information Used to Determine Emissions</u> shall include the following:



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)

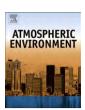
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## $NO_x$ emissions from blasting operations in open-cut coal mining

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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  $0.9 \, \mathrm{kt} \, \mathrm{t}^{-1}$  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.

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#### 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 (NO₂) 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 ( $N_2$ ).

$$3NH_4NO_3 + CH_2 \rightarrow 3N_2 + CO_2 + 7H_2O$$
 (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.

$$2NH_4NO_3 + CH_2 \rightarrow 2N_2 + CO + 5H_2O$$
 (2)

$$5NH_4NO_3 + CH_2 \rightarrow 4N_2 + 2NO + CO_2 + 7H_2O$$
 (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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$$2NO + O_2 \rightarrow 2NO_2 \tag{4}$$

Often in practice, large quantities of NO₂ 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 SO₂ and NO₂ from industrial plants but found a niche application in the measurement of SO₂ 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 SO₂ 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 NO₂. The reference spectrum was required in order to determine the increase in concentration of NO₂ above ambient levels in the blast plumes.

The plume resulting from each blast was tracked with the spectrometer until the NO₂ 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.

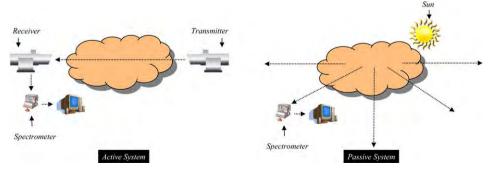


Fig. 1. Schematic diagram of DOAS systems operating in both active and passive modes.

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 NO₂ 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  $(\sigma_v)$  and vertical  $(\sigma_z)$  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

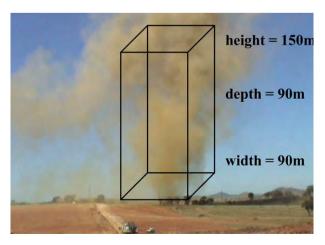


Fig. 2. Blast plume with estimated dimensions.

assumed to be 100 m  $\times$  200 m based upon sizes commonly observed during the field measurements. The area was subdivided into 10 m  $\times$  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).

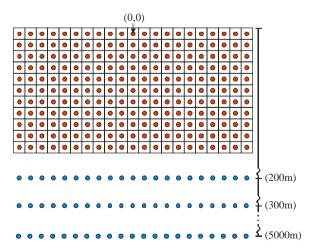


Fig. 3. Emission grid and receptor array setup.

$$\overline{C} = \frac{1}{N} \sum_{i=1}^{N} C_i^* \tag{6}$$

$$\sigma_{\overline{C}} = \frac{1}{N} \sum_{j=1}^{N} \left( C_j^* - \overline{C} \right)^2 \tag{7}$$

$$C_{\max} = \max_{k=1}^{N} |\overline{C}_k| \tag{8}$$

A dosage expressed in ppms 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  $C' \neq 0$ .

$$C_{\text{dose}} = \sum_{k=1}^{N} (\overline{C}_k) dt$$
 (9)

The relative variation for the dosage is provided by similarly treating the ensemble standard deviation.

$$\sigma_{\mathsf{dose}} = \sum_{k=1}^{N} (\sigma_{\overline{C}k}) \mathsf{d}t \tag{10}$$

#### 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

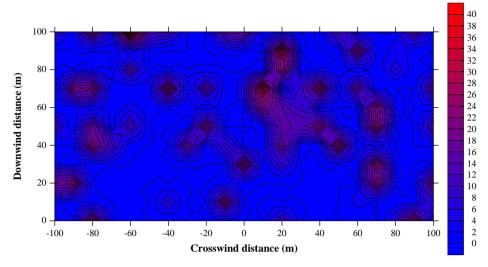


Fig. 4. Example of emission grid for 1 of the 120 scenarios modelled (the scale on the right hand side refers to NO₂ concentration in ppm).

a corresponding increase in plume volume by a factor of two. This expansion of the plume corresponds to a decrease in NO₂ 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 NO₂ 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 NO₂ 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  $200~\text{m}\times100~\text{m}$  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 NO₂ 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

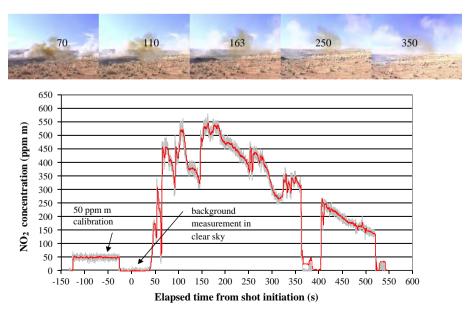


Fig. 5. Typical NO₂ spectrum demonstrating plume colour characteristics relative to concentration level.

**Table 1**Through plume measurement results

Date	Total ANFO	Peak NO ₂	Plume volume	Mass of	Emission flux (kg t ⁻¹ ANFO)		
	charge (t)	Conc (ppm)	$(m^3\times 10^{-6})$	$NO_2$ (kg)	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 NO₂ 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 =	$0.5  \mathrm{m  s^{-1}}$												
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 =	$3 \text{ m s}^{-1}$												
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– $5.3 \text{ kg t}^{-1}$  ANFO. The average flux level for all the blast plumes measured was  $0.9 \text{ kg t}^{-1}$ . This figure is considerably lower than the current NPI emission factor which is  $8 \text{ kg t}^{-1}$ .

#### 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

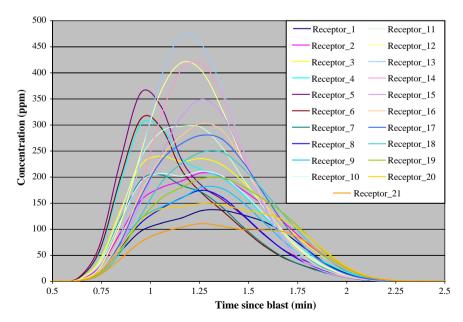


Fig. 6. Calculated NO₂ concentration profiles 200 m from source.

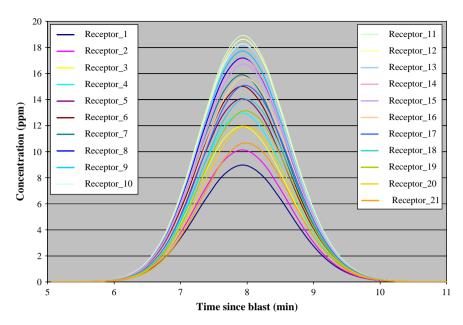


Fig. 7. Calculated NO₂ concentration profiles 1 km from source.

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 NO₂ in plumes from blasting were made at two open-cut mines. The results showed that NO₂ 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

We gratefully acknowledge the financial support of the Australian Coal Association Research Program (ACARP) and the staff at the Hunter Valley mine sites.

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## FACTORS AFFECTING ANFO FUMES PRODUCTION

James H. Rowland III and Richard Mainiero

#### **ABSTRACT**

For many years there have been small scale tests available for evaluating the toxic fumes production by capsensitive 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  $23^{rd}$  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 ft³ (274 m³). 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 ft³/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 length¹. 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. Vacutainer¹ 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 Santis². 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.

¹Reference 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**

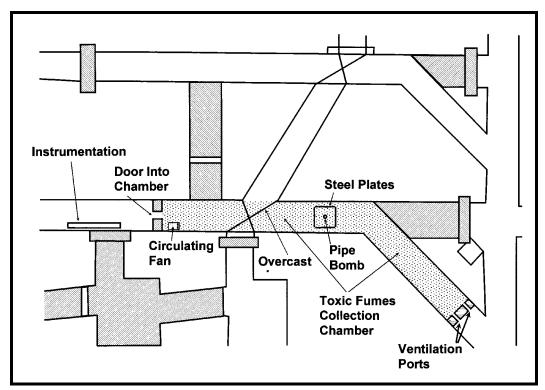
Several factors that may effect the fumes production of ANFO have been investigated. Probably the easiest to control is the fuel oil content. To minimize toxic fumes production, the ANFO should be mixed at 6 pct fuel oil. Deviating from the 6 pct will lead to excessive fumes. Water contamination may 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, and ammonia.

In the case of nitrogen oxides and nitrogen dioxide the fumes production will increase, while the ammonia fumes production will decrease.

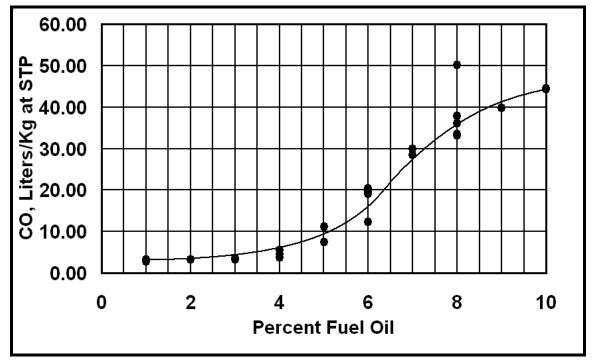
Adding aluminum or rock dust to ANFO does not affect the fumes production of carbon monoxide. The addition of aluminum does not have a significant affect on nitrogen oxides and nitrogen dioxide production, but the addition of rock dust leads to an increased production of nitrogen oxides. Additionally, 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.

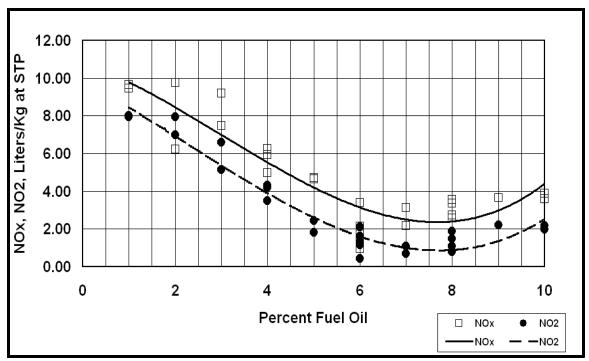
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**Figure 1**. Research was conducted in a chamber created in the underground mine at the Pittsburgh Research Lab.



**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.

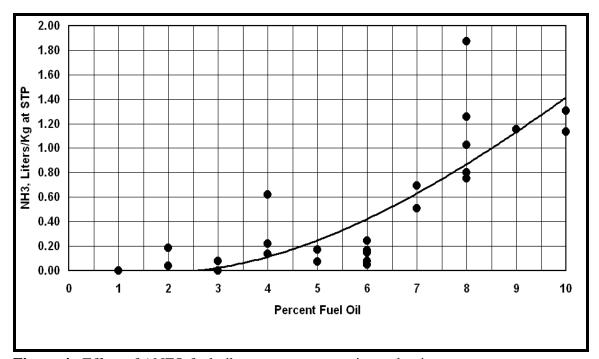
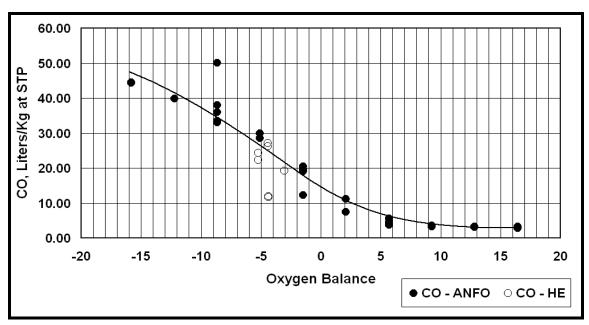
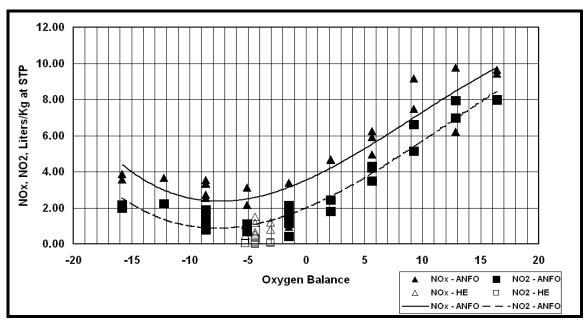


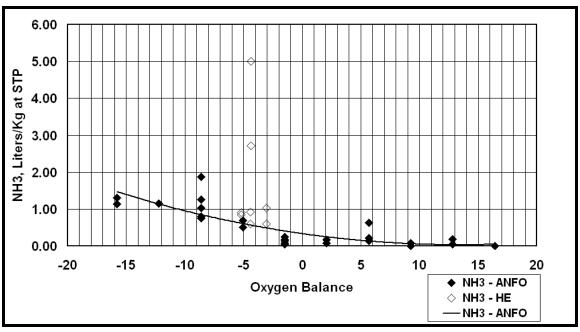
Figure 4. Effect of ANFO fuel oil content on ammonia production.



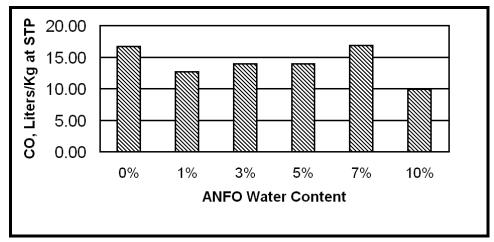
**Figure 5.** Effect of Oxygen Balance on carbon monoxide production for 94/6 ANFO and high explosives (cap-sensitive explosives).



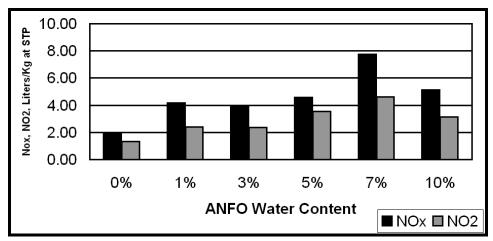
**Figure 6.** Effect of Oxygen Balance on nitrogen oxides and nitrogen dioxide production for 94/6 ANFO and high explosives (cap-sensitive explosives).



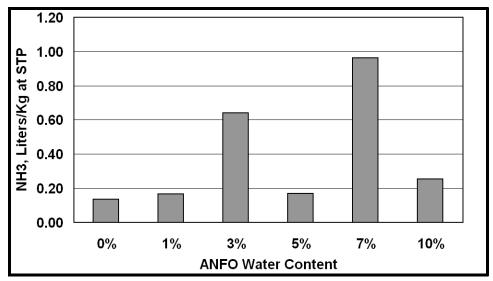
**Figure 7.** Effect of Oxygen Balance on ammonia production for 94/6 ANFO and high explosives (cap-sensitive explosives).



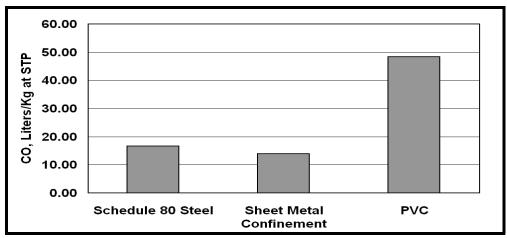
**Figure 8.** Effect of ANFO water content on carbon monoxide production for a 94/6 mix.



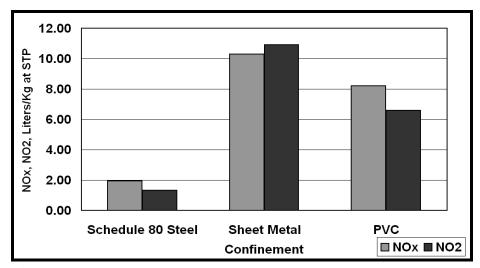
**Figure 9.** Effect of 94/6 ANFO water content on nitrogen oxides and nitrogen dioxide production.



**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.

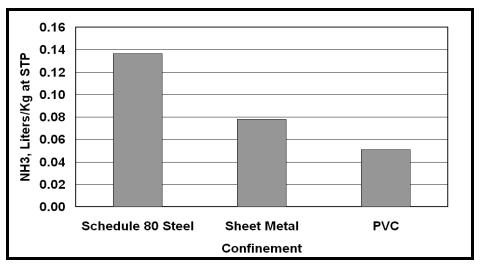
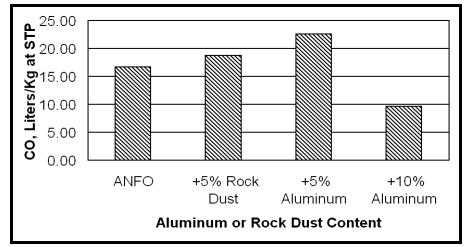
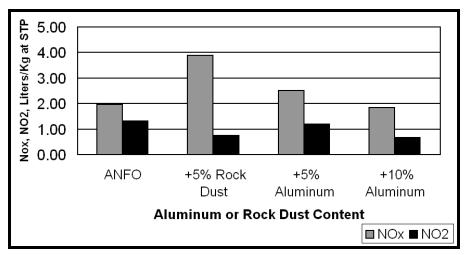


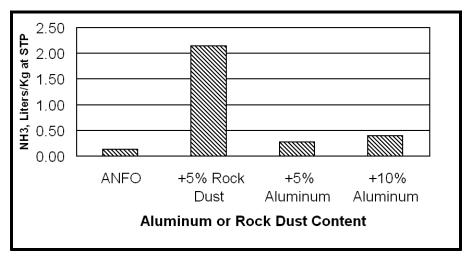
Figure 13. Effect of 94/6 ANFO confinement on ammonia production.



**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

		Emissions By Particle Size Range (Aerodynamic Diameter) ^{b,c}					
		Emission Factor Equations		Scali	ing Factors		EMISSION FACTOR
Operation	Material	TSP ≤30 µm	≤15 µm	$\leq\!10\;\mu m^d$	$\leq\!2.5~\mu m/TSP^e$	Units	RATING
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	$\frac{78.4 \text{ (s)}^{1.2}}{\text{(M)}^{1.3}}$	$\frac{18.6 \text{ (s)}^{1.5}}{\text{(M)}^{1.4}}$	0.75	0.022	lb/hr	CCDD
	Overburden	$\frac{5.7 \text{ (s)}^{1.2}}{\text{(M)}^{1.3}}$	$\frac{1.0 \text{ (s)}^{1.5}}{\text{(M)}^{1.4}}$	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/yd³	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	lb (acre)(hr)	C'

^a Reference 1, except as noted. VMT = vehicle miles traveled. ND = no data. Quality ratings coded where "Q, X, Y, Z" are ratings for  $\leq$ 30  $\mu$ m,  $\leq$ 15  $\mu$ m,  $\leq$ 10  $\mu$ m, and  $\leq$ 2.5  $\mu$ m, respectively. See also note below.

 $A = \text{horizontal area (ft}^2)$ , with blasting depth  $\leq 70$  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

^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). "Symbols for equations:

# Bloomberg BNA

# Environment & Safety Resource Center™

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 x 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 x 10 ⁻³	274.32
Coke Oven Gas	0.599 x 10 ⁻³	46.85
Propane Gas	2.516 x 10 ⁻³	61.46
Fuel Gas ⁴	1.388 x 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 x 10 ⁻³	52.07
Other Biomass Gases	0.655 x 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  $^{\circ}\mathrm{F}$  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.

[78 FR page 71950, Nov. 29, 2013]

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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.

## Bloomberg BNA

## Environment & Safety Resource Center™

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 ₂ O emission factor (kg N ₂ O/mmBtu)		
Coal and Coke (All fuel types in Table C-1)	$1.1 \times 10^{-02}$	$1.6 \times 10^{-03}$		
Natural Gas	$1.0 \times 10^{-03}$	$1.0 \times 10^{-04}$		
Petroleum (All fuel types in Table C-1)	$3.0 \times 10^{-03}$	6.0 x 10 ⁻⁰⁴		
Fuel Gas	$3.0 \times 10^{-03}$	$6.0 \times 10^{-04}$		
Municipal Solid Waste	$3.2 \times 10^{-02}$	$4.2 \times 10^{-03}$		
Tires	$3.2 \times 10^{-02}$	$4.2 \times 10^{-03}$		
Blast Furnace Gas	2.2 × 10 ⁻⁰⁵	$1.0 \times 10^{-04}$		
Coke Oven Gas	$4.8 \times 10^{-04}$	$1.0 \times 10^{-04}$		
Biomass Fuels—Solid (All fuel types in Table C-1, except wood and wood residuals)	3.2 x 10 ⁻⁰²	4.2 x 10 ⁻⁰³		
Wood and wood residuals	7.2 x 10 ⁻⁰³	3.6 x 10 ⁻⁰³		
Biomass Fuels— Gaseous (All fuel types in Table C- 1)	3.2 x 10 ⁻⁰³	6.3 x 10 ⁻⁰⁴		
Biomass Fuels—Liquid (All fuel types in Table C-1)	$1.1 \times 10^{-03}$	$1.1 \times 10^{-04}$		

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 CH₄/mmBtu.

[75 FR page 79154, Dec. 17, 2010; 78 FR page 71952, Nov. 29, 2013]

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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		$\mathrm{ND}^{\mathrm{n}}$		ND ⁿ	
Primary Crushing (controlled) (SCC 3-05-020-01)	ND		$\mathrm{ND}^{\mathrm{n}}$		$ND^n$	
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)	$0.0054^{\rm d}$	Е	0.0024°	С	$ND^n$	
Tertiary Crushing (controlled) (SCC 3-05-020-03)	0.0012 ^d	Е	0.00054 ^p	С	0.00010 ^q	Е
Fines Crushing (SCC 3-05-020-05)	0.0390 ^e	Е	0.0150 ^e	Е	ND	
Fines Crushing (controlled) (SCC 3-05-020-05)	$0.0030^{\rm f}$	Е	0.0012 ^f	Е	0.000070 ^q	Е
Screening (SCC 3-05-020-02, 03)	0.025°	Е	$0.0087^{l}$	С	ND	
Screening (controlled) (SCC 3-05-020-02, 03)	0.0022 ^d	Е	0.00074 ^m	С	0.000050 ^q	Е
Fines Screening (SCC 3-05-020-21)	$0.30^{g}$	Е	0.072 ^g	Е	ND	
Fines Screening (controlled) (SCC 3-05-020-21)	0.0036 ^g	Е	0.0022 ^g	Е	ND	
Conveyor Transfer Point (SCC 3-05-020-06)	0.0030 ^h	Е	0.00110 ^h	D	ND	
Conveyor Transfer Point (controlled) (SCC 3-05-020-06)	0.00014 ⁱ	Е	4.6 x 10 ⁻⁵ⁱ	D	1.3 x 10 ^{-5q}	Е
Wet Drilling - Unfragmented Stone (SCC 3-05-020-10)	ND		8.0 x 10 ^{-5j}	Е	ND	
Truck Unloading -Fragmented Stone (SCC 3-05-020-31)	ND		1.6 x 10 ^{-5j}	Е	ND	
Truck Loading - Conveyor, crushed stone (SCC 3-05-020-32)	ND		0.00010 ^k	Е	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 material²⁵. 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 Parameters¹⁻⁶

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. 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

	Road Use Or	Plant	No. Of	Silt Content (%)		
Industry	Surface Material	Sites	Samples	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	

^aReferences 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:

$$E = k (s/12)^a (W/3)^b$$
 (1a)

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, emissions may be estimated from the following:

$$E = \frac{k (s/12)^{a} (S/30)^{d}}{(M/0.5)^{c}} - C$$
 (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:

$$1 \text{ lb/VMT} = 281.9 \text{ g/VKT}$$

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

	Industria	Industrial Roads (Equation 1a)			Public Roads (Equation 1b)		
Constant	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	
ь	0.45	0.45	0.45	ı	ı	-	
С	ı	ı	ı	0.2	0.2	0.3	
d	ı		-	0.5	0.5	0.3	
Quality Rating	В	В	В	В	В	В	

^{*}Assumed equivalent to total suspended particulate matter (TSP)

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

		Mean Vehicle Weight		Mean Vehicle Speed		Mean	Surface Moisture
Emission Factor	Surface Silt Content, %	Mg	ton	km/hr	mph	No. of Wheels	Content, %
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

[&]quot;-" = not used in the emission factor equation

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
$PM_{2.5}$	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:

$$E_{\text{ext}} = E [(365 - P)/365]$$
 (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 Controls¹⁸⁻²²

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. <u>Surface improvement</u>, by measures such as (a) paving or (b) adding gravel or slag to a dirt road; and
  - 3. <u>Surface treatment</u>, 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.

<u>Vehicle restrictions</u>. 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.

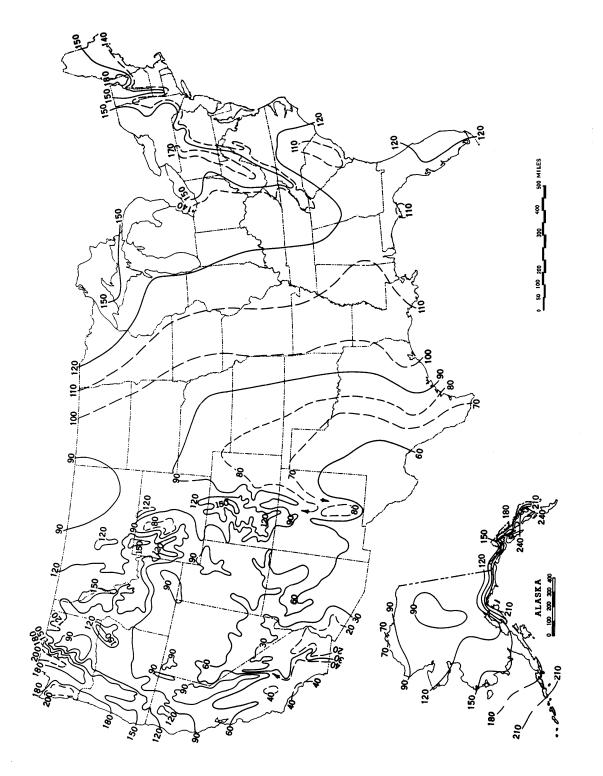


Figure 13.2.2-1. Mean number of days with 0.01 inch or more of precipitation in United States.



# New Mexico ENVIRONMENT DEPARTMENT

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CABINET SECRETARY-DESIGATE

JC BORREGO DEPUTY SECRETARY

# 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**

Accepted Default Values for Aggregate Handling, Storage Piles, and Haul Roads Page 2 of 2

Applicants should calculate the particulate matter emissions from unpaved haul roads using the EPA's AP-42 Chapter 13.2.2. <a href="http://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf">http://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0202.pdf</a>

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 <u>may</u> request to apply control measures to reduce the particulate matter emissions from facility haul roads. Applications submitted under Part 73 <u>may not</u> 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 <b>or</b> watering	60%
Base course <b>and</b> watering	80%
Base course and surfactant	90%
Paved <b>and</b> Swept	95%

# **WRAP Fugitive Dust Handbook**



# **Prepared for:**

Western Governors' Association 1515 Cleveland Place, Suite 200 Denver, Colorado 80202

Prepared by:

Countess Environmental 4001 Whitesail Circle Westlake Village, CA 91361 (WGA Contract No. 30204-111)

September 7, 2006

# 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%
r	Apply water	10 – 74%
	Apply dust suppressant	84%
	Pave the surface	>90%
Mineral Products Industry	Cyclone or muliclone	68 –79%
, and the second	Wet scrubber	78 –98%
	Fabric filter	99 – 99.8%
	Electrostatic precipitator	90 – 99.5%
Abrasive Blasting	Water spray	50 - 93%
<u> </u>	Fabric filter	> 95%
Livestock Husbandry	Daily watering of corrals and pens	> 10%
•	Add wood chips or mulch to working pens	> 10%
Wind Erosion	Plant trees or shrubs as a windbreak	25%
(agricultural, open area, and	Create cross-wind ridges	24 – 93%
storage piles)	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  $[\mu m]$  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

			Silt Content (%)		Moist	ure Content	(%)	
	No. Of		No. Of			No. Of		
Industry	Facilities	Material	Samples	Range	Mean	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).

- Educing of aggregate onto storage piles (batch of continuous drop operations).
   Equipment traffic in storage area.
   Wind erosion of pile surfaces and ground areas around piles.
   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

(1)

E = k(0.0016) 
$$\frac{\left(\frac{U}{2.2}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$
 (kg/megagram [Mg])

E = k(0.0032) 
$$\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$
 (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						
$< 30 \ \mu m$ $< 15 \ \mu m$ $< 10 \ \mu m$ $< 5 \ \mu m$ $< 2.5 \ \mu m$						
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					
Cile Comercia	Maintena Contant	Wind S	Speed		
Silt Content (%)	Moisture Content (%)	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 Controls¹²⁻¹³

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

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- 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.
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- 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.
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- 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.

#### 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  $\mathrm{CO}_2$  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.

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 (NH₃) into the flue gas. The NH₃ 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 CO₂ 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

		ne Fuel 01, 2-03-003-01)		Diesel Fuel (SCC 2-02-001-02, 2-03-001-01)				
Pollutant	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)	EMISSION FACTOR RATING			
NO _x	0.011	1.63	0.031	4.41	D			
СО	6.96 E-03 ^d	$0.99^{\rm d}$	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	В			
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	Е			
Refueling	1.08 E-03	0.15	0.00	0.00	Е			

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.

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 CO₂ 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

	Emission Factor (Fuel Input)
Pollutant	(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 $^{\rm a}$ 

	Affecte	ed Parameter
Technology	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

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# 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
		1	2000- 2004	-	10.5	-	1.0	8.0			1,500/2
	kW < 8	2	2005- 2007	1	7.5	-	0.80	8.0		3,000/5	
		4	2008+	-	7.5	-	0.40 °	8.0			
	0 < 1.384	1	2000- 2004	-	9.5	-	0.80	6.6			
	8 ≤ kW < 19	2	2005- 2007	-	7.5	-	0.80	6.6		3,000/5	1,500/2
		4	2008+	-	7.5	-	0.40	6.6		5,000/7 d	
		1	1999- 2003	-	9.5	-	0.80	5.5			3,000/5 °
	19 ≤ kW < 37	2	2004- 2007	-	7.5	-	0.60	5.5			
	- 01	4	2008- 2012	-	7.5	-	0.30	5.5			
			2013+	-	4.7	-	0.03	5.5			
		1	1998- 2003	-	-	9.2	-	-		8,000/10	3,000/5
		2	2004- 2007	-	7.5	-	0.40	5.0			
Federal	37 ≤ kW < 56	3 f	2008- 2011	-	4.7	-	0.40	5.0	20/15/50		
rederai	<b>~</b> 30	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			
		1	1998- 2003	-	-	9.2	-	-			
	50 - 114	2	2004- 2007	-	- 7.5 -	-	0.40	5.0			
	56 ≤ kW < 75	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			
		1	1997- 2002	-	-	9.2	-	-			
	75 < 130	2	2003- 2006	-	6.6	-	0.30	5.0			
	75 ≤ kW < 130	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			

	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
		1	1996- 2002	1.3 ^j	-	9.2	0.54	11.4			
	130 ≤ kW < 225	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			
		1	1996- 2000	1.3 ^j	-	9.2	0.54	11.4			
		2	2001- 2005	-	6.4	-	0.20	3.5			
	225 ≤ kW < 450	3	2006- 2010	-	4.0	-	0.20	3.5			
		4	2011- 2013 ^h	-	4.0	-	0.02	3.5	20/15/50 8,000/10		
			2014+ i	0.19	-	0.40	0.02	3.5			3,000/5
	-	1	1996- 2001	1.3 ^j	-	9.2	0.54	11.4		8,000/10	
Federal		2	2002- 2005	-	6.4	-	0.20	3.5			
	450 ≤ kW < 560	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			
		1	2000- 2005	1.3 ^j	-	9.2	0.54	11.4			
	560 ≤ kW	2	2006- 2010	-	6.4	-	0.20	3.5			
	< 900	4	2011- 2014	0.40	-	3.5	0.10	3.5			
			2015+ i	0.19	-	3.5 k	0.04 1	3.5			
		1	2000- 2005	1.3 ^j	-	9.2	0.54	11.4			
	kW > 900	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 1	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.
- I 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

GDF1 Silver City New Mexico Freeport McMoRan Horizontal Tank Tyrone GDF1 User Identification: City: State: Company: Type of Tank: Description:

Tank Dimensions
Shell Length (ft):
Diameter (ft):
Volume (gallons):
Turnovers: 28.00 11.00 20,000.00 3.17 Net Throughput(gal/yr): Is Tank Heated (y/n): Is Tank Underground (y/n): 63,353.00

Paint Characteristics Shell Color/Shade: Shell Condition Red/Primer

Breather Vent Settings Vacuum Settings (psig): Pressure Settings (psig) -0.03

Meterological Data used in Emissions Calculations: Roswell, New Mexico (Avg Atmospheric Pressure = 12.73 psia)

TANKS 4.0 Report Page 2 of 6

# TANKS 4.0.9d Emissions Report - Detail Format Liquid Contents of Storage Tank

#### GDF1 - Horizontal Tank Silver City, New Mexico

		Da Tem	ily Liquid Su perature (de	urf. eg F)	Liquid Bulk Temp	Vapo	r Pressure	(psia)	Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight.	Fract.	Fract.	Weight	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:	4 004 0500
Vapor Space Volume (cu ft):	1,694.8592
Tank Diameter (ft): Effective Diameter (ft):	11.0000 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	0.0100
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	7.0400
Surface Temperature (psia): Vapor Pressure at Daily Minimum Liquid	7.0490
Surface Temperature (psia):	5.1283
Vapor Pressure at Daily Maximum Liquid	5.1205
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	00.0000
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 Lagrage (Ib):	15 204 2422
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 Emis						
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

GDF2 Silver City New Mexico Freeport McMoRan Horizontal Tank Tyrone GDF2 User Identification: City: State: Company: Type of Tank: Description:

Tank Dimensions
Shell Length (ft):
Diameter (ft):
Volume (gallons):
Turnovers: 12.00 5.33 2,000.00 62,024.00

Net Throughput(gal/yr): Is Tank Heated (y/n): Is Tank Underground (y/n):

Paint Characteristics Shell Color/Shade: Shell Condition Gray/Medium

Breather Vent Settings Vacuum Settings (psig): Pressure Settings (psig) -0.03

Meterological Data used in Emissions Calculations: Roswell, New Mexico (Avg Atmospheric Pressure = 12.73 psia)

TANKS 4.0 Report Page 2 of 6

### TANKS 4.0.9d Emissions Report - Detail Format Liquid Contents of Storage Tank

#### GDF2 - Horizontal Tank Silver City, New Mexico

			ly Liquid Su erature (de		Liquid Bulk Temp	Vapo	r Pressure (	(psia)	Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight.	Fract.	Fract.	Weight	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	00.0000
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	00.0107
(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	0.0800
	4 040 0000
Factor (Btu/sqft day):	1,810.0000
Vapor Space Expansion Factor	0.0455
Vapor Space Expansion Factor:	0.6455 55.9424
Daily Vapor Temperature Range (deg. R):	
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
Marking Lagger (Ib):	637.6481
Working Losses (lb):	
Vapor Molecular Weight (lb/lb-mole):	66.0000
Vapor Pressure at Daily Average Liquid	0.5400
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
Tabella and the	0.047.4.00
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**

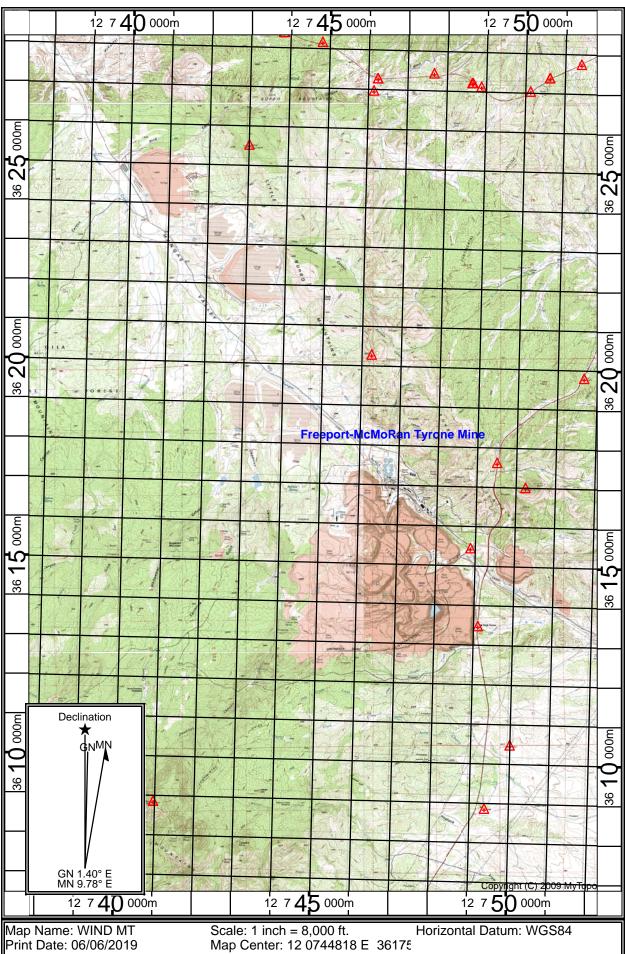
# Map(s)

**<u>A map</u>** 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.



# **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. \( \overline{\sigma} \) 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.  $\square$  A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
- 9. A copy of the <u>classified or legal</u> 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 <u>display</u> 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.

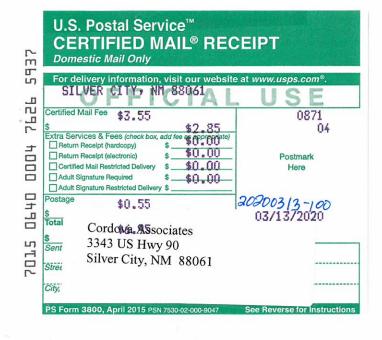
Proof of public notice is attached.

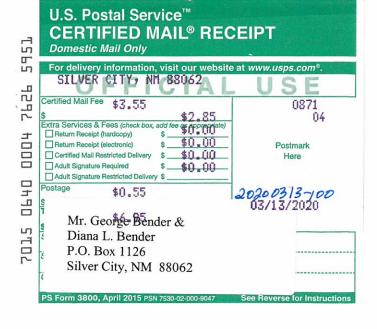


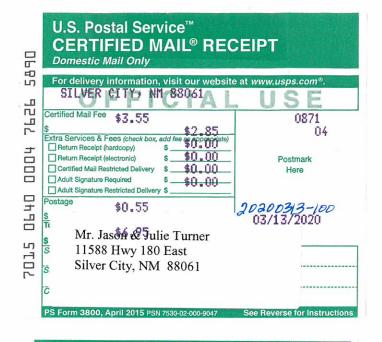




#### U.S. Postal Service™ CERTIFIED MAIL® RECEIPT Domestic Mail Only 급 For delivery information, visit our website at www.usps.com® SILVER CITY NM 88062 ... Certified Mail Fee \$3.55 П 0871 Extra Services & Fees (check box, add fee as portor) 1 04 Return Receipt (hardcopy) Return Receipt (electronic) \$0.00 Postmark Certified Mail Restricted Delivery \$0.00 Here Adult Signature Required \$0.00 Adult Signature Restricted Delivery \$ ostage \$0.55 上 Annie A. Brown Estate Trust Ш c/o James McCauley P.O. Box 1497 Silver City, NM 88062









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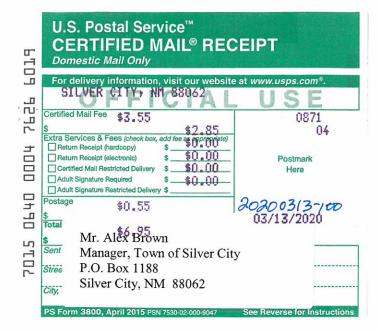
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# **General Posting of Notices – Certification**

I, <u>Erich J. Bower</u>, 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	

<u>President; General Manager, Freeport-McMoRan Tyrone Inc.</u>
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}

# **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	H P
Payment Ty	pe O 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

## 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	To
Payment 7	Type O First	<del></del>
	• 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

# **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

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# Inquiry

A -	0
AS	U

02/15/2018

Payment Type O 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

# **Summary**

R088189 Account Id

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

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### Inquiry

As Of

02/15/2018

Payment Type O First

Full

Total Due \$0.00

### Value

Area Id

Mill Levy

010 NR - 010 NR

20.8240000

Actual

Assessed

MISC N/R LAND - 0081 72,760

24,253

Taxes

\$505.04

## **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**



## Value

Area Id		Mill Levy
01O_NR - 01O_NR	2	20.8240000
	Actual	Assessed
MISC N/R LAND - 0081	3,182	1,061
Taxes		\$22.08

# **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	To
Payment Type	O First	
	Full	

Total Due \$0.00

### Value

Area Id		Mill Levy
01O_NR - 01O_NR	2	20.8240000
	Actual	Assessed
GRAZING - ALL ONE CLASS - 0010	894	298
Taxes		\$6.20

Tax Account Page 1 of 1

### 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 Ty	ype O First	
	<ul><li>Full</li></ul>	
Taxes Due	\$656.16	
Interest Du	e \$45.96	
Penalty Du	e \$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

# **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 T	ype O 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

# **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	i n
Payment Type	First	-
	• Full	

Total Due \$0.00

### Value

Special Assessment	Area Id MINTAX	Taxes \$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



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 CO2e	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

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**



March 13, 2020

### Certified Mail #70150640000476265906 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.

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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 CO2e	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

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

#### **Notice of Non-Discrimination**



March 13, 2020

### Certified Mail #70150640000476265913 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.** 

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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 CO2e	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

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

#### Notice of Non-Discrimination



March 13, 2020

#### Certified Mail #70150640000476265920 Return Receipt Required

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The proposed **revision** consists of updating emissions associated with mine operations and adding engines.

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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 CO2e	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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Sincerely

Erich J. Bower

President; General Manager Freeport-McMoRan Tyrone Inc.

20200313-100

#### **Notice of Non-Discrimination**



March 13, 2020

#### Certified Mail #70150640000476265937 Return Receipt Required

Dear Neighbor:

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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 CO2e	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

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

#### Notice of Non-Discrimination



March 13, 2020

#### Certified Mail #70150640000476265944 Return Receipt Required

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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 CO2e	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

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

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Sincerely,

Erich J. Bower

President; General Manager Freeport-McMoRan Tyrone Inc.

20200313-100

#### Notice of Non-Discrimination



March 13, 2020

#### Certified Mail #70150640000476265951 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 CO2e	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

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

#### **Notice of Non-Discrimination**



March 13, 2020

### <u>Certified Mail #70150640000476265968</u> <u>Return Receipt Required</u>

US Forest Service 3005 Camino de Bosque Silver City, NM 88061

To Whom it Concerns:

**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.** 

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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 CO2e	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

#### **Notice of Non-Discrimination**



March 13, 2020

#### Certified Mail #70150640000476265975 Return Receipt Required

U Bar Ranch HCR 88061-Box 10199 Hwy 180 W. Silver City, NM 88061

To Whom it Concerns:

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.

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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 CO2e	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

March 13, 2020 Page 2

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.

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Sincerely,

Erich J. Bower

President; General Manager Freeport-McMoRan Tyrone Inc.

20200313-100

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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:

**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.** 

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The proposed revision consists of updating emissions associated with mine operations and adding engines.

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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 CO2e	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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Erich J. Bower

President; General Manager Freeport-McMoRan Tyrone Inc.

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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

To Whom it Concerns:

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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 CO2e	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

March 13, 2020 Page 2

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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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:

**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.** 

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Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	8,200 tpy
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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 CO2e	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

March 13, 2020 Page 2

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Sincerely,

Erich J. Bower

President; General Manager Freeport-McMoRan Tyrone Inc.

20200313-100

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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.** 

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Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	8,200 tpy
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Sulfur Dioxide (SO ₂ )	30 pph	30 tpy
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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 CO2e	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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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.



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**.

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 CO2e	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

March 13, 2020 Page 2

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.

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Sincerely,

Erich J. Bower

President; General Manager Freeport-McMoRan Tyrone Inc.

20200313-100

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### **General Posting of Notices – Certification**

I, <u>Erich J. Bower</u>, 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	

<u>President; General Manager, Freeport-McMoRan Tyrone Inc.</u>
Title {APPLICANT OR RELATIONSHIP TO APPLICANT}



# NOTICE

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Toxic Air Pollutant (TAP)	N/A	N/A
Green House Gas Emissions as Total CO2e	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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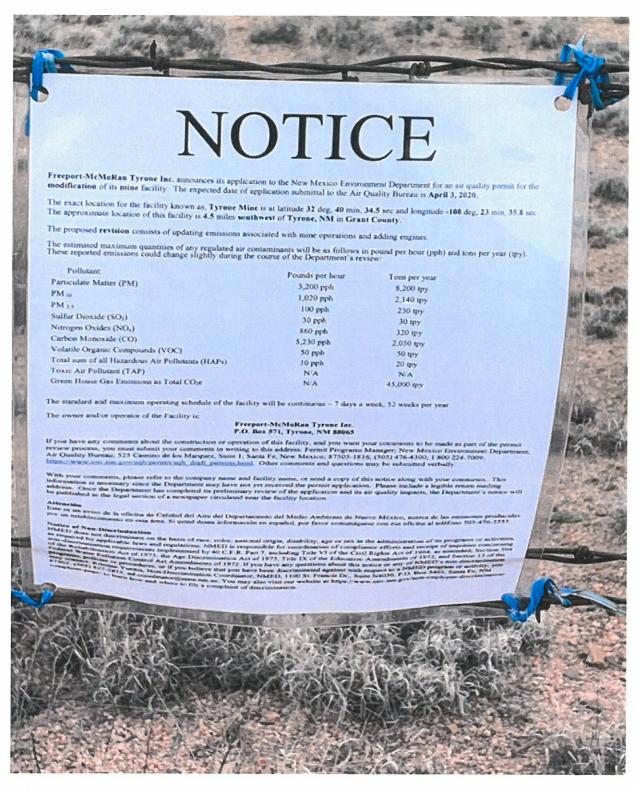
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### **Section 9 - Public Notice**

### **Property Owners**

Recipient	Address		City	State	Zip Code
Pacific Western Land Compa	iny	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 Est	es	215 E. 7th Street	Safford	ΑZ	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						
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.

### <u>Submittal of Public Service Announcement – Certification</u>

I, <u>Michael Celente</u>, 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: <u>Tyrone Mine</u>, location: <u>4.5 miles southwest of Tyrone</u>, <u>NM; P.O. Box 571, Tyrone</u>, <u>NM 88065</u> and type of business: <u>Mine</u>.
- (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: <u>Permit Programs</u>

  <u>Manager; New Mexico Environment Department; Air Quality Bureau; 525 Camino de los Marquez, Suite 1,</u>

  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

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### 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 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 Óran, 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."

À 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.



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### NOTICE OF AIR QUALITY PERMIT APPLICATION

ri-McMaRan Tyrone Inc. announces in application to the New Mexico Environment Department for an air quality for the modification of its mine facility. The expected date of application submittal to the Air Quality Burson is April

The exact location for the facility known as, Tyrone Mine is at latitude 32 deg. 40 min, 34.5 sec and longitude -100 deg. 23 min, 36.8 sec. The approximate location of this facility is 4.5 miles southwest of Tyrone, NM in Grant County.

The proposed revision consists of undating 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 ((pp)).

tions could change slightly during the course of the Department's review

Pollutant:	Pounds per hour	Tons per year
Particulate Matter (PM)	3,200 pph	\$,300 tpy
PM 10	1,000 pph	2,140 my
PM ₂₅	100 pph	230 гру
Sulfur Dioxide (SO ₅ )	30 pph	30 my
Nitrogen Oxides (NO ₄ )	860 pph	320 tpy
Carbon Monoraide (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 Pollstatt (TAP)	N/A	N/A
Green House Gas Emissions as Total CO ₂ e	N/A	45,000 my

ing schedule of the facility will be continuous – 7 days a week, 52 weeks per year

The owner and/or operator of the Facility is:

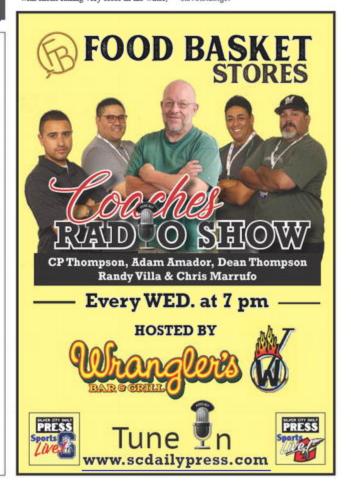
you have any comments about the construction or operation of this facility, and you we the permit review process, you must submit your comments in writing to this address ruice Environment Department. Air Quality Bureau, SS 5 Common de los Marquez, Su 705-1816, (305) 470-4100, 1 800 234-7005, https://www.estr.unt.org/abs/permit/sb/

Este es un aviso de la eficina 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 comuniquese siones producidas por un establecia oficina al teléfono 505-476-5557.

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Mr14-2to

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Mr11dh

A11-tinc

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Mr11.16c

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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 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

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### Legal

NOTICE OF AIR QUALITY PERMIT APPLICATION

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 Coality 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, Nim in Grant County.

The proposed revision consists of updating emissions associated with mine operations and adding appropries.

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: Particulate Matter (PM) Tons per year 8,200 tpy 2,140 tpy 230 tpy Pounds per hour 3,200 pph 1,020 pph 100 pph PM 2.5 Sulfur Dioxide (SO₂) 30 tpy 320 tpy 2,050 tpy 50 tpy 20 tpy Sumur Dixixie (2004)
Nitrogen Oxides (NO₄)
Carton Monoxide (CO)
Volatile Organic Compounds (VOC)
Total sum of all Hazandous Air Pollutarits (HAPs)
Toxic Air Pollutarit (TAP)
Green House Gas Emissions as Total CO₄e 860 pph 5,230 pph 50 pph 10 pph N/A 45,000 tpy N/A

The standard and maximum operating schedule of the facility will be continuous - 7 days a week, 52

The standard and maximum operating scriedule or the standard and maximum operating scriedules.

The owner and/or operator of the Facility is:

Freeport-McMoRian 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 past of the permit review process, you must submit your comments in writing but so this address? Permit Programs Manager, New Mexico Environment Department, Air Qualify Bureau; 525 Camino de los Marquez, Suite 1; Santa Fe, New Mexico; 67505-1816; (505) 476-4300; 1 800 224-7009; https://www.env.rom.gov/aqb/permit/laqb_draft_permits.html. Other comments and questions may be submitted verificial.

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 re-ceived 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.

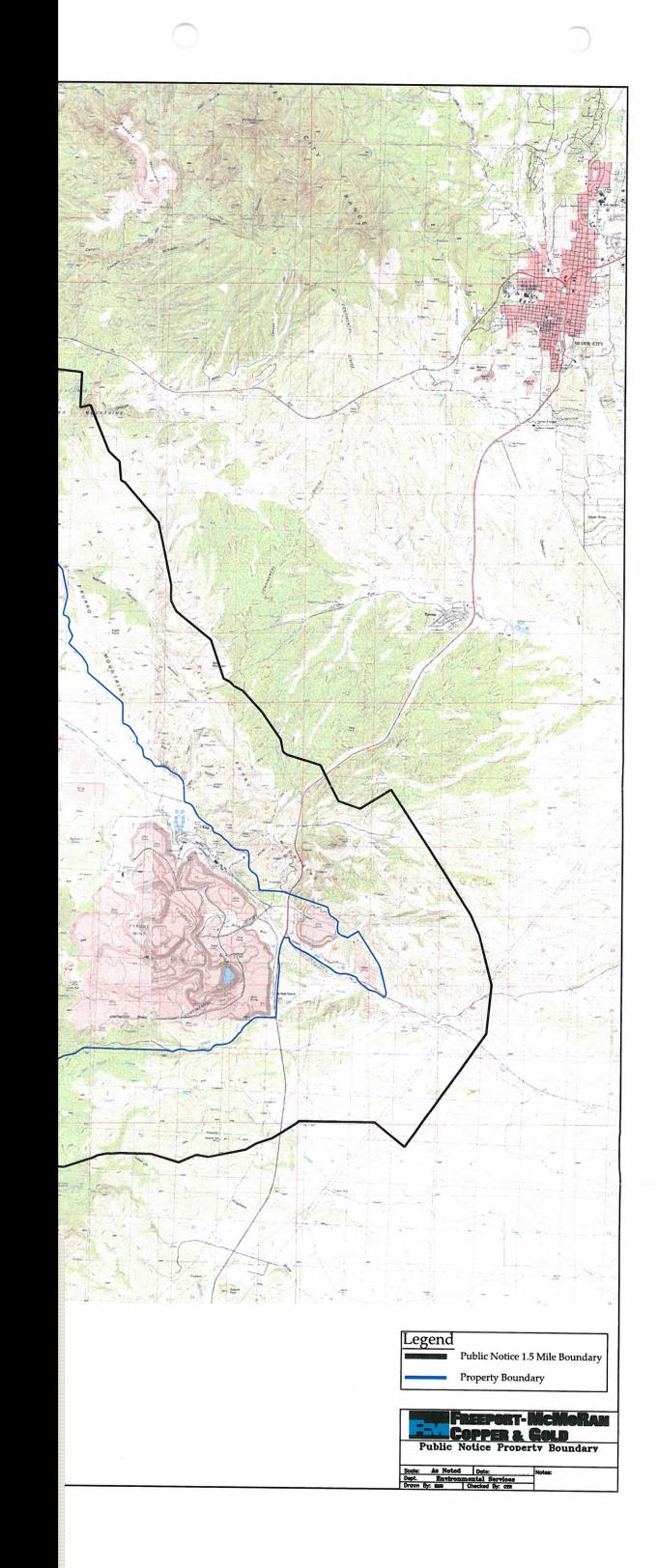
Este es un aviso de la oficina de Calidad del Aire del Departamento del Medio Ambiente de Nuevo Ester es un arriso de la cinicipa de Calicida de la receptar de la participa de la composition del la composition del la composition de la composition de la composition del la composition del la composition del la composition della composition de

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NMED does not discriminate on the basis of race, color, national origin, disability, age or sex in the
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1190 St. Francis Dt., Suite N4000, P.O. Box 5468, Santa Fe, NM 67302, (503) 827-2855, ad.coordinatortrifflatate.nmus. You may also visit our website at https://www.enr.mm.gov/non-employee-dscrimination complaint page/ to learn how and where to file a complaint of discrimination.

M16



### **Section 10**

### Written Description of the Routine Operations of the Facility

_____

<u>A written description of the routine operations of the facility</u>. 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 openpit 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.

grouping (2-digit SIC code	or associated see) as this facility	source: ources belong to the same 2-digit industrial y, <u>OR</u> surrounding or associated sources that port facilities for this source.
	<b>☑</b> Yes	□ <b>No</b>
Common Ownership or Cownership or control as this		nding or associated sources are under common
	<b>☑</b> Yes	□ <b>No</b>
Contiguous or Adjacent: with this source.	Surrounding or	associated sources are contiguous or adjacent
	☑ Yes	□ <b>No</b>
C. Make a determination:		

### C. N

- ☑ 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.

Form-Section 11 last revised: 10/26/2011 Section 11, Page 1 Saved Date: 3/19/2020

### **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.

iop iv	<u>ianuai</u> to c	letermine if the revision is subject to PSD review.							
A.	This faci	This facility is:							
	<b>☑</b> □	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.							
В.	3. 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]:								
	b. c. d. e.	NOx: XX.X TPY CO: XX.X TPY VOC: XX.X TPY SOx: XX.X TPY PM: XX.X TPY PM10: 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.

Sulfur compounds (listed in Table 2): XX.X TPY

PM2.5: XX.X TPY
Fluorides: XX.X TPY
Lead: XX.X TPY

GHG: XX.X TPY

### **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.

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EPA Applicability Determination Index for 40 CFR 60, 61, 63, etc: http://cfpub.epa.gov/adi/

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### **Table for STATE REGULATIONS:**

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			
20.2.34 NMAC	Oil Burning Equipment: NO ₂	No	N/A	or modification of which is commenced after February 17, 1972.  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.			
20.2.37 and 20.2.36 NMAC	Petroleum Processing Facilities and Petroleum Refineries	N/A	N/A	This facility does not operate a sulfur recovery unit. This regulation does not apply.  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	Stationa ry Combus tion Equipm ent	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 REQUIREMENT S	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, 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		Annlies	Unit(a) an	
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 <b>Equipment Leaks</b> (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	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.
	Facilities			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.

Saved Date: 3/19/2020

# **Section 14**

## **Operational Plan to Mitigate Emissions**

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

□ <b>Title V Sources</b> (20.2.70 NMAC): By checking this box and certifying this application the permittee certifies that developed an <b>Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies</b> defining 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 req This plan should not be submitted with this application.	the
NSR (20.2.72 NMAC), PSD (20.2.74 NMAC) & Nonattainment (20.2.79 NMAC) Sources: By checking this box certifying this application the permittee certifies that it has developed an Operational Plan to Mitigate Source Em 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 mad available to the Department upon request. This plan should not be submitted with this application.	issions
☑ Title V (20.2.70 NMAC), NSR (20.2.72 NMAC), PSD (20.2.74 NMAC) & Nonattainment (20.2.79 NMAC) Sources checking this box and certifying this application the permittee certifies that it has established and implemented a Pla Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work p standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept or at the nearest field office to be made available to the Department upon request. This plan should not be submitte this application.	n to ractice on site

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

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: <a href="https://www.env.nm.gov/aqb/permit/aqb-pol.html">https://www.env.nm.gov/aqb/permit/aqb-pol.html</a>. 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
Mina Evaitivas	Diagting	N/A	Daviliaht	75,000	tons/yr
Mine Fugitives	Blasting	IN/A	Daylight	400,000	lb/day
	Normal N	Mining Rates from NSR	2448-M3		
	Hauling	Little Rock			
Mine Fugitives	Handling	Waste	24 hrs/day	100,000	tons/day
	Handling	Leach			
	Hauling	Copper Leach			
Mine Fugitives	Handling	Waste	24 hrs/day	60,000	tons/day
	Handling		each		

Table 108.A.1: Allowable Mining Operating and Throughput Limits

Permit ID	Emissions Source Description	Activity Location Description	Operating Schedule	Material ¹ Throughput	Units
	Hauling	Copper Mountain			
Mine Fugitives	Handling	Leach	24 hrs/day	100,000	tons/day
	rialidillig	Waste			
	Hauling	Valencia		ay 100,000	tons/day
Mine Fugitives	Handling	Leach	24 hrs/day		
	Handing	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	
Mina Evaitivas	Hauling	Little Rock	24 has/day	1 /1 200.000	. /1	
Mine Fugitives	Handling	Leach	24 hrs/day	300,000	tons/day	
) ( F ) (	Hauling	Little Rock		250 000	tons/day	
Mine Fugitives	Handling	Waste	24 hrs/day	250,000		
Mina Evaitivas	Hauling	Main Pit Mohawk Area	241 /1	200,000	tons/day	
Mine Fugitives	Handling	Leach	24 hrs/day			
Mina Evaitivas	Hauling	Main Pit Mohawk Area	24 has/day	200,000	4 / 1	
Mine Fugitives	Handling	Waste	24 hrs/day	200,000	tons/day	
Mine Fugitives	Hauling Main Pit ²	Main Pit ²	24 hrs/day	300.000	tons/day	
Willie Fugitives	Handling	Leach	24 ms/day	300,000	tons/day	
Mine Fugitives	Hauling	Main Pit ²	24 hrs/day	300,000	tons/day	
winc rugitives	Handling	Waste	24 111 5/Uay	300,000	tons/day	

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 (<a href="http://www.env.nm.gov/aqb/permit/app">http://www.env.nm.gov/aqb/permit/app</a> 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. <b>Note:</b> 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:

Ш	see attached, approved modeling waiver for an pollutants from the facility.
	See attached, approved modeling waiver for some pollutants from the facility.
$\checkmark$	Attached in Universal Application Form 4 (UA4) is a modeling report for all pollutants from the facility.
	Attached in UA4 is a <b>modeling report for some</b> pollutants from the facility.
	No modeling is required.





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 – Electrowinning (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		
	Hauling	Mohawk	24 hrs/day				
Mine Fugitives	Handling	Leach		200,000	tons/day		
		Waste					
	Hauling	Gettysburg					
Mine Fugitives	Handling	Leach	24 hrs/day	200,000	tons/day		
	Handling						



#### **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	
Min a Frankling	Blasting N ₂	NI / A	Dandialak	75,000	tons/yr	
Mine Fugitives		N/A	Daylight	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.

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#### **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 Guidelines¹.

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  $50 \, \text{km}$  of a Class I area. The nearest Class I area is the Gila Wilderness at  $37 \, \text{km}$  from the facility. There are no other Class I areas within  $50 \, \text{km}$  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).



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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 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 (describ	e below)
	Describe the permit changes relevant to the modeling.		
3	Freeport-McMoRan Tyrone Inc (Tyrone) is submitting a significant permit revision application p NMAC for its Tyrone Mine. The proposed action will allow for mining and hauling activities assometimes to 200,000 tons per day. However, mining in these areas will not increase mining rate as they will be offset by a decrease in mining in other areas. Tyrone will also be addituited Rock Pit (Units OP-4, OP-7, EMP-1, and EMP-2) and one new pump engine to South Rim the two worst-case scenario engines will be modeled for Little Rock Pit, as there will never be a sengines are running simultaneously. Tyrone is reducing the Indian Peak Generator (Unit IPG) to a generator; therefore, the unit will not be included in the model as it is exempt pursuant to 20.2.72	ociated with Get se the overall fac ng four new pun Pit (Unit ENV- scenario where n an emergency-u	ettysburg and cility-wide np engines to 117). Only nore than two se only

	Tyrone is requesting to maintain the mining and reclamation acmining rates from NSR 2448-M2.	tivities from NSR Permit 2448-M	4 along with the	alternate	
4	What geodetic datum was used in the modeling?		WGS84		
5	How long will the facility be at this location?		Greater than o	ne year.	
6	Is the facility a major source with respect to Prevention of Sign	ificant Deterioration (PSD)?	Yes□	No⊠	
7	Identify the Air Quality Control Region (AQCR) in which the f	acility is located	012		
	List the PSD baseline dates for this region (minor or major, as a	appropriate).			
0	NO2	8/10/1995			
8	SO2	8/10/1995			
	PM10	8/10/1995			
	PM2.5	Not established			
	Provide the name and distance to Class I areas within 50 km of	the facility (300 km for PSD pern	nits).		
9	Gila Wilderness; 37 km				
10	10 Is the facility located in a non-attainment area? If so describe below			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**

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		N/.	A
(20.2.72.402 NMAC)			

16	-D: Mod	eling perfo	ormed for this a	pplication			
	For each po Choose the	llutant, indicate th	e modeling performed and modeling applicable for t	d submitted with this		umes ROI and c	umulative
	Pollutant	ROI	Cumulative analysis	Culpability analysis	Waiver app		tant not ed or not ged.
	СО		$\boxtimes$				
	$NO_2$		$\boxtimes$				
4	SO ₂	$\boxtimes$					
1	$H_2S$					$\boxtimes$	
	PM2.5		$\boxtimes$				
	PM10		$\boxtimes$				
	TSP					$\boxtimes$	
	Lead					$\boxtimes$	
	Ozone					$\boxtimes$	
	State air tox (20.2.72.402 NMAC)					$\boxtimes$	
	1 (1/11/10)				L		
16	-E: New	Mexico tox	xic air pollutan	ts modeling	– N/A		
1	List any Ne	w Mexico toxic air	r pollutants (NMTAPs) fr s not emit NMTAPs requ	om Tables A and B i		C that are mode!	led for this
		ist any NMTAPs that are emitted but not modeled because stack height correction factor. Add additional rows to the table elow, if required.					
2	Pollutant	Emission Rate (pounds/hour)	Emission Rate Screenin Level (pounds/hour)	g Stack Height (meters)	Correction Factor	Emission Correctio	
				•			
16	-F: Mod	eling option	ns				
1			MOD used with regulato	ry default options? If	not explain	Yes⊠	No□
	The model	was run in regulato	ory default mode on BRE	EZE AERMOD v180	081.		
16	-G: Surr	ounding so	ource modeling				
1	Date of surr	ounding source re	trieval	January 8, 2020			
2	sources mod		ntory provided by the Air he inventory provided. If rows as needed.				
-	AQB Sourc		n of Corrections				

16-	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	d 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□			
	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 800-1 meters from the boundary. A fine grid with 500 meter spacing extends to 10,000 meters from the facility center. A capital 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 running out of memory due to file size.						
	Describe receptor spacing along the fence line.					
5	Fenceline receptors were modeled with 100 meter spacing.					
	Describe the PSD Class I area receptors.					
6	PSD class I area receptors were obtained from the 2018 MergeMaster database provided by NMI	ED 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	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.								sions were	
2	Which scen	nario prodi	uces the hi	ghest conc	entrations	? Why?					
2	N/A – Onl	y one scen	ario was m	nodeled.							
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										table for that gormatting easie	
	Hour of Day	Factor	Hour of Day	Factor							
	1		13								
	2		14								
	3		15								
	4		16								
	5		17								
5	7		18 19								
3	8		20								
	9		21								
	10		22								
	11		23								
	12		24								
	If hourly, v	ariable en	nission rate	es were use	ed that wer	e not descr	ribed above	e, 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.	16-L: NO ₂ Modeling						
10		of NO ₂ modeling were used?					
	$\boxtimes$	ARM2					
1		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		t NO ₂ /NO _X ratios (0.5 minimum, 0.9 maximum or equilibrium) used? If not justify the ratios used below.	Yes⊠	No□			
	N/A						
4	Describe the	Describe the design value used for each averaging period modeled.					
		n eighth high					
'n	Annual: One	Year Annual Average					

16-	M: Part	iculate Matter Modeling					
	Select the pollutants for which plume depletion modeling was used.						
1	□ PM2.5						
	$\boxtimes$	PM10					
		None					
	Describe the	particle size distributions used. Include the source of information.					
2	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.						
4	Was second	ary PM modeled for PM2.5?	Yes□	No⊠			
5	If MERPs w below.	ere used to account for secondary PM2.5 fill out the information below. If another	method was use	ed describe			
		M is only required for PSD major modifications that are significant for NOx and/or allows use of high eighth high. This is not a PSD major modification, so we did no					

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-	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-modeling files. Do these match? If not, provide a cross-referentif they do not match below.		Yes□	No⊠	
	Mine Fugitives (Hauling) is represented by numerous road sou RD1_001 for reach roadway. There are a total of 22 haul road s			ch as	
2	The emission rates in the Tables 2-E and 2-F should match the these match? If not, explain why below.	ones in the modeling files. Do	Yes⊠	No□	
	N/A				
3	Have the minor NSR exempt sources or Title V Insignificant Activities" (Table 2-B) sources been modeled?			No⊠	
	Which units consume increment for which pollutants?				
4	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 This is necessary to verify the accuracy of PSD increment mod how increment consumption status is determined for the missing	leling. If not please explain	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-	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.					
	Describe the determination of sigma-Y and sigma-Z for fugitive sources.					
2	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.					
	Describe any open pits.					
4	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 Concentr	ations						
	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.  No□							
	CO: N/A							
	NO ₂ : N/A							
1	PM2.5: Las Cruces Distric Office (350130	025)						
	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							
	Was NMED provided meteorological data used? If so select the station used.						
1	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						
_	What was the source of the terrain data?						
2	N/A						

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.						
4	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: Mod	leling Re	esults								
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.							No⊠		
	N/A									
2	Identify the as necessary		ntrations from the	e modeling analys	sis. Rows may	be modified	, added and re	moved from the	table below	
Pollutant, Time Period and	Modeled Facility Concentra	Modeled Concentration with	Background Concentration	Cumulative Concentration (µg/m3)	Value of	Percent		Location		
Standard		Surrounding Sources (µg/m3)	urces (µg/m3)		Standard (µg/m3)	of Standard	UTM E (m)	UTM N (m)	Elevation (ft)	
CO, 8-hr, NAAQS					10,303.6	17.7%	748567.40	3612853.90	1829.80	
CO, 8-hr, NMAAQS	1,820.92	1,821.06	-	1,821.06	9,960.1	18.3%				
CO, 1-hr, NAAQS					40,069.6	36.3%		3612853.90	1829.80	
CO, 1-hr, NMAAQS	14,563.27	14,564.04	-	14,564.04	14,997.5	97.1%	748567.40			
NO ₂ , Annual, NAAQS					99.66	2.6%		3614460.70	1833.10	
NO ₂ , Annual, NMAAQS	2.17	2.64	-	2.64	94.0	2.8%	743711.20			
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	Modeled Facility Concentra tion (µg/m3)	Modeled Concentration with Surrounding Sources (µg/m3)	Background Concentration (µg/m3)	Cumulative Concentration	Value of Standard (µg/m3) Percent of Standard	Percent	Location		
Standard				(μg/m3)		-	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.

Saved Date: 3/19/2020

# **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,	Tested in accordance with EPA test methods for NOx and CO as	3/10/2014
12, 13, 15	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.

Form-Section 20 last revised: 8/15/2011 Section 20, Page 1 Saved Date: 3/19/2020

# **Section 22: Certification**

Company Name: Freeport-McMoRan Tyrone Inc.	
I, Erich J. Bower , hereby c and as accurate as possible, to the best of my knowledge	ertify that the information and data submitted in this application are true 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 Marc	ch , <u>2020 .</u>
My authorization as a notary of the State of New Mexi	co expires on the
day of December	<u>, 2021 .</u>
Jeanie B. Sutieng	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 2 8 2 3

*For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC.