Mosaic Potash Carlsbad Inc.
PO Box 71
1361 Potash Mines Road
Carlsbad, NM 88221

(575) 628-6200
Fax (575) 887-0589
www.mosaicco.com

September 16, 2020

CERTIFIED MAIL: 7019 2970 0000 3887 1857

New Mexico Environment Department
Air Quality Bureau
Permits Section
525 Camino de los Marquez, Suite 1
Santa Fe, NM 87505-1816

Received
SEP 2 1 2020
Air Quality Bureau

RE: Mosaic Potash Carlsbad, Inc.
Title V Significant Modification Application

To whom it may concern:

Provided with this letter is a Title V significant modification application for Mosaic Potash Carlsbad, Inc. This permit application is being submitted under 20.2.70.404.C.(3)(b) NMAC to incorporate NSR Permit Nos. 495-M13-R1, M13-R2, M13-R3, M13-R4, and M14 into the current Title V Permit No. P039-R3. Additional information regarding the NSR permits to be incorporated is provided in Section 3 of the enclosed permit application. Please note that NMED's secure file transfer service has been chosen for the electronic submittal, so no CDs/DVDs will be provided in the hard copies.

If you have any questions or need additional information, please don't hesitate to contact me at 575-628-6267 or via e-mail at Haskins.Hobson@mosaicco.com.

Sincerely,

Haskins Hobson, P.E.

Haskins Hobson, P.E.
EHS Senior Engineer

Enclosures: Official Hard Copy (1)
Working Hard Copy (1)

Mail Application To:		For Department use only:
New Mexico Environment Department Air Quality Bureau Permits Section 525 Camino de los Marquez, Suite 1 Santa Fe, New Mexico, 87505 Phone: (505) 476-4300 Fax: (505) 476-4375 www.env.nm.gov/aqb	NEW MEXICO ENVIRONMENT DEPARTMENT	Received SEP 21 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 X 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. X 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:
X I acknowledge that a pre-application meeting is available to me upon request. X Title V Operating, Title IV Acid Rain, and NPR applications have no fees.
☐ $500 NSR application Filing Fee enclosed OR ☐ The full permit fee associated with 10 fee points (required w/ streamline applications).
☐ Check No.: in the amount of
X 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: **20.2.70.404.C.(3)(b) NMAC**
(e.g. application for a new minor source would be 20.2.72.200.A NMAC, one example for a Technical Permit Revision is 20.2.72.219.B.1.b NMAC, a Title V acid rain application would be: 20.2.70.200.C NMAC)

Section 1 – Facility Information

Section 1-A: Company Information		AI # if known (see 1st 3 to 5 #s of permit IDEA ID No.): **196**	Updating Permit/NOI #:**P039-R3**
1	Facility Name: **Mosaic Potash Carlsbad, Inc.**	Plant primary SIC Code (4 digits): **1474** Plant NAIC code (6 digits): **212391**	
a	Facility Street Address (If no facility street address, provide directions from a prominent landmark): **1361 Potash Mines Road, Carlsbad, NM 88220**		
2	Plant Operator Company Name: **Mosaic Potash Carlsbad, Inc.**	Phone/Fax: **(575) 628-6200 / (575) 628-6263**	
a	Plant Operator Address: **1361 Potash Mines Road, Carlsbad, NM 88220**		
b	Plant Operator's New Mexico Corporate ID or Tax ID: **CRS # 02-357860-00-2**		

3	Plant Owner(s) name(s): **The Mosaic Company**	Phone/Fax: **(813) 775-4200**
a	Plant Owner(s) Mailing Address(s): **101 East Kennedy Blvd, Suite 2500, Tampa, FL 33602**	
4	Bill To (Company): **Mosaic Potash Carlsbad, Inc.**	Phone/Fax: **(575) 628-6367 / (575) 628-6263**
a	Mailing Address: **P.O. Box 71, Carlsbad, NM 88220**	E-mail: **John.Anderson@mosaicco.com**
5	☐ Preparer: **X** Consultant: **Claire Booth**	Phone/Fax: **(720) 316-9935**
a	Mailing Address: **1496 Conestoga Circle, Steamboat Springs, CO 80487**	E-mail: **claire@arrayenvironmental.com**
6	Plant Operator Contact: **Paul Gill**	Phone/Fax: **(575) 628-6207 / (575) 628-6263**
a	Address: **P.O. Box 71, Carlsbad, NM 88220**	E-mail: **Paul.Gill@mosaicco.com**
7	Air Permit Contact: **Haskins Hobson**	Title: **Senior Environmental Engineer**
a	E-mail: **Haskins.Hobson@mosaicco.com**	Phone/Fax: **(575) 628-6267 / (575) 628-6263**
b	Mailing Address: **P.O. Box 71, Carlsbad, NM 88220**	
c	The designated Air permit Contact will receive all official correspondence (i.e. letters, permits) from the Air Quality Bureau.	

Section 1-B: Current Facility Status

1.a	Has this facility already been constructed? **X** Yes ☐ No	1.b If yes to question 1.a, is it currently operating in New Mexico? **X** 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 **X** 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? **X** Yes ☐ No
3	Is the facility currently shut down? ☐ Yes **X** 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? **X** Yes ☐ No	
5	If Yes to question 4, has this facility been modified (see 20.2.72.7.P NMAC) or the capacity increased since 8/31/1972? **X** Yes ☐ No ☐ N/A	
6	Does this facility have a Title V operating permit (20.2.70 NMAC)? **X** Yes ☐ No	If yes, the permit No. is: **P039-R3**
7	Has this facility been issued a No Permit Required (NPR)? ☐ Yes **X** No	If yes, the NPR No. is: **N/A**
8	Has this facility been issued a Notice of Intent (NOI)? ☐ Yes **X** No	If yes, the NOI No. is: **N/A**
9	Does this facility have a construction permit (20.2.72/20.2.74 NMAC)? **X** Yes ☐ No	If yes, the permit No. is: **0495-M14**
10	Is this facility registered under a General permit (GCP-1, GCP-2, etc.)? ☐ Yes **X** No	If yes, the register No. is: **N/A**

Section 1-C: Facility Input Capacity & Production Rate

1	What is the facility's maximum input capacity, specify units (reference here and list capacities in Section 20, if more room is required)			
a	Current	Hourly: **See NSR 0495-M14; Table 104.A**	Daily: **See NSR 0495-M14; Table 104.A**	Annually: **See NSR 0495-M14; Table 104.A**
b	Proposed	Hourly: **See NSR 0495-M14; Table 104.A**	Daily: **See NSR 0495-M14; Table 104.A**	Annually: **See NSR 0495-M14; Table 104.A**
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: **See NSR 0495-M14; Table 104.A**	Daily: **See NSR 0495-M14; Table 104.A**	Annually: **See NSR 0495-M14; Table 104.A**
b	Proposed	Hourly: **See NSR 0495-M14; Table 104.A**	Daily: **See NSR 0495-M14; Table 104.A**	Annually: **See NSR 0495-M14; Table 104.A**

Section 1-D: Facility Location Information

1	Section: **12**	Range: **29E**	Township: **22S**	County: **Eddy**	Elevation (ft): **3,220**
2	UTM Zone: ☐ 12 or **X** 13			Datum: ☐ NAD 27 ☐ NAD 83 **X** WGS 84	
a	UTM E (in meters, to nearest 10 meters): **600070**			UTM N (in meters, to nearest 10 meters): **3586900**	
b	**AND** Latitude (deg., min., sec.): **32°24'53" N**			Longitude (deg., min., sec.): **103°56'9" W**	
3	Name and zip code of nearest New Mexico town: **Carlsbad, NM 88220**				
4	Detailed Driving Instructions from nearest NM town (attach a road map if necessary): **From Loving, NM, drive east on US-285, then turn North on Hwy 31 and go approximately 14 miles. The plant is on the east side of the road.**				
5	The facility is **16** miles **East** of **Carlsbad, NM**.				
6	Status of land at facility (check one): ☐ Private ☐ Indian/Pueblo ☐ Federal BLM ☐ Federal Forest Service **X** Other (specify): **The facility is situated on both Private and Federal BLM land.**				
7	List all municipalities, Indian tribes, and counties within a ten (10) mile radius (20.2.72.203.B.2 NMAC) of the property on which the facility is proposed to be constructed or operated: **Eddy County**				
8	**20.2.72** NMAC applications **only**: Will the property on which the facility is proposed to be constructed or operated be closer than 50 km (31 miles) to other states, Bernalillo County, or a Class I area (see www.env.nm.gov/aqb/modeling/class1areas.html)? **X** Yes ☐ No (20.2.72.206.A.7 NMAC) If yes, list all with corresponding distances in kilometers: **Carlsbad Caverns is located 48 km from the facility.**				
9	Name nearest Class I area: **Carlsbad Caverns**				
10	Shortest distance (in km) from facility boundary to the boundary of the nearest Class I area (to the nearest 10 meters): **48 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: **1,218 m**				
12	Method(s) used to delineate the Restricted Area: **Fencing around the surface facilities and rugged physical terrain within and around the tailings.** "**Restricted Area**" is an area to which public entry is effectively precluded. Effective barriers include continuous fencing, continuous walls, or other continuous barriers approved by the Department, such as rugged physical terrain with steep grade that would require special equipment to traverse. If a large property is completely enclosed by fencing, a restricted area within the property may be identified with signage only. Public roads cannot be part of a Restricted Area.				
13	Does the owner/operator intend to operate this source as a portable stationary source as defined in 20.2.72.7.X NMAC? ☐ Yes **X** No A portable stationary source is not a mobile source, such as an automobile, but a source that can be installed permanently at one location or that can be re-installed at various locations, such as a hot mix asphalt plant that is moved to different job sites.				
14	Will this facility operate in conjunction with other air regulated parties on the same property? ☒ No ☐ Yes If yes, what is the name and permit number (if known) of the other facility?				

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

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

Section 1-F: Other Facility Information

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

Section 1-G: Streamline Application **(This section applies to 20.2.72.300 NMAC Streamline applications only)**

1	☐ I have filled out Section 18, "Addendum for Streamline Applications." **X** 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.) **Paul Gill** (20.2.70.300.D.2 NMAC):	Phone: **(575) 628-6207**
a	R.O. Title: **General Manager**	R.O. e-mail: **Paul.Gill@mosaicco.com**
b	R. O. Address: **1361 Potash Mines Road, Carlsbad, NM 88220**	
2	Alternate Responsible Official **Jim Johnson** (20.2.70.300.D.2 NMAC):	Phone: **(575) 628-6490**
a	A. R.O. Title: **Senior Mill Manager**	A. R.O. e-mail: **Jim.Johnson@mosaicco.com**
b	A. R. O. Address: **1361 Potash Mines Road, Carlsbad, NM 88220**	
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): **N/A**	
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.): **The Mosaic Company**	
a	Address of Parent Company: **101 East Kennedy Blvd, Suite 2500, Tampa, FL 33602**	
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: **John Anderson, EHS Manager, (575) 628-6367**	
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: **45 km north of Texas**	

Section 1-I – Submittal Requirements

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

Hard Copy Submittal Requirements:

1) One hard copy **original signed and notarized application package printed double sided 'head-to-toe' 2-hole punched** as we bind the document on top, not on the side; except Section 2 (landscape tables), which should be head-to-head. Please use **numbered tab separators** in the hard copy submittal(s) as this facilitates the review process. For NOI submittals only, hard copies of UA1, Tables 2A, 2D & 2F, Section 3 and the signed Certification Page are required. Please include a copy of the check on a separate page.
2) If the application is for a minor NSR, PSD, NNSR, or Title V application, include one working hard **copy** for Department use. This copy should be printed in book form, 3-hole punched, and **must be double sided**. Note that this is in addition to the head-to-to 2-hole punched copy required in 1) above. Minor NSR Technical Permit revisions (20.2.72.219.B NMAC) only need to fill out Sections 1-A, 1-B, 3, and should fill out those portions of other Section(s) relevant to the technical permit revision. TV Minor Modifications need only fill out Sections 1-A, 1-B, 1-H, 3, and those portions of other Section(s) relevant to the minor modification. NMED may require additional portions of the application to be submitted, as needed.
3) The entire NOI or Permit application package, including the full modeling study, should be submitted electronically. Electronic files for applications for NOIs, any type of General Construction Permit (GCP), or technical revisions to NSRs must be submitted with compact disk (CD) or digital versatile disc (DVD). For these permit application submittals, two CD copies are required (in sleeves, not crystal cases, please), with additional CD copies as specified below. NOI applications require only a single CD submittal. Electronic files for other New Source Review (construction) permits/permit modifications or Title V permits/permit modifications can be submitted on CD/DVD or sent through AQB's secure file transfer service.

Electronic files sent by (check one):

☐ CD/DVD attached to paper application

X secure electronic transfer. Air Permit Contact Name: Claire Booth

Email: claire@arrayenvironmental.com

Phone number: (352) 328-5764

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.

Table of Contents

Table 2-A: Regulated Emission Sources

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

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufacturer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classification Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
Nash Plant (FUG1, FUG2)	Hoist #1 and Screening	Nordberg; Mosaic Built	N/A	N/A	400 tph	400 tph	-- 1950; 1997	None None	30588801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **X To Be Modified (name and combined)** ☐ To be Replaced	N/A	N/A
LANG Hoist (STK4/FUG3,25,26)	No. 2 Langbeinite Hoist and Coarse Ore Bin	Mosaic Built/Norberg Hoist	N/A	N/A	729 tph	729 tph	-- 1940, converted 1999	CON4 STK4	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
LANG Crusher (STK5a/FUG27,28)	Langbeinite Raw Ore Crusher	Mosaic Built Multiple Equip. Mfgs	N/A	N/A	372 tph	372 tph	-- 1999	CON5a STK5a	30502201	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
LANG Fine Ore Bin (STK5b/FUG29)	Langbeinite Fine Ore Bin	Mosaic Built	N/A	N/A	825 tph	825 tph	-- 1999	CON5b STK5b	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
LANG Dryer (STK6/FUG30)	Langbeinite Dryer	Burner: Fives North American	4213-112-7X8GGO/12387	N/A	Burner: 90 MMBtu/hr; 225 tph throughput	Burner: 90 MMBtu/hr; 225 tph throughput	-- 2018 (burner); 2019 (dryer)	CON6 STK6	30502201	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
S&L Boiler (STK20)	Steam Boiler for storage and loading	Cleaver Brooks	FLX-700-250-150ST	10507	2.5 MMBtu/hr	2.5 MMBtu/hr	-- 2008	None STK20	10200603	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
S&L Loadout 4 (FUG9)	No. 4 Railcar Loadout	Mosaic Built	N/A	N/A	300 tph	300 tph	-- 1955	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
S&L Loadout 5 (FUG10)	No. 5 Railcar Loadout	Mosaic Built	N/A	N/A	300 tph	300 tph	-- 1955	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
S&L Truck Loadout (FUG12)	No. 2 Truck Loadout	Not Available	N/A	N/A	300 tph	300 tph	-- 1984	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
S&L Dispatch (FUG31,32)	Dispatch	Not Available	N/A	N/A	400 tph	400 tph	-- 1940	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
LANG Screens (STK7/FUG30)	Langbeinite Product Screening	Mosaic Built Multiple Equip. Mfrs.	N/A	N/A	400 tph	400 tph	-- 1999	CON7 STK7	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GRAN Dryer 10a (STK10ab-CON10a/FUG33)	Langbeinite (K-Mag) Granulation Dryer	North American	4213-60 LEX Burner	N/A	Burner: 60 MMBtu/hr; 250 tph throughput	Burner: 60 MMBtu/hr; 250 tph throughput	-- 1997	CON10a STK10ab	30502201	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GRAN Process Ventilation 10b (STK10ab-CON10b/FUG33)	Granulation Screens, Raymond Mill, material handling	Mosaic Built Multiple Equip. Mfrs.	N/A	N/A	250 tph	250 tph	-- 1997/2008	CON10b STK10ab	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GRAN Process Ventilation 10c (STK14/FUG24)	Granulation Second Raymond Mill Circuit	Mosaic Built Multiple Equip. Mfrs.	N/A	N/A	125 tph	125 tph	-- 9/2012	CON14 STK14	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Dispatch Transfer Tower (STK11/FUG32)	K-Mag and Granulation Dispatch Transfer Tower; Dispatch to Storage Belt	Mosaic Built Multiple Equip. Mfrs.	N/A	N/A	400 tph	400 tph	-- 1940; 2014	CON11 STK11	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
S&L Warehouse 1 and WH1 to Granulation Reclaim Belt (FUG6)	Warehouse 1 and (WH1 to Granulation Reclaim Belt)	N/A	N/A	N/A	100 (85) tph	100 (85) tph	-- 1940 (2020)	None None	30588801 (30502299)	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **X To Be Modified (added reclaim belt)** ☐ To be Replaced	N/A	N/A
S&L Warehouse 2 (FUG8)	Warehouse 2; Dispatch to Storage Belt	N/A	N/A	N/A	400 tph	400 tph	-- 1955; 2014	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
S&L Warehouse 3 (FUG11)	Warehouse 3	N/A	N/A	N/A	400 tph	400 tph	-- 1995	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Paved Roads (FUG 22,47,48,49,51,57,58,59,62,63,64,65,67)	Paved Haul Roads	N/A	N/A	N/A	N/A	N/A	-- 1954	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A

Unit Number[1]	Source Description	Make	Model #	Serial #	Manufacturer's Rated Capacity[3] (Specify Units)	Requested Permitted Capacity[3] (Specify Units)	Date of Manufacture[2] / Date of Construction/ Reconstruction[2]	Controlled by Unit # / Emissions vented to Stack #	Source Classification Code (SCC)	For Each Piece of Equipment, Check One	RICE Ignition Type (CI, SI, 4SLB, 4SRB, 2SLB)[4]	Replacing Unit No.
Railcar Offloading (FUG43)	Loading from Railcar to Truck/Front Loader	N/A	N/A	N/A	85 tph	85 tph	-- 2013	None None	30588801	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GRAN Reclaim (FUG44)	Material Handling from Warehouses/Railcar Offloading to Granulation Circuit	N/A	N/A	N/A	85 tph	85 tph	-- 2013	None None	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
K-Mag Rehandling (FUG50)	Material Handling from Warehouses/Railcar Offloading to LANG Circuit	N/A	N/A	N/A	85 tph	85 tph	-- 2013	None None	30502299	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **X To Be Modified (name only)** ☐ To be Replaced	N/A	N/A
Brine Circuit (FUG52)	Brine Circuit Material Handling	N/A	N/A	N/A	100 tph	100 tph	-- 2013	None None	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Permanent Abrasive Blasting (FUG20)	Stationary Abrasive Blasting	N/A	N/A	N/A	1,000 lb/hr each; 300 tpy total	1,000 lb/hr each; 300 tpy total	-- 1960	None None	30588801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **X To Be Modified (throughput only)** ☐ To be Replaced	N/A	N/A
Portable Abrasive Blasting (FUG40)	Portable Abrasive Blasting	N/A	N/A	N/A			-- 2011	None None	30588801	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **X To Be Modified (throughput only)** ☐ To be Replaced	N/A	N/A
Contractor Abrasive Blasting (FUG41)	Portable Abrasive Blasting by Contractor	N/A	N/A	N/A	To be removed	To be removed	-- 2011	None None	30588801	☐ Existing (unchanged) **X To be Removed** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
LRAD1	Diesel-Fired Genset	Northern Lights	NL673L 3.2	6733-44767C	8 hp	N/A	-- 2009	None None	20200102	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
LRAD2	Diesel-Fired Genset	Northern Lights	NL673L 3.2	6733-44766C	8 hp	N/A	-- 2009	None None	20200102	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit **X To Be Modified (serial number only)** ☐ To be Replaced	CI	N/A
LRAD3	Diesel-Fired Genset	Northern Lights	NL673L 3.2	6733-44847C	8 hp	N/A	-- 2009	None None	20200102	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
LRAD4	Diesel-Fired Genset	Northern Lights	NL673L 4E	6733-51829	8 hp	N/A	-- 2015	None None	20200102	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional **X Replacement Unit** ☐ To Be Modified ☐ To be Replaced	CI	LRAD4
LRAD5	Diesel-Fired Genset	Northern Lights	NL673L 4E	6733-51831	8 hp	N/A	-- 2015	None None	20200102	☐ Existing (unchanged) ☐ To be Removed ☐ New/Additional **X Replacement Unit** ☐ To Be Modified ☐ To be Replaced	CI	LRAD5
LRAD6	Diesel-Fired Genset	Northern Lights	NL673L 3.2	6733-44843C	8 hp	N/A	-- 2009	None None	20200102	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	CI	N/A
Reagent (FUG60, FUG61)	Reagent Material Handling and Wind Erosion	N/A	N/A	N/A	5 tph	5 tph	-- 1953	None None	30502299	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
TMA (FUG66)	Material Handling at the Tailings Management Area (TMA)	N/A	N/A	N/A	50 tph	50 tph	-- 2019	None None	30588801	☐ Existing (unchanged) ☐ To be Removed **X New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
Warehouse Screener and Stacker [502(b)(10) Change]	Warehouse Screener and Stacker with Diesel Engines (Rental)	Rental	Rental	Rental	400 tph	400 tph	-- 2020	None None	40600499	☐ Existing (unchanged) ☐ To be Removed **X New/Additional (Title V Only)** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	Non-Road CI	N/A
GDF1	Gasoline Dispensing Facility at the Auto Shop (AS1; CS8269)	Tessenderlo Kerley, Inc.	N/A	17031B	4,136 gallons	4,136 gallons	2017 (replacement tank) 2018 (replacement tank)	None None	40600499	☐ Existing (unchanged) ☐ To be Removed **X New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GDF2	Gasoline Dispensing Facility at the Lake Compound (LC1)	SC Fuels	N/A	001806	500 gallons	500 gallons	-- 2011 (tank)	None None	40600499	☐ Existing (unchanged) ☐ To be Removed **X New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	N/A	N/A
GEN1	Diesel Non-Road Engine	Cummins	QSB4.5	73709480	138 hp	138 hp	2014 Unknown	None None	20200102	☐ Existing (unchanged) ☐ To be Removed **X New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced	Non-Road CI	N/A

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

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

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

Unit Number	Source Description	Manufacturer	Model No.	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]	
CS9105	Starch Bin	Shop built	N/A	25	20.2.72.202.B.5	--	☐ Existing (unchanged) ☐ To be Removed **X New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	tph	IA List Item #1.a	Unknown	
Railcar Transloader	Railcar Transloader	Rental unit	Rental Unit	225	20.2.72.202.B.5	--	☐ Existing (unchanged) ☐ To be Removed **X New/Additional** ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			Rental Unit	tph	IA List Item #1.a	2020	
WLT1 (CS7253)	Storage and Loading (West) DeDusting Tank	Shop built	N/A	36,375	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	1999	
WLT2 (CS7257)	Storage and Loading (East) DeDusting Tank	Shop built	N/A	36,375	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	2000	
GDF1 (AS1; CS8269)	Unleaded Gasoline Tank (Auto Shop)	Tessenderlo Kerley, Inc.	N/A	4,136	20.2.72.202.B.5	2017 (replacement tank)	☐ Existing (unchanged) **X To be Removed (added to Table 2-A)** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			17031B	gallons	IA List Item #1.a	2018 (replacement tank)	
NLT2 (CS8270)	No. 2 Diesel Tank (Off-Highway) (Auto Shop)	Shop built	N/A	4,000	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	2005	
NLT3 (CS8268)	No. 2 Diesel Tank (On-Highway) (Auto Shop)	Shop built	N/A	1,000	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	2005	
NLT4 (CS8272)	Used/Waste Oil Tank (Auto Shop)	Shop built	N/A	4,000	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	2005	
NLT5 (CS8267)	No. 2 Diesel Tank (Sand Yard)	Shop built	N/A	500	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	Unknown	
LLT1 (CS10704)	K-Mag DeDusting Tank	Shop built	N/A	42,000	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	2009	
GDF2 (LC1)	Unleaded Gasoline Tank (Lake Compound)	SC Fuels	N/A	500	20.2.72.202.B.5	--	☐ Existing (unchanged) **X To be Removed (added to Table 2-A)** ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			001806	gallons	IA List Item #5	2011 (tank)	
LG2	No. 2 Diesel Tank (Laguna Grande)	SC Fuels	N/A	500	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			001807	gallons	IA List Item #5	2011	
CU057-1	Hydraulic Oil Tank (No. 5 Shaft)	Shop built	N/A	6,000	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	1988	
CU057-2	No. 2 Diesel (Bulk) Tank (No. 5 Shaft)	Shop built	N/A	15,000	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	1978	
CU057-3	No. 2 Diesel (Surge) Tank (No. 5 Shaft)	Shop built	N/A	500	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	1985	
CU057-4	Used/Waste Oil Tank (No. 5 Shaft)	Shop built	N/A	5,000	20.2.72.202.B.2	--	X Existing (unchanged) ☐ To be Removed ☐ New/Additional ☐ Replacement Unit ☐ To Be Modified ☐ To be Replaced
			N/A	gallons	IA List Item #5	1997	

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

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

Table 2-C: Emissions Control Equipment

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

Control Equipment Unit No.	Control Equipment Description	Date Installed	Controlled Pollutant(s)	Controlling Emissions for Unit Number(s)[1]	Efficiency (% Control by Weight)[2]	Method used to Estimate Efficiency
CON4	Donaldson/Torit 232RFW10 Baghouse with oval shaped filter bags and rotating cleaning arm with pulsing air	2012	TSP, PM_{10}, $PM_{2.5}$	LANG Hoist (STK4)	Est. 99.0+[2]	Engineering Judgment
CON5a	Donaldson/Torit 232RFT8 Baghouse with oval shaped filter bags and rotating cleaning arm with pulsing air	1999	TSP, PM_{10}, $PM_{2.5}$	LANG Crusher (STK5a)	99.7%	Manufacturer
CON5b	Donaldson/Torit 156RFT8 Baghouse with oval shaped filter bags and rotating cleaning arm with pulsing air	2012	TSP, PM_{10}, $PM_{2.5}$	LANG Fine Ore Bin (STK5b)	Est. 99.0+[2]	Engineering Judgment
CON6	Cyclone upstream of scrubber and Mikropul Variable Throat Venturi Scrubber, Type SVS	1999	TSP, PM_{10}, $PM_{2.5}$	LANG Dryer (STK6)	99.5% (cyclone + scrubber)	Manufacturer
CON7	Donaldson/Torit 484RFW12 Baghouse with oval shaped filter bags and rotating cleaning arm with pulsing air	1999	TSP, PM_{10}, $PM_{2.5}$	LANG Screens (STK7)	99.7%	Manufacturer
CON10a	Cyclone upstream of scrubber and Mikropul High Efficiency Scrubber, Type SVS, Size 60/150 Variable Throat Venturi Scrubber	2008	TSP, PM_{10}, $PM_{2.5}$	GRAN Dryer 10a (STK10ab)	99.6% (cyclone + scrubber)	Manufacturer
CON10b	Cyclone upstream of scrubber and Monsanto CCS Collision Venturi Scrubber	1997	TSP, PM_{10}, $PM_{2.5}$	GRAN Process Ventilation 10b (STK10ab)	Est. 99.0+[2]	Engineering Judgment
CON11	Donaldson/Torit 156RFT10 Baghouse with oval shaped filter bags and rotating cleaning arm with pulsing air	2002	TSP, PM_{10}, $PM_{2.5}$	Dispatch Transfer Tower (STK11)	Est. 99.0+[2]	Engineering Judgment
CON14	Siemens/Wheelabrator Baghouse, Size 1515 Model 120 TA-SB Series 6P Jet III High Pressure Continuous Automatic Pulse Type	2012	TSP, PM_{10}, $PM_{2.5}$	GRAN Process Ventilation 10c (STK14)	99.98%	Manufacturer
--[3, 4]	Donaldson/Torit Dalmatic Collector, Model DLMV 15/15, Type H	2015	TSP, PM_{10}, $PM_{2.5}$	#19 Dispatch Belt (CS9655)	Est. 99.0+[2]	Engineering Judgment
--[3, 4]	Donaldson/Torit Dalmatic Collector, Model DLMV 15/15, Type H	2015	TSP, PM_{10}, $PM_{2.5}$	#2 Warehouse Shuttle Belt (CS7415)	Est. 99.0+[2]	Engineering Judgment
--[3, 4]	Scientific Dust Collectors, Reverse Pulse Bin Vent Filter, Model SPJ-12-X4B6BV	2013	TSP, PM_{10}, $PM_{2.5}$	Premium Product Bin (CS9061)	Est. 99.0+[2]	Engineering Judgment
--[3]	Scientific Dust Collectors, Reverse Pulse Bin Vent Filter, Model SPJ-9-X4B6BV	2010	TSP, PM_{10}, $PM_{2.5}$	No. 4 Loadout Fines Bin (CS7446)	99.99%	Manufacturer
--[3]	Scientific Dust Collectors, Reverse Pulse Bin Vent Filter, Model SPJ-9-X4B6BV	2011	TSP, PM_{10}, $PM_{2.5}$	No. 5 Loadout Fines Bin (CS7350)	99.99%	Manufacturer

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

[2] The control efficiencies are typical, nominal values and can vary.

[3] These bin vents/dust collectors were installed as per Condition A606.A in Title V Permit No. P039-M3, which allows the installation of additional or more effective fugitive controls that do not result in an increase in stack emission limits, fugitive emissions, or an increase in ambient impacts without 20.2.72 NMAC permitting.

[4] No emissions reduction credits are being taken for these dust collectors in the fugitive emission calculations.

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

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

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

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Federally enforceable controls and limitations exist at the facility. No new equipment is being proposed at this time.																		
Totals																		

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

Table 2-E: Requested Allowable Emissions

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

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Stack CAP Emissions																		
LANG Hoist (STK4)	--	--	--	--	--	--	--	--	0.75	CAP	0.75	CAP	0.75	CAP	--	--	--	--
LANG Crusher (STK5a)	--	--	--	--	--	--	--	--	1.0	CAP	1.0	CAP	1.0	CAP	--	--	--	--
LANG Fine Ore Bin (STK5b)	--	--	--	--	--	--	--	--	1.0	CAP	1.0	CAP	1.0	CAP	--	--	--	--
LANG Dryer (STK6)	5.0	CAP	8.0	CAP	0.48	CAP	0.053	0.23	21.5	CAP	21.5	CAP	21.5	CAP	--	--	--	--
LANG Screens (STK7)	--	--	--	--	--	--	--	--	4.0	CAP	4.0	CAP	4.0	CAP	--	--	--	--
GRAN Dryer 10a & GRAN Process Ventilation 10b (STK10ab)	3.0	CAP	5.0	CAP	0.32	CAP	0.035	0.15	17.0	CAP	17.0	CAP	17.0	CAP	--	--	--	--
Dispatch Transfer Tower (STK11)	--	--	--	--	--	--	--	--	1.0	CAP	1.0	CAP	1.0	CAP	--	--	--	--
GRAN Process Ventilation 10c (STK14)	--	--	--	--	--	--	--	--	2.5	CAP	2.5	CAP	2.5	CAP	--	--	--	--
S&L Boiler (STK20)	0.4	CAP	0.2	CAP	0.013	CAP	0.0040	0.018	0.02	CAP	0.02	CAP	0.02	CAP	--	--	--	--
LRAD1[2]	0.077	CAP	0.030	CAP	0.020	CAP	0.016	0.072	0.0042	CAP	0.0042	CAP	0.0042	CAP	--	--	--	--
LRAD2[2]	0.077	CAP	0.030	CAP	0.020	CAP	0.016	0.072	0.0042	CAP	0.0042	CAP	0.0042	CAP	--	--	--	--
LRAD3[2]	0.077	CAP	0.030	CAP	0.020	CAP	0.016	0.072	0.0042	CAP	0.0042	CAP	0.0042	CAP	--	--	--	--
LRAD4[2]	0.060	CAP	0.021	CAP	0.020	CAP	0.016	0.072	0.0036	CAP	0.0036	CAP	0.0036	CAP	--	--	--	--
LRAD5[2]	0.060	CAP	0.021	CAP	0.020	CAP	0.016	0.072	0.0036	CAP	0.0036	CAP	0.0036	CAP	--	--	--	--
LRAD6[2]	0.077	CAP	0.030	CAP	0.020	CAP	0.016	0.072	0.0042	CAP	0.0042	CAP	0.0042	CAP	--	--	--	--
Diesel Non-Road Engine (GEN1)	0.59	CAP	0.92	CAP	0.0023	CAP	0.28	1.24	0.0045	CAP	0.0045	CAP	0.0045	CAP				
Warehouse Screener and Stacker Diesel Engines [502(b)(10) Change] (rental)	0.49	CAP	0.51	CAP	0.025	CAP	0.39	0.21	0.0051	CAP	0.0051	CAP	0.0051	CAP	--	--	--	--
Total Stack CAP Emissions[3]	**9.91**	**70**	**14.79**	**115**	**0.96**	**6.0**	**0.86**	**2.28**	**48.80**	**175**	**48.80**	**175**	**48.80**	**175**	--	--	--	--
Fugitive Emissions as Stack Emissions when Baghouses are Not Operating																		
LANG Hoist (STK4)	--	--	--	--	--	--	--	--	0.39	CAP	0.19	CAP	0.054	CAP	--	--	--	--
LANG Crusher (STK5a)	--	--	--	--	--	--	--	--	0.19	CAP	0.10	CAP	0.024	CAP	--	--	--	--
LANG Fine Ore Bin (STK5b)	--	--	--	--	--	--	--	--	0.17	CAP	0.081	CAP	0.023	CAP	--	--	--	--
LANG Screens (STK7)	--	--	--	--	--	--	--	--	0.64	CAP	0.46	CAP	0.27	CAP	--	--	--	--
Dispatch Transfer Tower (STK11)	--	--	--	--	--	--	--	--	0.60	CAP	0.29	CAP	0.083	CAP	--	--	--	--
GRAN Process Ventilation 10c (STK14)	--	--	--	--	--	--	--	--	0.072	CAP	0.038	CAP	0.0094	CAP	--	--	--	--
Total Fugitive Emissions as Stack Emissions[3,4]	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**2.06**	**CAP**	**1.16**	**CAP**	**0.46**	**CAP**				

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Fugitive Emissions																		
Nash Plant Hoist (FUG1)	--	--	--	--	--	--	--	--	0.74	3.25	0.36	1.59	0.10	0.45	--	--	--	--
Nash Plant Screening (FUG2)	--	--	--	--	--	--	--	--	0.80	3.49	0.40	1.74	0.052	0.23	--	--	--	--
LANG Hoist (FUG3)	--	--	--	--	--	--	--	--	0.33	1.44	0.16	0.70	0.045	0.20	--	--	--	--
S&L Warehouse 1 (Coating On)[5] (FUG6)	--	--	--	--	--	--	--	--	0.54	2.43	0.19	0.87	0.031	0.14	--	--	--	--
S&L Warehouse 1 (Coating Off)[6] (FUG6)	--	--	--	--	--	--	--	--	1.17		0.49		0.076		--	--	--	--
S&L Warehouse 2 (Coating On)[5] (FUG8)	--	--	--	--	--	--	--	--	1.12	5.12	0.40	1.88	0.068	0.32	--	--	--	--
S&L Warehouse 2 (Coating Off)[6] (FUG8)	--	--	--	--	--	--	--	--	3.74		1.67		0.35		--	--	--	--
S&L Loadout 4 (Coating On)[5] (FUG9)	--	--	--	--	--	--	--	--	0.72	3.41	0.50	2.37	0.28	1.32	--	--	--	--
S&L Loadout 4 (Coating Off)[6] (FUG9)	--	--	--	--	--	--	--	--	3.78		2.62		1.46		--	--	--	--
S&L Loadout 5 (Coating On)[5] (FUG10)	--	--	--	--	--	--	--	--	0.29	1.38	0.17	0.79	0.070	0.33	--	--	--	--
S&L Loadout 5 (Coating Off)[6] (FUG10)	--	--	--	--	--	--	--	--	1.51		0.87		0.36		--	--	--	--
S&L Warehouse 3 (Coating On)[5] (FUG11)	--	--	--	--	--	--	--	--	1.55	6.96	0.62	2.78	0.13	0.58	--	--	--	--
S&L Warehouse 3 (Coating Off)[6] (FUG11)	--	--	--	--	--	--	--	--	3.39		1.50		0.30		--	--	--	--
S&L Truck Loadout (Coating On)[5] (FUG12)	--	--	--	--	--	--	--	--	0.29	1.29	0.14	0.64	0.040	0.18	--	--	--	--
S&L Truck Loadout (Coating Off)[6] (FUG12)	--	--	--	--	--	--	--	--	0.58		0.29		0.081		--	--	--	--
Permanent Abrasive Blasting (FUG20)	--	--	--	--	--	--	--	--	13.20	1.98	3.12	0.47	0.31	0.047	--	--	--	--
Paved Roads (FUG22)	--	--	--	--	--	--	--	--	0.36	1.27	0.092	0.32	0.0092	0.032	--	--	--	--

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
GRAN Process Ventilation 10c (Baghouse On)[5] (FUG24)	--	--	--	--	--	--	--	--	0.018	0.47	0.0089	0.25	0.0024	0.063	--	--	--	--
GRAN Process Ventilation 10c (Baghouse Off)[6] (FUG24)	--	--	--	--	--	--	--	--	0.090		0.047		0.012		--	--	--	--
LANG Hoist (Baghouse On)[5] (FUG25)	--	--	--	--	--	--	--	--	0.086	0.38	0.042	0.19	0.012	0.053	--	--	--	--
LANG Hoist (Baghouse Off)[6] (FUG25)	--	--	--	--	--	--	--	--	0.16		0.080		0.023		--	--	--	--
LANG Hoist (Baghouse On)[5] (FUG26)	--	--	--	--	--	--	--	--	0.016	0.099	0.0080	0.048	0.0023	0.014	--	--	--	--
LANG Hoist (Baghouse Off)[6] (FUG26)	--	--	--	--	--	--	--	--	0.33		0.16		0.045		--	--	--	--
LANG Crusher (Baghouse On)[5] (FUG27)	--	--	--	--	--	--	--	--	0.17	0.79	0.085	0.38	0.024	0.11	--	--	--	--
LANG Crusher (Baghouse Off)[6] (FUG27)	--	--	--	--	--	--	--	--	0.29		0.14		0.040		--	--	--	--
LANG Crusher (Baghouse On)[5] (FUG28)	--	--	--	--	--	--	--	--	4.75	20.81	2.40	10.50	0.16	0.71	--	--	--	--
LANG Crusher (Baghouse Off)[6] (FUG28)	--	--	--	--	--	--	--	--	4.82		2.44		0.17		--	--	--	--
LANG Fine Ore Bin (Baghouse On)[5] (FUG29)	--	--	--	--	--	--	--	--	0.47	2.08	0.23	1.02	0.065	0.29	--	--	--	--
LANG Fine Ore Bin (Baghouse Off)[6] (FUG29)	--	--	--	--	--	--	--	--	0.64		0.31		0.088		--	--	--	--
LANG Dryer; LANG Screens (Baghouse On)[5] (FUG30)	--	--	--	--	--	--	--	--	1.48	6.55	1.07	4.71	0.62	2.73	--	--	--	--
LANG Dryer; LANG Screens (Baghouse Off)[6] (FUG30)	--	--	--	--	--	--	--	--	2.12		1.53		0.89		--	--	--	--
S&L Dispatch (Coating On)[5] (FUG31)	--	--	--	--	--	--	--	--	1.24	5.56	0.61	2.72	0.17	0.77	--	--	--	--
S&L Dispatch (Coating Off)[6] (FUG31)	--	--	--	--	--	--	--	--	2.70		1.32		0.37		--	--	--	--

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
Dispatch Transfer Tower (Baghouse and Coating On)[5] (FUG32)	--	--	--	--	--	--	--	--	0.024	0.16	0.012	0.077	0.0033	0.022	--	--	--	--
Dispatch Transfer Tower (Baghouse and Coating Off)[6] (FUG32)	--	--	--	--	--	--	--	--	0.63		0.31		0.087		--	--	--	--
GRAN Process Vent 10b; GRAN Dryer 10a (Baghouses and Coating On)[5] (FUG33)	--	--	--	--	--	--	--	--	0.27	1.24	0.15	0.68	0.056	0.26	--	--	--	--
GRAN Process Vent 10b; GRAN Dryer 10a (Baghouses and Coating Off)[6] (FUG33)	--	--	--	--	--	--	--	--	1.08		0.54		0.17		--	--	--	--
Portable Abrasive Blasting (FUG40)	--	--	--	--	--	--	--	--	13.20	1.98	3.12	0.47	0.31	0.047	--	--	--	--
Railcar Offloading (material handling) (FUG43)	--	--	--	--	--	--	--	--	0.048	0.21	0.023	0.10	0.0066	0.029	--	--	--	--
GRAN Reclaim (material handling) (FUG44)	--	--	--	--	--	--	--	--	0.25	1.10	0.12	0.54	0.027	0.12	--	--	--	--
Railcar Offloading (haul road to WHs) (FUG47)	--	--	--	--	--	--	--	--	0.053	0.19	0.013	0.048	0.0013	0.0048	--	--	--	--
GRAN Reclaim (haul road) (FUG48)	--	--	--	--	--	--	--	--	0.074	0.26	0.019	0.067	0.0019	0.0067	--	--	--	--
K-Mag Rehandling (haul road) (FUG49)	--	--	--	--	--	--	--	--	0.25	0.89	0.064	0.23	0.0064	0.023	--	--	--	--
K-Mag Rehandling (material handling) (FUG50)	--	--	--	--	--	--	--	--	0.16	0.70	0.080	0.35	0.022	0.098	--	--	--	--
Brine Circuit (haul road) (FUG51)	--	--	--	--	--	--	--	--	0.037	0.13	0.0095	0.034	0.00095	0.0034	--	--	--	--
Brine Circuit (material handling) (FUG52)	--	--	--	--	--	--	--	--	1.08	4.74	0.53	2.34	0.15	0.66	--	--	--	--
General Hauling between WH2 and WH3 (FUG57)	--	--	--	--	--	--	--	--	0.012	0.042	0.0030	0.011	0.00030	0.0011	--	--	--	--
Railcar Offloading (haul road to GRAN Reclaim) (FUG58)	--	--	--	--	--	--	--	--	0.15	0.52	0.037	0.13	0.0037	0.013	--	--	--	--
Railcar Offloading (haul road to K-Mag Rehandling) (FUG59)	--	--	--	--	--	--	--	--	0.014	0.05097	0.00367	0.01299	0.00037	0.001299	--	--	--	--
Reagent (material handling, wind erosion at pile) (FUG60)	--	--	--	--	--	--	--	--	0.14	0.61	0.070	0.31	0.011	0.047	--	--	--	--
Reagent (material handling at grate) (FUG61)	--	--	--	--	--	--	--	--	0.0084	0.037	0.0041	0.018	0.0012	0.0051	--	--	--	--
Reagent (hauling) (FUG62)	--	--	--	--	--	--	--	--	0.0049	0.017	0.0012	0.0044	0.00012	0.00044	--	--	--	--

Unit No.	NOx		CO		VOC		SOx		PM[1]		PM10[1]		PM2.5[1]		H_2S		Lead	
	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
General Hauling between WH1 and WH2 (FUG63)	--	--	--	--	--	--	--	--	0.012	0.042	0.0030	0.011	0.00030	0.0011	--	--	--	--
Potash Hauling (railcar unloading to Brine Circuit) (FUG64)	--	--	--	--	--	--	--	--	0.18	0.62	0.045	0.16	0.0045	0.016	--	--	--	--
Potash Hauling (WH1, WH2, or WH3 to Brine Circuit) (FUG65)	--	--	--	--	--	--	--	--	0.10	0.36	0.026	0.092	0.0026	0.0092	--	--	--	--
TMA (material handling) (FUG66)	--	--	--	--	--	--	--	--	0.33	1.45	0.17	0.72	0.047	0.20	--	--	--	--
TMA (hauling) (FUG67)	--	--	--	--	--	--	--	--	3.02	10.70	0.77	2.73	0.077	0.27	--	--	--	--
Warehouse Screener and Stacker Material Handling [502(b)(10) Change] (FUG8 or FUG11)	--	--	--	--	--	--	--	--	0.17	0.094	0.086	0.046	0.019	0.010	--	--	--	--
Warehouse Screener and Stacker Hauling [502(b)(10) Change] (FUG8 or FUG11)	--	--	--	--	--	--	--	--	0.25	0.14	0.064	0.035	0.0064	0.0035	--	--	--	--
Total Fugitives (Baghouses and Coating On)[5]	--	--	--	--	--	--	--	--	**48.01**	**95.04**	**16.03**	**43.19**	**2.95**	**10.42**	--	--	--	--
Total Fugitives (Baghouses and Coating Off)[6]	--	--	--	--	--	--	--	--	**62.01**		**23.71**		**5.74**		--	--	--	--

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

[2] Only three of the six engines ever operate at one time. The engines alternate between being the primary unit and secondary unit on an annual basis to reduce engine wear and tear. However, to reduce monitoring and recordkeeping requirements, all six engines are being represented as operating at the same time.

[3] The sum of all stack emissions from each unit must meet the facility wide stack CAP TPY emissions limit for NOx, CO, VOC, TSP, PM10, and PM2.5, including "fugitive emissions as stack emissions."

[4] Includes emission units and their "fugitive emissions as stack emissions" while units are operating without baghouse control for up to 175 hours per rolling 12-month total per unit. These emissions would normally be pulled into the stack at ventilation pickup points when the baghouses are operating and must be counted toward the stack cap TPY emission limit.

[5] The lb/hr values are based on normal operation (i.e., baghouses on and coating on; Case 1). Mosaic is allowed to operate 175 hrs/yr without the baghouses and coating on; therefore, the ton/yr values are based on 175 hrs/yr of operation without the baghouses or coating and 8,585 (8,760-175) hrs/yr of normal operation.

[6] The lb/hr values are based on worst case operation (i.e., baghouses off and coating off; Case 3). Mosaic is allowed to operate 175 hrs/yr without the baghouses and coating on; therefore, the ton/yr values are based on 175 hrs/yr of operation without the baghouses or coating and 8,585 (8,760-175) hrs/yr of normal operation.

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

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

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

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

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

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

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

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

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

Stack No.	Serving Unit Number(s) from Table 2-A	NOx		CO		VOC		SOx		PM		PM10		PM2.5		☐ H_2S or ☐ Lead	
		lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr	lb/hr	ton/yr
STK10ab	CON10a CON10b	3.0	CAP	5.0	CAP	0.32	CAP	0.035	0.15	17.0	CAP	17.0	CAP	17.0	CAP	--	--
Totals:		3.0	CAP	5.0	CAP	0.32	CAP	0.035	0.15	17.0	CAP	17.0	CAP	17.0	CAP	--	--

Table 2-H: Stack Exit Conditions

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

Stack Number	Serving Unit Number(s) from Table 2-A	Orientation (H-Horizontal V=Vertical)	Rain Caps (Yes or No)	Height Above Ground (ft)	Temp. (F)	Flow Rate		Moisture by Volume (%)	Velocity (ft/sec)	Inside Diameter (ft)
						(acfs)	(dscfs)			
STK4[a]	CON4 (LANG Hoist)	V	Yes	20	74	141.6	124.5	0.8	18.6	3.35
STK5a[a]	CON5a (LANG Crusher)	V	Yes	30	99	115.2	96.0	1.1	23.5	2.46
STK5b[a]	CON5b (LANG Fine Ore Bin)	H	No	83	88	127.9	108.7	1.2	41.6	1.98
STK6[a]	CON6 (LANG Dryer)	V	No	160	146	916.6	562.1	22.9	24.0	6.80
STK7[a]	CON7 (LANG Screens)	V	Yes	158	143	349.6	270.4	0.8	19.1	4.88
STK10ab[a]	CON10a, CON10b (GRAN Dryer 10a, GRAN Process Ventilation 10b)	V	No	145	132	1,796.6	1,240.1	14.2	48.8	6.92
STK11[a]	CON11 (Dispatch Transfer Tower)	V	No	20	89	85.0	72.2	1.2	50.2	1.46
STK14[a]	CON14 (GRAN Process Ventilation 10c)	V	No	70	104	140.4	115.9	0.4	38.1	2.20
STK20[b]	S&L Boiler	V	No	38	420	0.34	0.17	16	0.63	0.83
LRAD1-6	LRAD1-6 (diesel gensets)	V	No	2.1	~900	1.1	1.1	0	Unknown	0.10
GEN1	GEN1 (diesel non-road engine)	V	No	5.8	Unknown	Unknown	Unknown	0	Unknown	0.10
Rental	Warehouse Screener and Stacker Diesel Non-Road Engines	V	No	5 to 8	Unknown	Unknown	Unknown	0	Unknown	0.10

[a] Based on an average of the 2015 to 2020 stack test results.

[b] Based on information from the manufacturer.

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		Hexane X 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		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
STK6 (LANG Dryer)		0.17	0.72	0.16	0.69												
STK10ab (GRAN Dryer)		0.11	0.48	0.11	0.46												
STK20 (S&L Boiler)		0.0046	0.020	0.0044	0.019												
LRAD1-6		0.00013	0.00056	--	--												
Diesel Non-Road Engine (GEN1)		0.0037	0.016	--	--												
Warehouse Screener and Stacker Diesel Non-Road Engines (Rental)		0.0052	0.0028	--	--												
Totals:		0.29	1.24	0.27	1.17												

Table 2-J: Fuel

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

Unit No.	Fuel Type (low sulfur Diesel, ultra low sulfur diesel, Natural Gas, Coal, …)	Fuel Source: purchased commercial, pipeline quality natural gas, residue gas, raw/field natural gas, process gas (e.g. SRU tail gas) or other	Specify Units				
			Higher Heating Value	Maximum Hourly Usage	Maximum Annual Usage	% Sulfur	% Ash
STK6 (LANG Dryer)	Natural Gas	Commercial Pipeline	1,028 Btu/scf (2019 average)	88 Mscf/hr (based on burner rating)	766,926 Mscf/yr (based on burner rating and 8,760 hr/yr)	Commercial Pipeline	0
STK10ab (GRAN Dryer)	Natural Gas	Commercial Pipeline	1,028 Btu/scf (2019 average)	58 Mscf/hr (based on burner rating)	511,284 Mscf/yr (based on burner rating and 8,760 hr/yr)	Commercial Pipeline	0
STK20 (S&L Boiler)	Natural Gas	Commercial Pipeline	1,028 Btu/scf (2019 average)	2 Mscf/hr (based on burner rating)	21,303 Mscf/yr (based on burner rating and 8,760 hr/yr)	Commercial Pipeline	0
LRAD1-6 (Diesel Gensets)	ULSD	Purchased	138,000 Btu/gal	0.5 gal/hr	26,280 gal/yr (based on max hourly fuel usage and 6 units operating 8,760 hr/yr)	0.0015%	0
GEN1 (Diesel Non-Road Engine)	ULSD	Purchased	138,000 Btu/gal	5.5 gal/hr	48,220 gal/yr (based on max hourly fuel usage and 8,760 hr/yr)	0.0015%	0
Warehouse Screener and Stacker Diesel Non-Road Engines (Rental)	ULSD	Purchased	138,000 Btu/gal	9.7 gal/hr (combined total; calculated based on 7,000 Btu/hp-hr and 138,000 Btu/gal)	10,476 gal/yr (combined total; based on max hourly fuel usage and 1,080 hr/yr)	0.0015%	0

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

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

Tank No.	SCC Code	Material Name	Composition	Liquid Density (lb/gal)	Vapor Molecular Weight (lb/lb*mol)	Average Storage Conditions		Max Storage Conditions	
						Temperature (°F)	True Vapor Pressure (psia)	Temperature (°F)	True Vapor Pressure (psia)
Auto Shop (AS1; CS8269)	3050229	Unleaded Gasoline	Petroleum Distillate	6.4	N/A	Ambient	9	Ambient	9
Lake Compound (LC1; Serial No. 001806)	3050229	Unleaded Gasoline	Petroleum Distillate	6.4	N/A	Ambient	9	Ambient	9

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 = 0.159 M3 = 42.0 gal

Tank No.	Date Installed	Materials Stored	Seal Type (refer to Table 2-LR below)	Roof Type (refer to Table 2-LR below)	Capacity		Diameter (M)	Vapor Space (M)	Color (from Table VI-C)		Paint Condition (from Table VI-C)	Annual Throughput (gal/yr)	Turn-overs (per year)
					(bbl)	(M^3)			Roof	Shell			
Auto Shop (AS1; CS8269)	2018 (replacement tank)	Unleaded Gasoline (RVP = 9)	Welded Tank	FX	98	16	2.4	Unknown	MG	MG	Good	50,000	12
Lake Compound (LC1; Serial No. 001806)	2011	Unleaded Gasoline (RVP = 9)	Welded Tank	Horizontal Tank	12	1.9	1.2	N/A	WH	WH	Good	16,500	33

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

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

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

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

Material Processed				Material Produced			
Description	**Chemical Composition**	**Phase (Gas, Liquid, or Solid)**	**Quantity (specify units)**	**Description**	**Chemical Composition**	**Phase**	**Quantity (specify units)**
LANG	Langbeinite Ore - various mixtures of K, Mg, Ca, Na salts and other elements including O, S, Cl	Solid	6,387,500 tpy *(based on 17,500 tons/day)*	K-Mag & Granulation	97% K2SO4*2(MgSO4)	Solid	3,504,000 tpy *(based on 400 tons/hour)*

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
There are no CEMs employed at this facility.									

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
CON6	Scrubber pressure drop[1]	At scrubber pressure drop gauge	Inches H_2O	0-30"	Monthly	Clean and calibrate	Log entry	Daily
CON10a	Scrubber pressure drop[1]	At scrubber pressure drop gauge	Inches H_2O	0-30"	Monthly	Clean and calibrate	Log entry	Daily
CON10b	Scrubber pressure drop[1]	At scrubber pressure drop gauge	Inches H_2O	0-30"	Monthly	Clean and calibrate	Log entry	Daily
CON6	Scrubber dust cyclone valves	At dust cyclone valves	Yes or No	Valve operating freely	As necessary	Clean out valves	Log entry	Daily
CON10a	Scrubber dust cyclone valves	At dust cyclone valves	Yes or No	Valve operating freely	As necessary	Clean out valves	Log entry	Daily
CON10b	Scrubber dust cyclone valves	At dust cyclone valves	Yes or No	Valve operating freely	As necessary	Clean out valves	Log entry	Daily
CON6	Scrubber salt concentration	At scrubber effluent tank	TDS	0-3%	As necessary	Adjust freshwater makeup	Log entry	Daily
CON10a	Scrubber salt concentration	At scrubber effluent tank	TDS	0-3%	As necessary	Adjust freshwater makeup	Log entry	Daily
CON10b	Scrubber salt concentration	At scrubber effluent tank	TDS	0-3%	As necessary	Adjust freshwater makeup	Log entry	Daily
CON4	Baghouse pressure drop	At baghouse presure drop gauge	Inches H_2O	0.2-3"	Monthly	Clean and calibrate	Log entry	Daily
CON5a	Baghouse pressure drop	At baghouse presure drop gauge	Inches H_2O	0.2-3"	Monthly	Clean and calibrate	Log entry	Daily
CON5b	Baghouse pressure drop	At baghouse presure drop gauge	Inches H_2O	0.2-3"	Monthly	Clean and calibrate	Log entry	Daily
CON7	Baghouse pressure drop	At baghouse presure drop gauge	Inches H_2O	1-5"	Monthly	Clean and calibrate	Log entry	Daily
CON11	Baghouse pressure drop	At baghouse presure drop gauge	Inches H_2O	0.2-3"	Monthly	Clean and calibrate	Log entry	Daily
CON14	Baghouse pressure drop	At baghouse presure drop gauge	Inches H_2O	0.5-7"	Monthly	Clean and calibrate	Log entry	Daily
CON4[2]	Baghouse cleaning arm	At baghouse cleaning arm/chains	Yes or No	Operating correctly	As necessary	Repair and/or replace	Log entry	Daily
CON5a	Baghouse cleaning arm/chains	At baghouse cleaning arm/chains	Yes or No	Operating correctly	As necessary	Repair and/or replace	Log entry	Daily
CON5b	Baghouse cleaning arm/chains	At baghouse cleaning arm/chains	Yes or No	Operating correctly	As necessary	Repair and/or replace	Log entry	Daily
CON7	Baghouse cleaning arm/chains	At baghouse cleaning arm/chains	Yes or No	Operating correctly	As necessary	Repair and/or replace	Log entry	Daily
CON11	Baghouse cleaning arm/chains	At baghouse cleaning arm/chains	Yes or No	Operating correctly	As necessary	Repair and/or replace	Log entry	Daily
CON14	Baghouse cleaning air jets	At baghouse	Yes or No	Operating correctly	As necessary	Repair and/or replace	Log entry	Daily
CON4	Baghouse visible emissions	At appropriate VE observation location	Opacity	No visible emissions	As necessary	Replace bags	Log entry	Once per daylight shift
CON5a	Baghouse visible emissions	At appropriate VE observation location	Yes or No	No visible emissions	As necessary	Replace bags	Log entry	Once per daylight shift
CON5b	Baghouse visible emissions	At appropriate VE observation location	Yes or No	No visible emissions	As necessary	Replace bags	Log entry	Once per daylight shift
CON7	Baghouse visible emissions	At appropriate VE observation location	Yes or No	No visible emissions	As necessary	Replace bags	Log entry	Once per daylight shift
CON11	Baghouse visible emissions	At appropriate VE observation location	Yes or No	No visible emissions	As necessary	Replace bags	Log entry	Once per daylight shift
CON14	Baghouse visible emissions	At appropriate VE observation location	Yes or No	No visible emissions	As necessary	Replace bags	Log entry	Once per daylight shift

[1] Minimum average pressure drop is established by stack testing.

[2] Since the cleaning arm/chains are not visible for CON4, a whisker switch shall alarm if it is not tripped by the cleaning arm/chain movement, signaling that the cleaning arm/chain is not operating.

Table 2-P: Greenhouse Gas Emissions

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

		CO_2 ton/yr	N_2O ton/yr	CH_4 ton/yr	SF_6 ton/yr	PFC/HFC ton/yr[2]					Total GHG Mass Basis ton/yr[4]	Total CO_2e ton/yr[5]
Unit No.	**GWPs [1]**	**1**	**298**	**25**	**22,800**	**footnote 3**						
STK6 (LANG Dryer)	**mass GHG**	46,112	0.087	0.87							46,113	
	CO_2e	46,112	25.9	21.7								46,160
STK10ab (GRAN Dryer)	**mass GHG**	30,742	0.058	0.58							30,742	
	CO_2e	30,742	17.3	14.5								30,773
STK20 (S&L Boiler)	**mass GHG**	1,281	0.0024	0.024							1,281	
	CO_2e	1,281	0.72	0.60								1,282
LRAD1-6	**mass GHG**	296	0.0024	0.012							296	
	CO_2e	296	0.71	0.30								297
GEN1	**mass GHG**	543	0.0044	0.022							543	
	CO_2e	543	1.31	0.55								544
Warehouse Screener and Stacker Diesel Non-Road Engines (Rental)	**mass GHG**	118	0.0010	0.0048							118	
	CO_2e	118	0.28	0.12								118
Total	**mass GHG**	79,091	0	2							79,093	
	CO_2e	79,091	46	38								79,175

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

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

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

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

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

Section 3

Application Summary

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

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

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

This Title V permit modification is being submitted to incorporate NSR Permit Nos. 495-M13-R1, -R2, -R3, -R4 and 495-M14 into the current Title V permit. A summary of these NSR permits is provided below. Note that no changes to the underlying permit conditions are being requested in this permit application.

- NSR Permit No. 495-M13-R1 was issued on September 17, 2019 as an NSR Technical Permit Revision and authorized new tailings management area (TMA) activities. Operation of these new activities began on October 8, 2019. This activity is a regulated source and the fugitive emission calculations are included in Section 6 of this permit application.
- NSR Permit No. 495-M13-R2 was issued on March 16, 2020 as an NSR Administrative Permit Revision and authorized a new Railcar Transloader as NSR-exempt. As a result of the Railcar Transloader having a potential-to-emit of less than 1 tpy, the transloader is also an Insignificant Activity under the Title V program. The associated approval and originally-submitted backup calculations are provided in Section 6 of this permit application. Note that the emission tables have been updated to include TSP since TSP is a regulated pollutant under 20.2.70 NMAC, and the updated tables are also provided in Section 6 of this permit application..
- NSR Permit No. 495-M13-R3 was issued on April 16, 2020 as an NSR Administrative Permit Revision with Federally-enforceable 502(b)(10) conditions and authorized the temporary portable Warehouse Screener and Stacker as NSR-exempt. The associated approval and backup calculations are provided in Section 6 of this permit application. The Warehouse Screener and Stacker are shown in the UA2 tables of this permit application because this equipment is regulated as a result of the 502(b)(10) change request. Specifically, the equipment is limited to 1,080 hr/yr based on a 365-day rolling total.
- NSR Permit No. 495-M13-R4 was issued on May 21, 2020 as an NSR Administrative Permit Revision and authorized the Starch Storage Bin as NSR-exempt. As a result of the Starch Storage Bin having a potential-to-emit of less than 1 tpy, the bin is also an Insignificant Activity under the Title V program. The associated approval and originally-submitted backup calculations are provided in Section 6 of this permit application. Note that the emission tables have been updated to include TSP since TSP is a regulated pollutant under 20.2.70 NMAC, and the updated tables are also provided in Section 6 of this permit application. The emission factor references in Section 7 of this permit application have also been updated to include the Starch Storage Bin.
- NSR Permit No. 495-M14 is an NSR Significant Permit Revision that will be issued on or before October 25, 2020. The various changes requested in this permit application include:
  - Lowering the facility-wide CO stack CAP from 225 tpy to 115 tpy.
  - Adding a new belt that will allow material to go from Warehouse No. 1 to Granulation Reclaim.

- Correcting the serial number for LRAD2 and updating the model and serial numbers for LRAD4 and LRAD5, which were replaced in 2015 with like-kind generators that have lower emissions.
- Removing the "Contractor Abrasive Blasting (FUG41)" emission source, renaming the "Mosaic Permanent Abrasive Blasting (FUG20)" emission source "Permanent Abrasive Blasting (FUG20)", renaming the "Mosaic Portable Abrasive Blasting (FUG40)" emission source "Portable Abrasive Blasting (FUG40)", and lowering the annual abrasive blasting throughput limit from 900 tpy to 300 tpy.
- Adding a diesel non-road engine (GEN1).
- Updating the LANG Dryer (STK6) model number from "North American 4213-112-XXLEX" to "Fives North America 4213-112-7X8GGO/12387".
- Representing the gasoline dispensing facilities (GDF1 and GDF2) as regulated units because they are subject to 40 CFR 63, Subpart CCCCCC. Also, changing the GDF1 facility ID to "AS1" and the GDF2 facility ID to "LC1".
- Changing the "Cuttings Circuit" references throughout the permit to "Nash Plant" to be in-line with the facility's nomenclature.
- Changing the name of "Railcar Unloading" to "Railcar Offloading" throughout this permit application to be in-line with the facility's nomenclature.
- Changing the name of "K-Mag Reclaim" to "K-Mag Rehandling" throughout this permit application to be in-line with the facility's nomenclature.
- Incorporating other minor fugitive emission table updates.
- Making an administrative adjustment to the STK7 throughput limit in the permit to align with the corresponding scale reference.
- Add the Dispatch to Storage Belt (CS11535) scale as an alternative measurement option location for the Dispatch Transfer Tower (STK11) and remove the Granulation #2 Product Belt (CS9045) scale. This change will require adjustment of the Dispatch Transfer Tower (STK11) throughout monitoring location wording in the permit to, "Monitor using the sum of the ton per hour rates of the weigh belts at the KMAG Secondary Dispatch Conveyor #2 (CS11515) and the Granulation #1 Product Belt (CS9040), or the Dispatch to Storage Belt (CS11535)".
- Reducing the portable analyzer testing frequency based on the history of compliance.
- Reducing the property boundary observation frequency based on the history of compliance.

Section 4

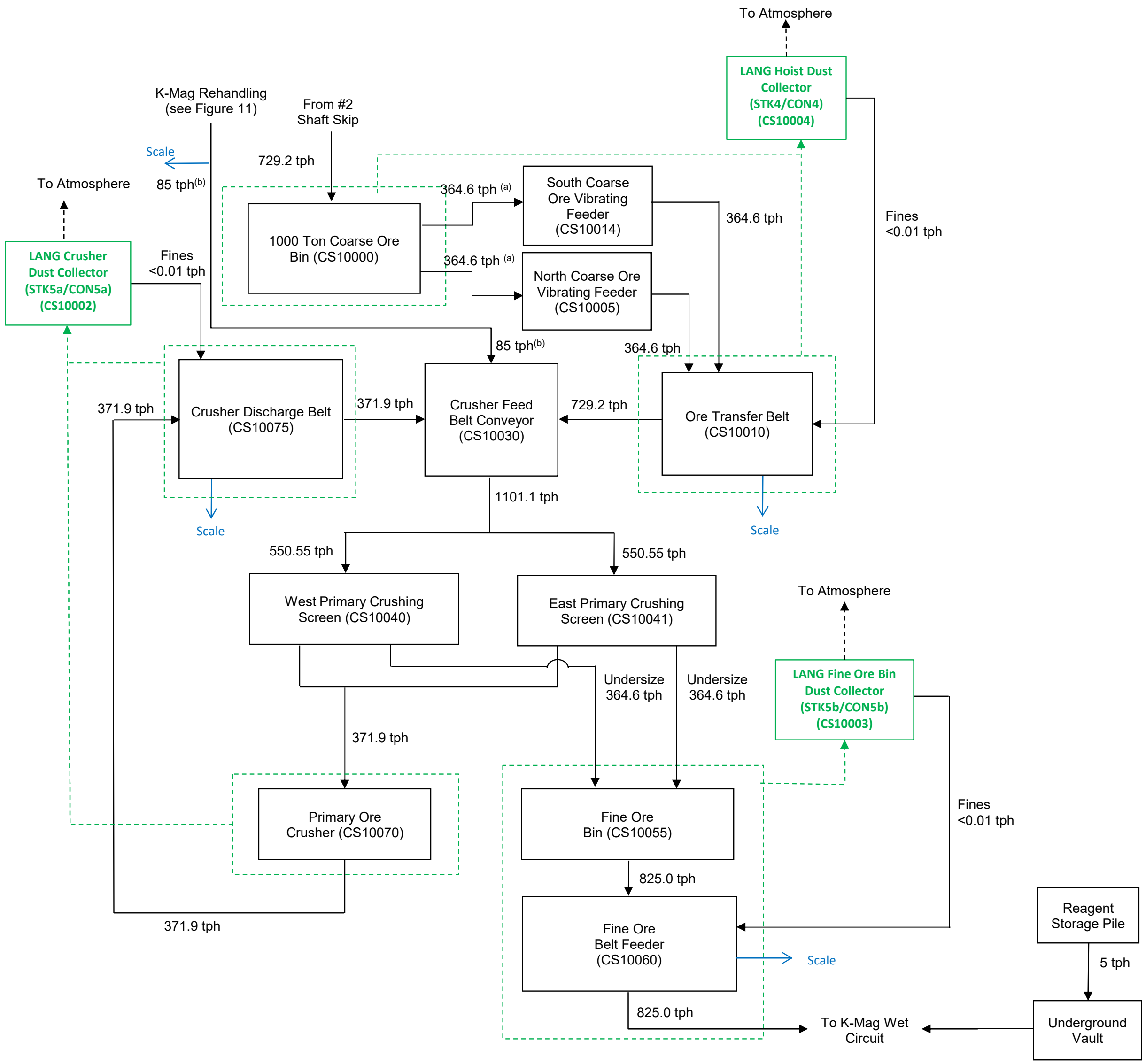
Process Flow Sheet

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.

Please see the enclosed process flow sheets, which are the same as the flow sheets provided in the most recent NSR significant permit revision application for NSR Permit No. 495-M14.

- Figure 1 – LANG Hoist, LANG Crushing and LANG Fine Ore Bin Circuits
- Figure 2 – LANG Screening Circuit
- Figure 3 – Granulation Plant
- Figure 4 – Nash Plant (formerly "Cuttings Circuit")
- Figure 5 – Dispatch
- Figure 6 – No. 4 Railcar Loadout
- Figure 7 – No. 5 Railcar Loadout
- Figure 8 – Truck Loadout
- Figure 9 – Railcar Offloading (formerly "Railcar Unloading")
- Figure 10 – Brine Circuit and Potash Hauling
- Figure 11 – K-Mag Rehandling (formerly "K-Mag Reclaim")

Figure 1
LANG Hoist, LANG Crushing, and LANG Fine Ore Bin Circuits
Mosaic Potash Carlsbad, Inc.



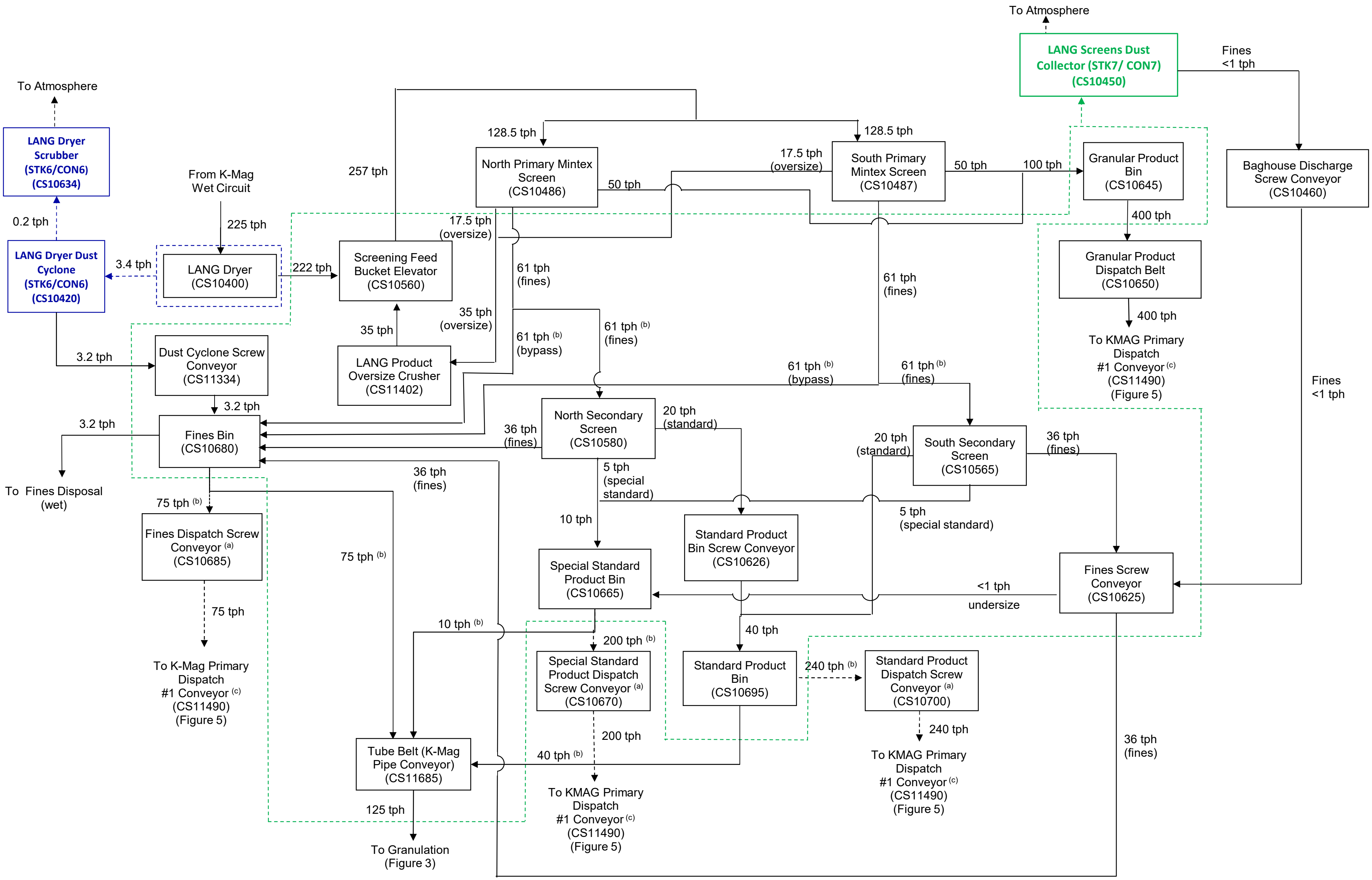
Footnotes:

(a) 550 tph is the maximum throughput that each vibrating feeder can process, but only if the other one goes down. The worst case operating scenario is represented above such that we are accounting for all of the material going through both feeders.

(b) 85 tpy represents the maximum K-Mag Rehandling material that can be added to the system. When this material is introduced, the other throughputs will be adjusted such that the maximum throughput from the Crusher Feed Belt Conveyor (CS10030) using data from the existing scales will not exceed 1101 tph on a daily average basis.

September 2020

Figure 2
LANG Screening Circuit
Mosaic Potash Carlsbad, Inc.

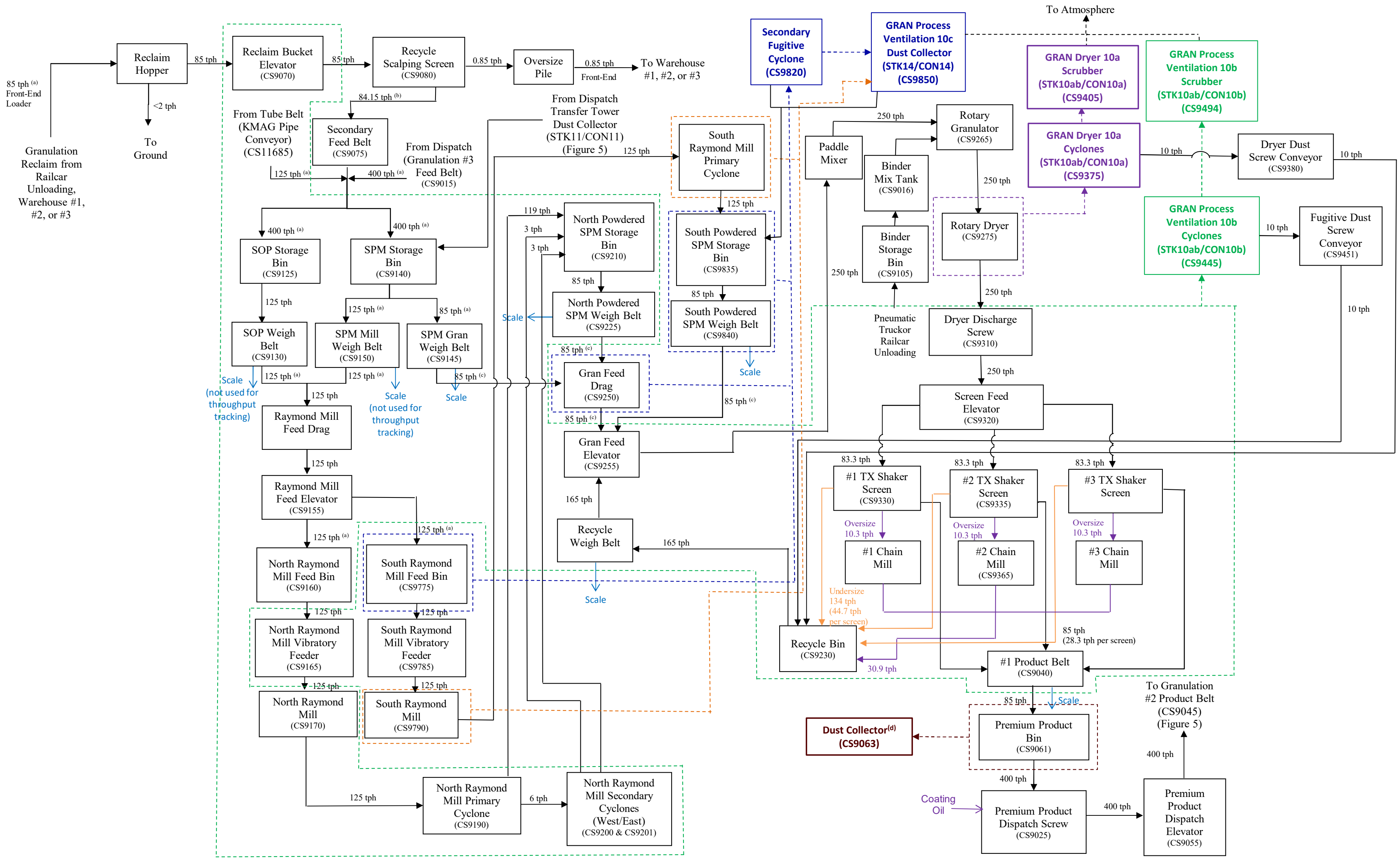


Footnotes:

(a) To be used when the Tube Belt is not operating.
(b) Only one contributes to the total throughput at a time.
(c) Only one product (i.e., Standard, Special Standard, Fines, or Granular) can be transferred to Dispatch at a time.

September 2020

Figure 3
Granulation Plant
Mosaic Potash Carlsbad, Inc.



Footnotes:

(a) Only one contributes to the total throughput at a time. The worst-case emissions estimates are based on the maximum throughput moving through each piece of equipment even though some of the equipment can only operate on an "either/or" basis.

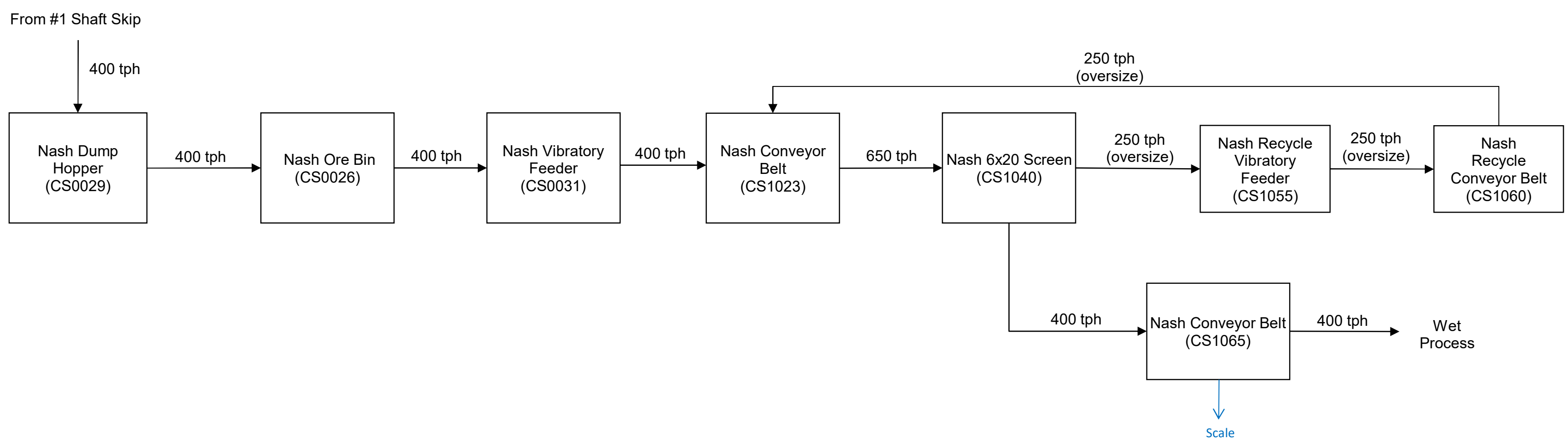
(b) When the Granulation Reclaim material is introduced into the system, the maximum throughput after the Secondary Feed Belt (CS9075) will not exceed 400 tph.

(c) Throughput contributions to the dryer are based on material from the SPM Gran Weigh Belt (CS9145), the North Powdered SPM Weigh Belt (CS9225), the South Powdered SPM Weigh Belt (CS9840), and the Recycle Belt (CS9235). The throughputs represented in this flow diagram are based on maximum hourly throughputs even though not all of these sources can contribute the maximum amount to the dryer at the same time. The maximum dryer thoughput of 250 tph will not be exceeded with the four source contributions.

(d) This dust collector was installed as per Condition A606.A in Title V Permit P039-M3, which allows the installation of additional or more effective fugitive controls that do not result in an increase in stack emission limits, fugitive emissions, or an increase in ambient impacts without 20.2.72 NMAC construction permitting. No emissions reduction credits are being taken for this dust collector in the fugitive emission calculations.

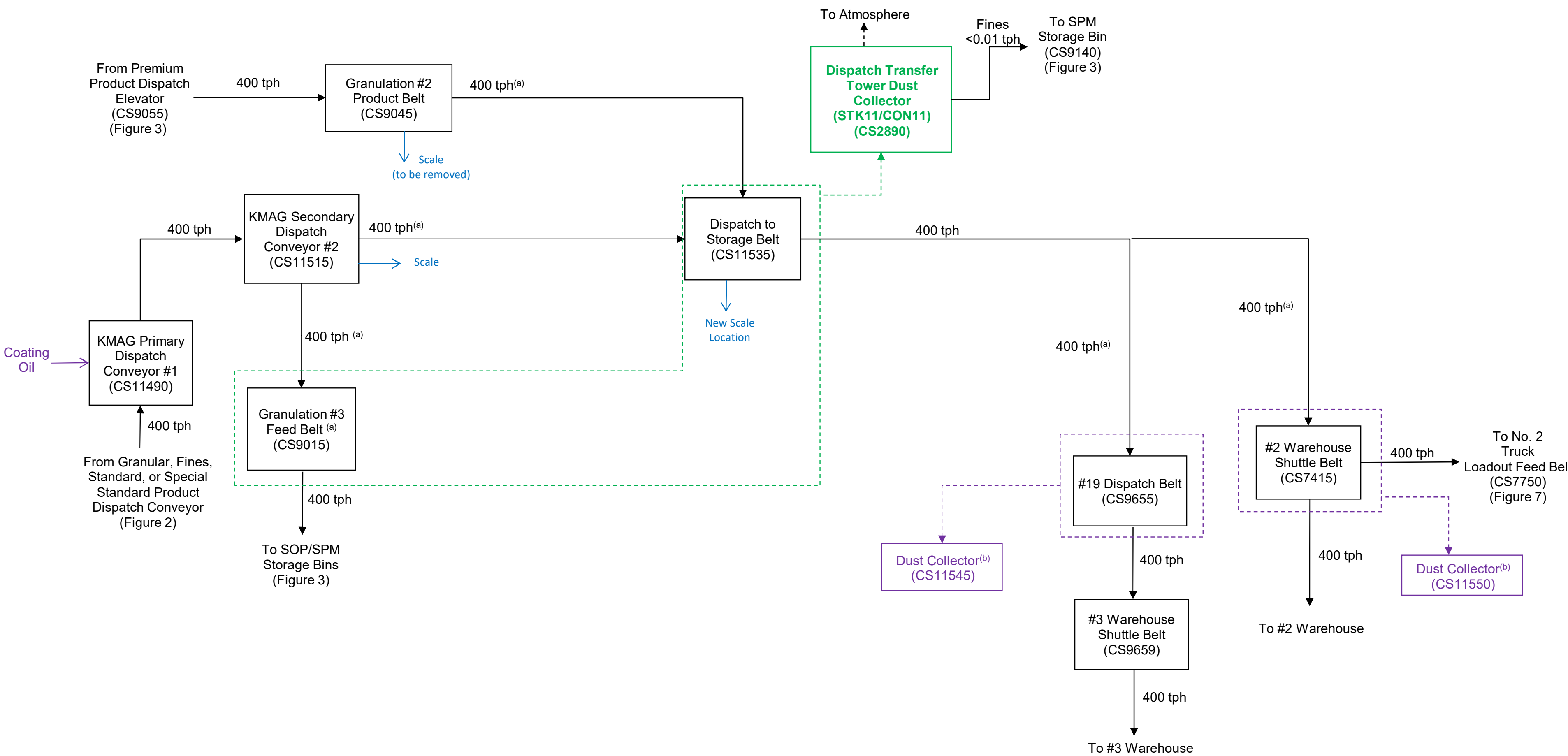
September 2020

Figure 4
Nash Plant (formerly "Cuttings Circuit")
Mosaic Potash Carlsbad, Inc.



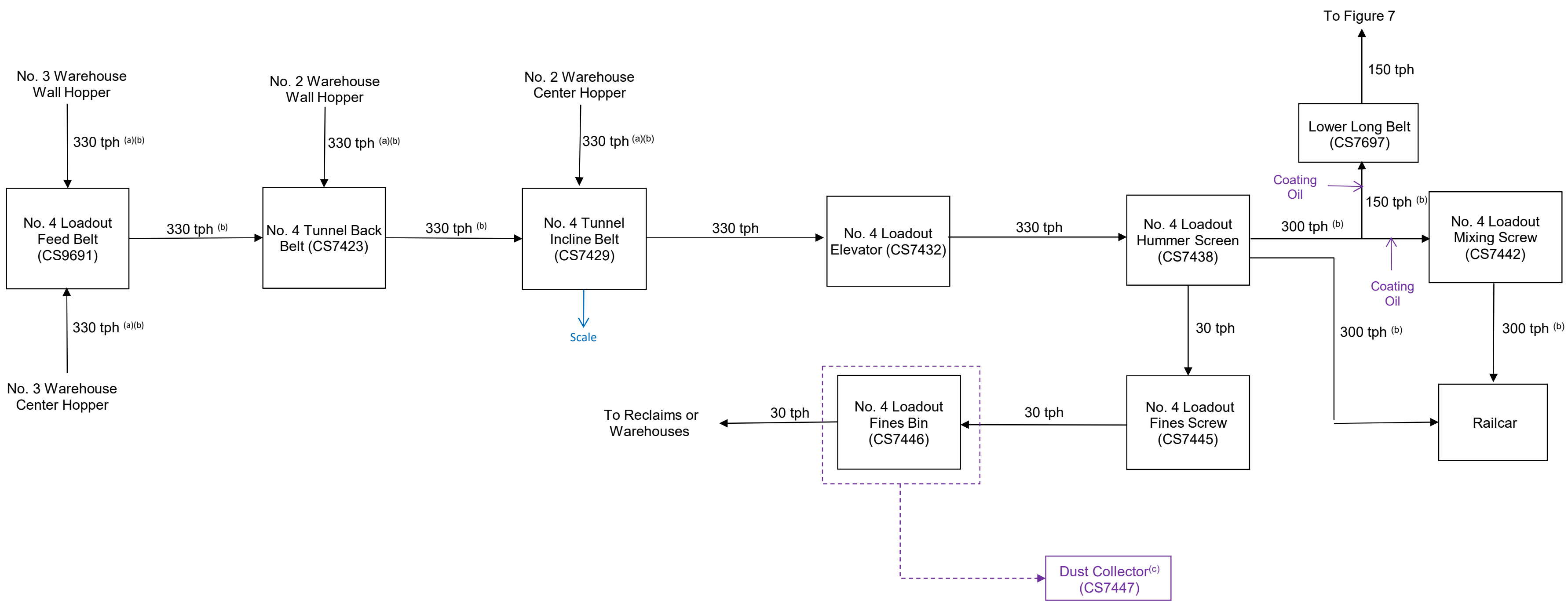
September 2020

Figure 5
Dispatch
Mosaic Potash Carlsbad, Inc.



Footnotes:
[a] Only one contributes to the total throughput at a time.
[b] These dust collectors were installed as per Condition A606.A in Title V Permit P039-M3, which allows the installation of additional or more effective fugitive controls that do not result in an increase in stack emission limits, fugitive emissions, or an increase in ambient impacts without 20.2.72 NMAC construction permitting. No emissions reduction credits are being taken for this dust collector in the fugitive emission calculations.

Figure 6
No. 4 Railcar Loadout
Mosaic Potash Carlsbad, Inc.

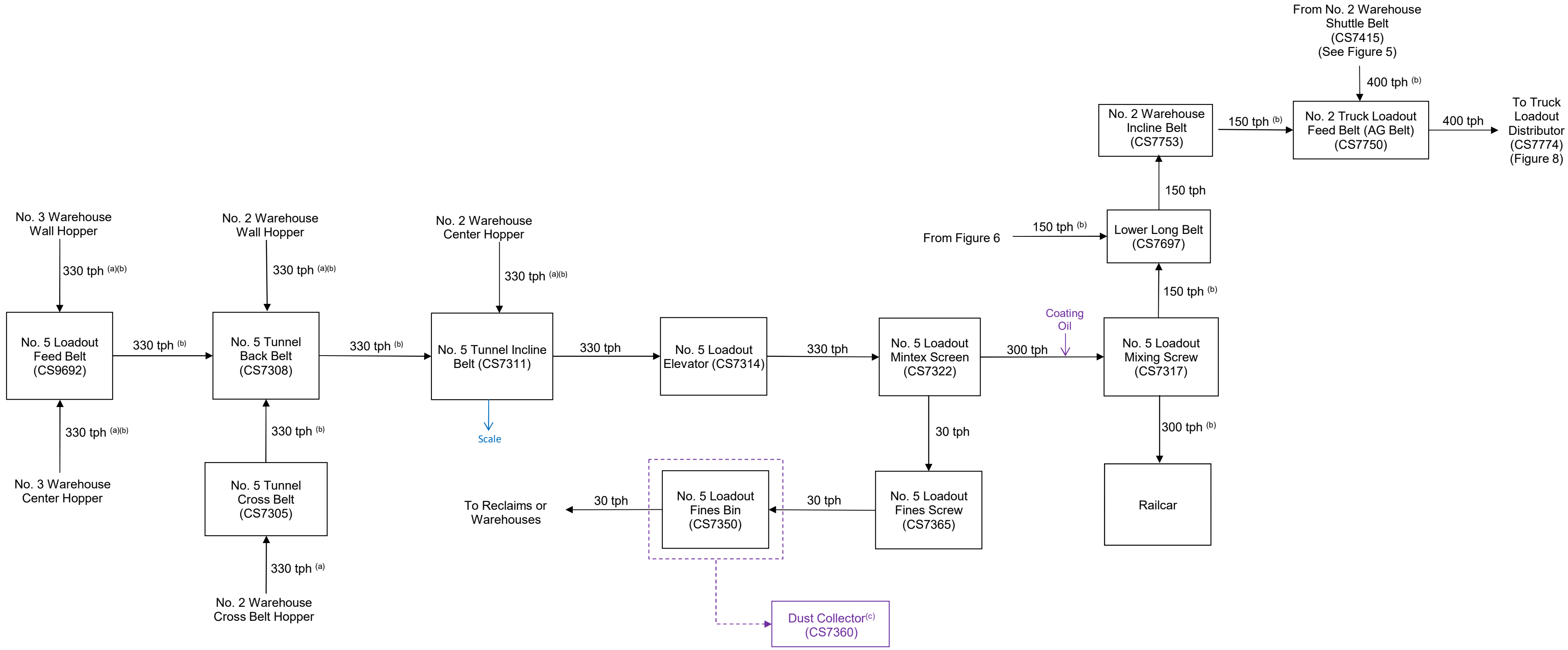


Footnotes:
(a) Only the No. 2 Warehouse Hoppers or the No. 3 Warehouse Hoppers contribute to the total throughput at a time. Even though the hoppers within a warehouse can operate simultaneously, each one can not move more than the max throughput shown on this flow diagram.

(b) Only one contibutes to the total throughput at a time.

(c) This bin vent dust collector was installed as per Condition A606.A in Title V Permit P039-M3, which allows the installation of additional or more effective fugitive controls that do not result in an increase in stack emission limits, fugitive emissions, or an increase in ambient impacts without 20.2.72 NMAC construction permitting.

Figure 7
No. 5 Railcar Loadout
Mosaic Potash Carlsbad, Inc.



Footnotes:

[(a)] Only the No. 2 Warehouse Hoppers or the No. 3 Warehouse Hoppers contribute to the total throughput at a time. Even though the hoppers within a warehouse can operate simultaneously, each one can not move more than the max throughput shown on this flow diagram.

[(b)] Only one contibutes to the total throughput at a time.

[(c)] This bin vent dust collector was installed as per Condition A606.A in Title V Permit P039-M3, which allows the installation of additional or more effective fugitive controls that do not result in an increase in stack emission limits, fugitive emissions, or an increase in ambient impacts without 20.2.72 NMAC construction permitting.

Figure 8
Truck Loadout
Mosaic Potash Carlsbad, Inc.

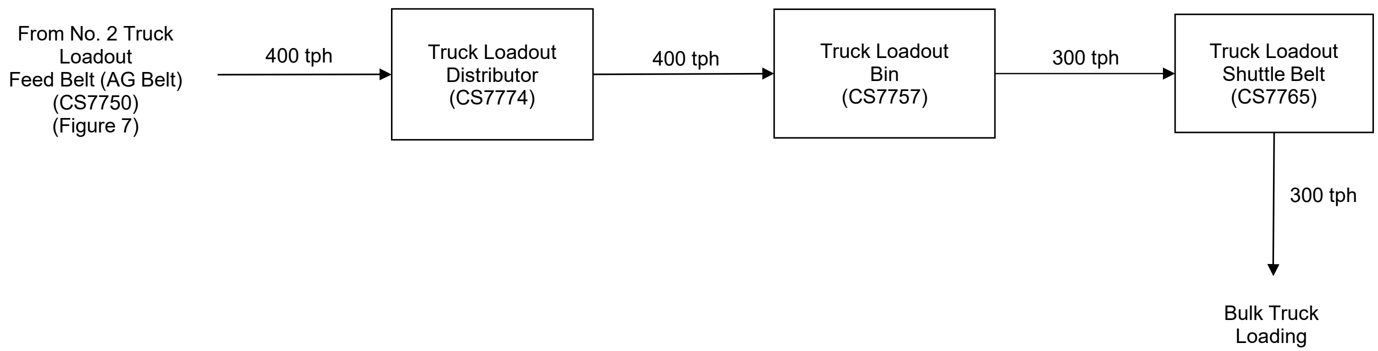


Figure 9
Railcar Offloading (formerly "Railcar Unloading")
Mosaic Potash Carlsbad, Inc.

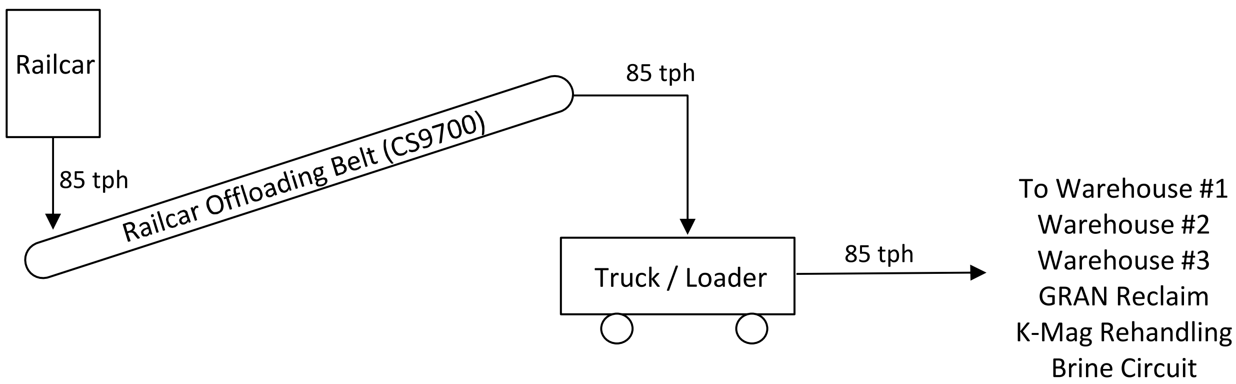
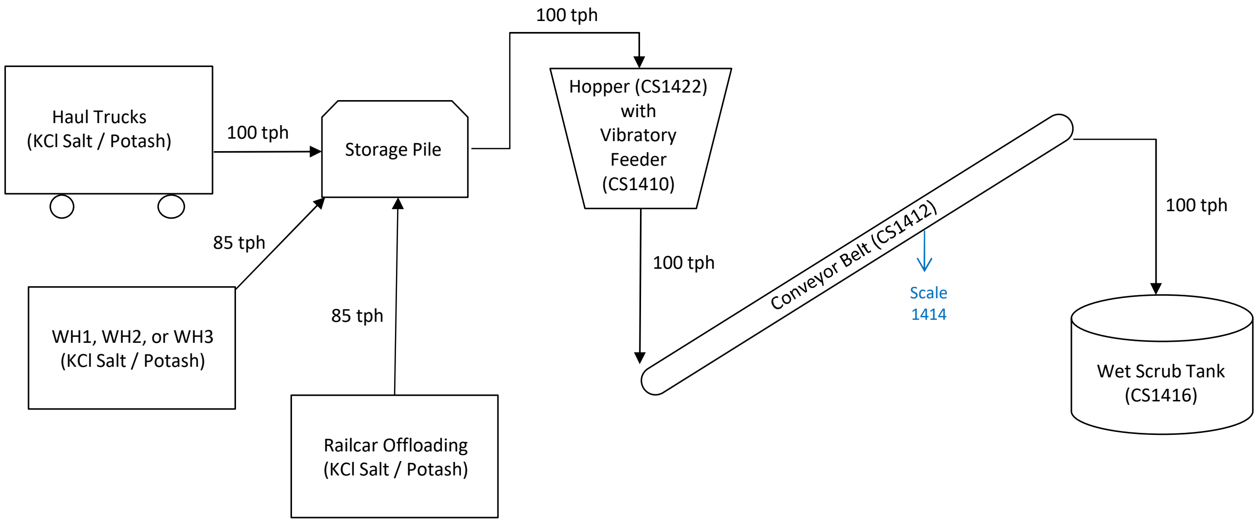
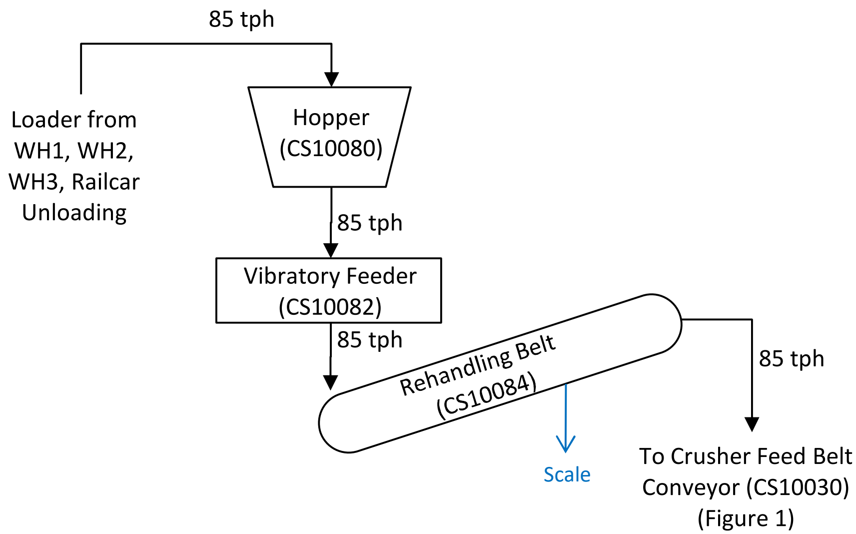


Figure 10
Brine Circuit and Potash Hauling
Mosaic Potash Carlsbad, Inc.



September 2020

Figure 11
K-Mag Rehandling (formerly "K-Mag Reclaim")
Mosaic Potash Carlsbad, Inc.



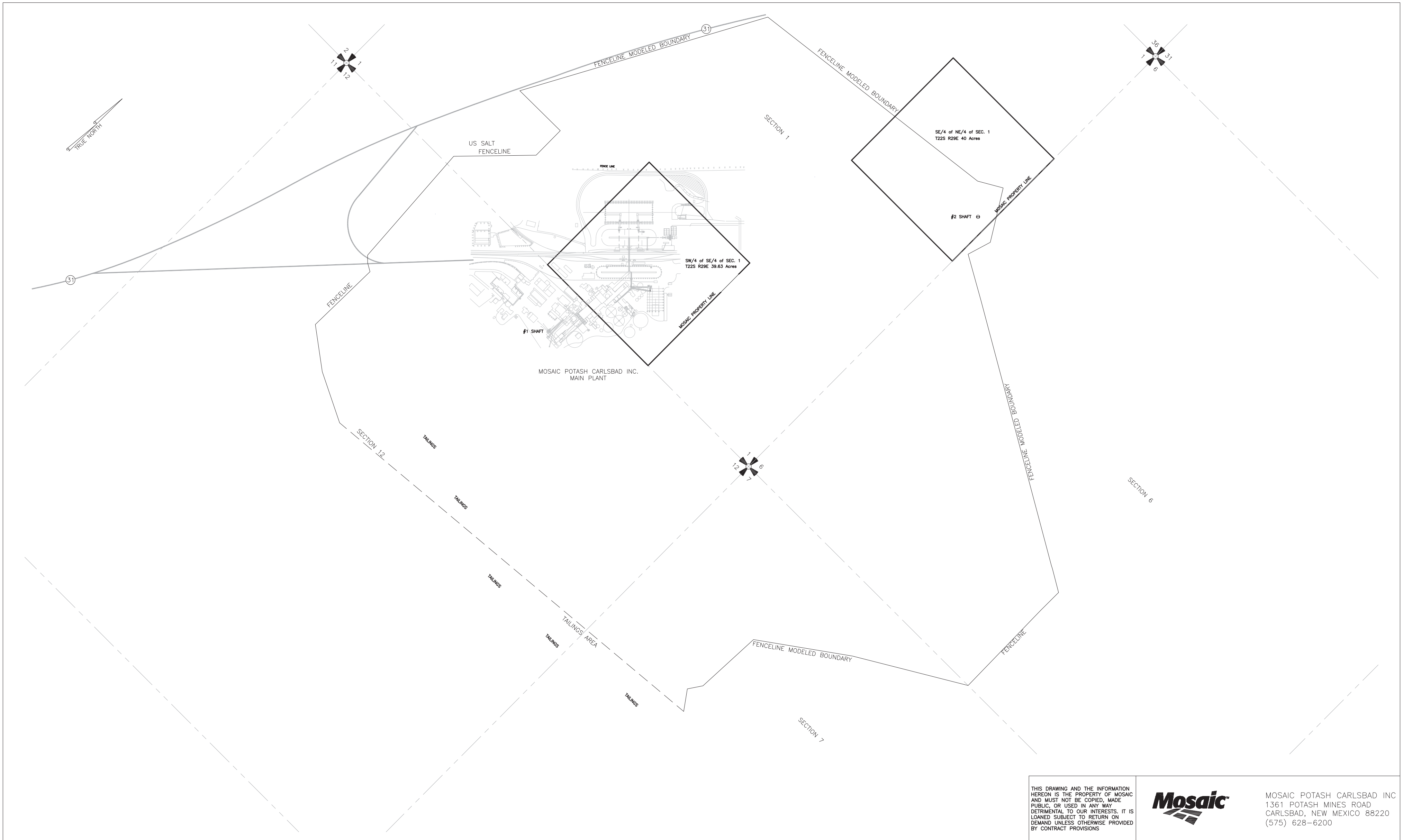
Section 5

Plot Plan Drawn To Scale

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

Please see the enclosed drawings:

- 199-T-0005
- 199-G-0130



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Mosaic

MOSAIC POTASH CARLSBAD INC
1361 POTASH MINES ROAD
CARLSBAD, NEW MEXICO 88220
(575) 628-6200

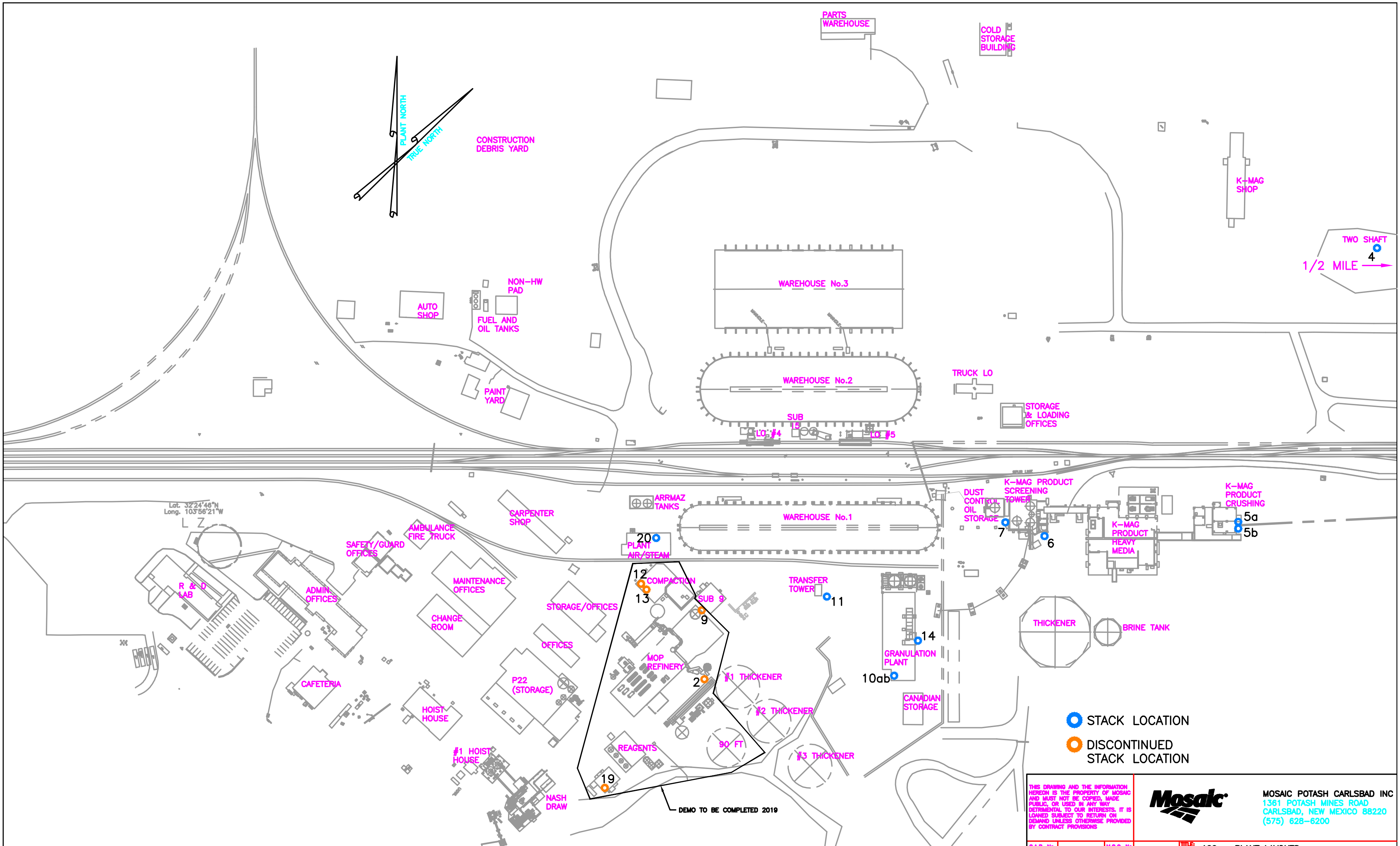
C.A.R. No.	
SUB. CODE	1
DRAWN BY	M.G.J. 7-24-2009
CHECKED	
APPROVED	
APPROVED	
SCALE	1" = 400'

TITLE: 199 – PLANT LAYOUTS
T – GEOLOGICAL & TOPOGRAPHIC
GENERAL ARRANGEMENTS
MOSAIC POTASH CARLSBAD INC.
DEEDED PROPERTY T22S, R29E NMPM

DRAWING NO. 199-T-0005 A

NUMBER	DESCRIPTION	NUMBER	DESCRIPTION

NO.	DESCRIPTION	BY	CHK	DATE	NO.	DESCRIPTION	BY	CHK	DATE



NUMBER	DESCRIPTION	NUMBER	DESCRIPTION	NO.	DESCRIPTION	BY	CHK	DATE	NO.	DESCRIPTION	BY	CHK	DATE
				△					△				
				△					△				
				△					△				
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MOSAIC POTASH CARLSBAD INC
1361 POTASH MINES ROAD
CARLSBAD, NEW MEXICO 88220
(575) 628-6200

C.A.R. No.		M.O.C. No.	
SUB. CODE			
DRAWN BY	BR	9/27/18	
CHECKED			
APPROVED			
APPROVED			
SCALE	1"=100'-0"		

TITLE:
199 – PLANT LAYOUTS
G – GENERAL ARRANGEMENT
SURFACE STACK LOCATIONS

DRAWING NO. 199–G–0130 A

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.

Enclosed with this Title V Significant Permit Modification application are the following emission calculation tables, which are the same as the emission calculations provided in the most recent NSR significant permit revision application for NSR Permit No. 495-M14.

- Stack Emissions
  - Table of Contents
  - Table 1 – PM, NOx, and CO Permitted Stack Emissions
  - Table 2 – Summary of SO_2, VOC, and HAP Stack Emissions
  - Table 3 – SO_2, VOC, and HAP Emissions from the LANG Dryer (STK6)
  - Table 4 – SO_2, VOC, and HAP Emissions from the GRAN Dryer (STK10ab)
  - Table 5 – SO_2, VOC, and HAP Emissions from the S&L Boiler (STK20)
  - Table 6 – LRAD Emission Calculations (LRAD1-6)
  - Table 7 – Diesel Non-Road Engine (GEN1)

- Tank Emissions
  - GDF1 TANKS 4.0.9d printout
  - GDF2 TANKS 4.0.9d printout

- Fugitive Emissions
  - Table of Contents
  - Table 1 – LANG Hoist Circuit
  - Table 2 – LANG Crushing Circuit
  - Table 3 – LANG Fine Ore Bin Circuit
  - Table 4 – LANG Screening Circuit
  - Table 5 – Granulation Plant (Two Raymond Mills)
  - Table 6 – Second Raymond Mill Circuit in the Granulation Plant
  - Table 7 – Nash Plant (formerly "Cuttings Circuit")
  - Table 8 – Dispatch – With Coating
  - Table 9 – Dispatch – No Coating
  - Table 10 – Nos. 1, 2, and 3 Warehouses – Aggregate Handling – With Coating
  - Table 11 – Nos. 1, 2, and 3 Warehouses – Aggregate Handling – No Coating
  - Table 12 – No. 4 Railcar Loadout – With Coating
  - Table 13 – No. 4 Railcar Loadout – No Coating
  - Table 14 – No. 5 Railcar Loadout – With Coating
  - Table 15 – No. 5 Railcar Loadout – No Coating
  - Table 16 – Truck Loadout – With Coating
  - Table 17 – Truck Loadout – No Coating
  - Table 18 – Nos. 1, 2, and 3 Warehouses – Material Handling
  - Table 19 – Nos. 1, 2, and 3 Warehouses – Hauling
  - Table 20 – Main Haul Road
  - Table 21 – Abrasive Blasting
  - Table 22 – Railcar Offloading – Material Handling
  - Table 23 – Railcar Offloading – Hauling
  - Table 24 – Granulation Reclaim – Material Handling
  - Table 25 – Granulation Reclaim – Hauling
  - Table 26 – K-Mag Rehandling – Material Handling
  - Table 27 – K-Mag Rehandling – Hauling
  - Table 28 – Brine Circuit – Material Handling
  - Table 29 – Brine Circuit – Hauling
  - Table 30 – Reagent – Material Handling
  - Table 31 – Reagent – Hauling
  - Table 32 – Reagent – Wind Erosion
  - Table 33 – Potash – Material Handling

- Table 34 – Potash – Hauling
- Table 35 – TMA – Material Handling
- Table 36 – TMA – Hauling
- Table 37 – Fugitive Emission Control Efficiencies
- Table 38 – Material Handling Emission Factors
- Table 39 – Summary of Fugitive Emissions
- Table 40 – Fugitive Emissions as Stack Emissions
- Figure 1 – Controlled Emission Factors

- Insignificant Activities approved under 20.2.72.202.B(5) NMAC. These activities are also on NMED's Operating Permit Program List of Insignificant Activities (Item #1.a.) dated March 24, 2005.
    - Railcar Transloader administrative revision approval and original submittal.
    - Railcar Transloader updated emission calculations that include TSP.
    - Starch Bin administrative revision approval and original submittal.
    - Starch Bin updated emission calculations that include TSP.

- Insignificant Activities approved under 20.2.72.202.B(5) NMAC. This activity is a 502(b)(10) change:
    - Warehouse Screener 502(b)(10) change request approval and original submittal.
    - Warehouse Screener updated emission calculations that include TSP and HAPs.

Section 6.a
Green House Gas Emissions

(Submitting under 20.2.70, 20.2.72 20.2.74 NMAC)

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

Calculating GHG Emissions:

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

Sources for Calculating GHG Emissions:

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

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

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

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

Please see Table 2-P in the enclosed UA2 tables.

Table of Contents
Stack Emission Calculations
Mosaic Potash Carlsbad, Inc.

Table Number	Description	Stack Source IDs
1	PM, NOx, and CO Permitted Stack Emissions	STK4, 5a, 5b, 6, 7, 10ab, 11, 14, 20, LRAD1-6
2	Summary of SO_2, VOC, and HAP Stack Emissions	STK6, 10ab, 20, LRAD1-6
3	SO_2, VOC, and HAP Emissions from the LANG Dryer (STK6)	STK6
4	SO_2, VOC, and HAP Emissions from the GRAN Dryer (STK10ab)	STK10ab
5	SO_2, VOC, and HAP Emissions from the S&L Boiler (STK20)	STK20
6	LRAD Emission Calculations	LRAD1-6
7	Diesel Non-Road Engine	GEN1

Table 1
PM, NOx, and CO Permitted Stack Emissions
Mosaic Potash Carlsbad, Inc.

Emissions Unit	Stack ID/Control ID	Control Device	Permitted Maximum Allowable PM Stack Emissions[a]		Permitted Maximum Allowable NOx Stack Emissions[a]		Permitted Maximum Allowable CO Stack Emissions[a]	
			lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
LANG Hoist	STK4/CON4	Baghouse	0.75	CAP	--	--	--	--
LANG Crusher	STK5a/CON5a	Baghouse	1.0	CAP	--	--	--	--
LANG Fine Ore Bin	STK5b/CON5b	Baghouse	1.0	CAP	--	--	--	--
LANG Dryer	STK6/CON6	Scrubber	21.5	CAP	5.0	CAP	8.0	CAP
LANG Screens	STK7/CON7	Baghouse	4.0	CAP	--	--	--	--
GRAN Dryer 10a; GRAN Process Vent. 10b	STK10ab/CON10ab	Scrubber	17.0	CAP	3.0	CAP	5.0	CAP
Dispatch Transfer Tower	STK11/CON11	Baghouse	1.0	CAP	--	--	--	--
GRAN Process Vent. 10c	STK14/CON14	Baghouse	2.5	CAP	--	--	--	--
S&L Boiler	STK20	--	0.02	CAP	0.4	CAP	0.2	CAP
LRAD1[b]	LRAD1	--	0.0042	CAP	0.077	CAP	0.030	CAP
LRAD2[b]	LRAD2	--	0.0042	CAP	0.077	CAP	0.030	CAP
LRAD3[b]	LRAD3	--	0.0042	CAP	0.077	CAP	0.030	CAP
LRAD4[b]	LRAD4	--	0.0036	CAP	0.060	CAP	0.021	CAP
LRAD5[b]	LRAD5	--	0.0036	CAP	0.060	CAP	0.021	CAP
LRAD6[b]	LRAD6	--	0.0042	CAP	0.077	CAP	0.030	CAP
Diesel Non-Road Engine[c]	GEN1	--	0.0045	CAP	0.59	CAP	0.92	CAP
		Total Stack Emissions =	**48.8**	**175**	**9.4**	**70**	**14.3**	**115**

Footnotes:
[a] Based on NSR Permit No. 495-M13-R1 (-R2, -R3, and -R4 are administrative revisions) and Title V Permit No. P039-R3. Note that emissions less than 1 lb/hr are shown in Table 106.A of both permits with a "<" sign.
[b] See Table 6.
[c] See Table 7.

Table 2
Summary of SO_2, VOC, and HAP Stack Emissions
Mosaic Potash Carlsbad, Inc.

Emission Unit	Stack ID	Pollutant	Maximum Hourly Emissions (lb/hr)	Maximum Annual Emissions (TPY)
LANG Dryer[a]	STK6	SO_2	0.053	0.23
		VOC	0.48	2.11
		HAP	0.17	0.72
GRAN Dryer[b]	STK10ab	SO_2	0.035	0.15
		VOC	0.32	1.41
		HAP	0.11	0.48
S&L Boiler[c]	STK20	SO_2	0.0040	0.018
		VOC	0.013	0.059
		HAP	0.0046	0.020
LRAD Diesel Engines[d]	LRADS1-6	SO_2	0.099	0.43
		VOC	0.12	0.53
		HAP	0.00013	0.00056
Diesel Non-Road Engine[e]	GEN1	SO_2	0.28	1.24
		VOC	0.0023	0.0099
		HAP	0.0037	0.016
Auto Shop Gasoline Tank[f]	GDF1	VOC	0.16	0.68
Lake Compound Gasoline Tank[f]	GDF2	VOC	0.032	0.14
Total SO_2 Stack Emissions =			**0.47**	**2.07**
Total VOC Stack Emissions =			**1.13**	**4.94**
Total HAP Stack Emissions =			**0.28**	**1.24**

Footnotes:

[a] See Table 3.
[b] See Table 4.
[c] See Table 5.
[d] See Table 6.
[e] See Table 7.
[f] See enclosed TANKS 4.0.9d printouts.

Table 3
SO_2, VOC, and HAP Emissions from the LANG Dryer (STK6)
Mosaic Potash Carlsbad, Inc.

Pollutant	Emission Factors (lb/MMscf)	Ref.	Maximum Hourly Emissions[(a)] (lb/hr)	Maximum Annual Emissions[(b)] (TPY)
Criteria Pollutants				
SO_2	0.6	1	0.053	0.23
VOC	5.5	1	0.48	2.11
Hazardous Air Pollutants (HAPs)				
2-Methylnapthalene	2.4E-05	2	2.1E-06	9.2E-06
3-Methylchloranthrene	< 1.8E-06	2	1.6E-07	6.9E-07
7,12-Dimethylbenz(a)anthracene	< 1.6E-05	2	1.4E-06	6.1E-06
Acenaphthene	< 1.8E-06	2	1.6E-07	6.9E-07
Acenaphthylene	< 1.8E-06	2	1.6E-07	6.9E-07
Anthracene	< 2.4E-06	2	2.1E-07	9.2E-07
Arsenic	2.0E-04	2	1.8E-05	7.7E-05
Benzene	2.1E-03	2	1.8E-04	8.1E-04
Benz(a)anthracene	< 1.8E-06	2	1.6E-07	6.9E-07
Benzo(a)pyrene	< 1.2E-06	2	1.1E-07	4.6E-07
Benzo(b)fluoranthene	< 1.8E-06	2	1.6E-07	6.9E-07
Benzo(g,h,i)perylene	< 1.2E-06	2	1.1E-07	4.6E-07
Benzo(k)fluoranthene	< 1.8E-06	2	1.6E-07	6.9E-07
Beryllium	< 1.2E-05	2	1.1E-06	4.6E-06
Cadmium	1.1E-03	2	9.6E-05	4.2E-04
Chromium (total)	1.4E-03	2	1.2E-04	5.4E-04
Chrysene	< 1.8E-06	2	1.6E-07	6.9E-07
Cobalt	8.4E-05	2	7.4E-06	3.2E-05
Dibenzo(a,h)anthracene	< 1.2E-06	2	1.1E-07	4.6E-07
Dichlorobenzene	1.2E-03	2	1.1E-04	4.6E-04
Fluoranthene	3.0E-06	2	2.6E-07	1.2E-06
Fluorene	2.8E-06	2	2.5E-07	1.1E-06
Formaldehyde	7.5E-02	2	6.6E-03	2.9E-02
Hexane	1.8E+00	2	1.6E-01	6.9E-01
Indeno(1,2,3-cd)pyrene	< 1.8E-06	2	1.6E-07	6.9E-07
Lead	5.0E-04	1	4.4E-05	1.9E-04
Manganese	3.8E-04	2	3.3E-05	1.5E-04
Mercury	2.6E-04	2	2.3E-05	1.0E-04
Naphthalene	6.1E-04	2	5.3E-05	2.3E-04
Nickel	2.1E-03	2	1.8E-04	8.1E-04
Phenanathrene	1.7E-05	2	1.5E-06	6.5E-06
Pyrene	5.0E-06	2	4.4E-07	1.9E-06
Selenium	< 2.4E-05	2	2.1E-06	9.2E-06
Toluene	3.4E-03	2	3.0E-04	1.3E-03
Highest Single HAP (Hexane)	--	--	0.16	0.69
Total HAPs	--	--	**0.17**	**0.72**

Footnotes:

[(a)] Maximum Hourly Emissions (lb/hr) = (Maximum Heat Input [MMBtu/hr]) / (Higher Heat Value [MMBtu/MMscf]) x (Emission Factor [lb/MMscf])

Maximum Heat Input =	90	MMBtu/hr
Higher Heating Value =	1,027.8	MMBtu/MMscf *(based on average monthly 2019 HHV da*

[(b)] Based on operating 8,760 hours per year.

References:

1 Emission factor from AP-42, Table 1.4-2 (7/98).
2 Emission factor from AP-42, Tables 1.4-3 and 1.4-4 (7/98). For non-detect values, the detection limit was used.

Mosaic

Table 4
SO_2, VOC, and HAP Emissions from the GRAN Dryer (STK10ab)
Mosaic Potash Carlsbad, Inc.

Pollutant		Emission Factor (lb/MMscf)	Ref.	Maximum Hourly Emissions[(a)] (lb/hr)	Maximum Annual Emissions[(b)] (TPY)
Criteria Pollutants					
SO_2		0.6	1	0.035	0.15
VOC		5.5	1	0.32	1.41
Hazardous Air Pollutants (HAPs)					
2-Methylnapthalene		2.4E-05	2	1.4E-06	6.1E-06
3-Methylchloranthrene	<	1.8E-06	2	1.1E-07	4.6E-07
7,12-Dimethylbenz(a)anthracene	<	1.6E-05	2	9.3E-07	4.1E-06
Acenaphthene	<	1.8E-06	2	1.1E-07	4.6E-07
Acenaphthylene	<	1.8E-06	2	1.1E-07	4.6E-07
Anthracene	<	2.4E-06	2	1.4E-07	6.1E-07
Arsenic		2.0E-04	2	1.2E-05	5.1E-05
Benzene		2.1E-03	2	1.2E-04	5.4E-04
Benz(a)anthracene	<	1.8E-06	2	1.1E-07	4.6E-07
Benzo(a)pyrene	<	1.2E-06	2	7.0E-08	3.1E-07
Benzo(b)fluoranthene	<	1.8E-06	2	1.1E-07	4.6E-07
Benzo(g,h,i)perylene	<	1.2E-06	2	7.0E-08	3.1E-07
Benzo(k)fluoranthene	<	1.8E-06	2	1.1E-07	4.6E-07
Beryllium	<	1.2E-05	2	7.0E-07	3.1E-06
Cadmium		1.1E-03	2	6.4E-05	2.8E-04
Chromium (total)		1.4E-03	2	8.2E-05	3.6E-04
Chrysene	<	1.8E-06	2	1.1E-07	4.6E-07
Cobalt		8.4E-05	2	4.9E-06	2.1E-05
Dibenzo(a,h)anthracene	<	1.2E-06	2	7.0E-08	3.1E-07
Dichlorobenzene		1.2E-03	2	7.0E-05	3.1E-04
Fluoranthene		3.0E-06	2	1.8E-07	7.7E-07
Fluorene		2.8E-06	2	1.6E-07	7.2E-07
Formaldehyde		7.5E-02	2	4.4E-03	1.9E-02
Hexane		1.8E+00	2	1.1E-01	4.6E-01
Indeno(1,2,3-cd)pyrene	<	1.8E-06	2	1.1E-07	4.6E-07
Lead		5.0E-04	1	2.9E-05	1.3E-04
Manganese		3.8E-04	2	2.2E-05	9.7E-05
Mercury		2.6E-04	2	1.5E-05	6.6E-05
Naphthalene		6.1E-04	2	3.6E-05	1.6E-04
Nickel		2.1E-03	2	1.2E-04	5.4E-04
Phenanathrene		1.7E-05	2	9.9E-07	4.3E-06
Pyrene		5.0E-06	2	2.9E-07	1.3E-06
Selenium	<	2.4E-05	2	1.4E-06	6.1E-06
Toluene		3.4E-03	2	2.0E-04	8.7E-04
Highest Single HAP (Hexane)		--	--	0.11	0.46
Total HAPs		--	--	**0.11**	**0.48**

Footnotes:

[(a)] Maximum Hourly Emissions (lb/hr) = (Maximum Heat Input [MMBtu/hr]) / (Higher Heat Value [MMBtu/MMscf]) x (Emission Factor [lb/MMscf])

Maximum Heat Input =	60	MMBtu/hr
Higher Heating Value =	1,027.8	MMBtu/MMscf *(based on average monthly 2019 HHV dat*

[(b)] Based on operating 8,760 hours per year.

References:

1 Emission factor from AP-42, Table 1.4-2 (7/98).
2 Emission factor from AP-42, Tables 1.4-3 and 1.4-4 (7/98). For non-detect values, the detection limit was used.

Mosaic

Table 5
SO_2, VOC, and HAP Emissions from the S&L Boiler (STK20)
Mosaic Potash Carlsbad, Inc.

Pollutant	Emission Factor (lb/MMscf)	Ref.	Maximum Hourly Emissions[(a)] (lb/hr)	Maximum Annual Emissions[(b)] (TPY)
Criteria Pollutants				
SO_2	--	3	0.0040	0.018
VOC	5.5	1	0.013	0.059
Hazardous Air Pollutants (HAPs)				
2-Methylnapthalene	2.4E-05	2	5.8E-08	2.6E-07
3-Methylchloranthrene	< 1.8E-06	2	4.4E-09	1.9E-08
7,12-Dimethylbenz(a)anthracene	< 1.6E-05	2	3.9E-08	1.7E-07
Acenaphthene	< 1.8E-06	2	4.4E-09	1.9E-08
Acenaphthylene	< 1.8E-06	2	4.4E-09	1.9E-08
Anthracene	< 2.4E-06	2	5.8E-09	2.6E-08
Arsenic	2.0E-04	2	4.9E-07	2.1E-06
Benzene	2.1E-03	2	5.1E-06	2.2E-05
Benz(a)anthracene	< 1.8E-06	2	4.4E-09	1.9E-08
Benzo(a)pyrene	< 1.2E-06	2	2.9E-09	1.3E-08
Benzo(b)fluoranthene	< 1.8E-06	2	4.4E-09	1.9E-08
Benzo(g,h,i)perylene	< 1.2E-06	2	2.9E-09	1.3E-08
Benzo(k)fluoranthene	< 1.8E-06	2	4.4E-09	1.9E-08
Beryllium	< 1.2E-05	2	2.9E-08	1.3E-07
Cadmium	1.1E-03	2	2.7E-06	1.2E-05
Chromium (total)	1.4E-03	2	3.4E-06	1.5E-05
Chrysene	< 1.8E-06	2	4.4E-09	1.9E-08
Cobalt	8.4E-05	2	2.0E-07	8.9E-07
Dibenzo(a,h)anthracene	< 1.2E-06	2	2.9E-09	1.3E-08
Dichlorobenzene	1.2E-03	2	2.9E-06	1.3E-05
Fluoranthene	3.0E-06	2	7.3E-09	3.2E-08
Fluorene	2.8E-06	2	6.8E-09	3.0E-08
Formaldehyde	7.5E-02	2	1.8E-04	8.0E-04
Hexane	1.8E+00	2	4.4E-03	1.9E-02
Indeno(1,2,3-cd)pyrene	< 1.8E-06	2	4.4E-09	1.9E-08
Lead	5.0E-04	1	1.2E-06	5.3E-06
Manganese	3.8E-04	2	9.2E-07	4.0E-06
Mercury	2.6E-04	2	6.3E-07	2.8E-06
Naphthalene	6.1E-04	2	1.5E-06	6.5E-06
Nickel	2.1E-03	2	5.1E-06	2.2E-05
Phenanathrene	1.7E-05	2	4.1E-08	1.8E-07
Pyrene	5.0E-06	2	1.2E-08	5.3E-08
Selenium	< 2.4E-05	2	5.8E-08	2.6E-07
Toluene	3.4E-03	2	8.3E-06	3.6E-05
Highest Single HAP (Hexane)	--	--	0.0044	0.019
Total HAPs	--	--	**0.0046**	**0.020**

Footnotes:

[(a)] Maximum Hourly Emissions (lb/hr) = (Maximum Heat Input [MMBtu/hr]) / (Higher Heat Value [MMBtu/MMscf]) x (Emission Factor [lb/MMscf])

Maximum Heat Input =	2.5	MMBtu/hr
Higher Heating Value =	1,027.8	MMBtu/MMscf *(based on average monthly 2019 HHV d*

[(b)] Based on operating 8,760 hours per year.

References:

1 Emission factor from AP-42, Table 1.4-2 (7/98).
2 Emission factor from AP-42, Tables 1.4-3 and 1.4-4 (7/98). For non-detect values, the detection limit was used.
3 Emissions from the boiler manufacturer's data (Cleaver-Brooks).

Table 6
LRAD Emission Calculations
Mosaic Potash Carlsbad, Inc.

Size of Each Unit = 6 kw
Size of Each Unit = 8.0 hp

Pollutant	Model	Emission Factor	Units	Source
NOx	NL673L3.2	5.8	g/kW-hr	Manufacturer[(a)]
	NL673L4E	4.5	g/kW-hr	Manufacturer[(b)]
CO	NL673L3.2	2.251	g/kW-hr	Manufacturer[(a)]
	NL673L4E	1.6	g/kW-hr	Manufacturer[(b)]
PM	NL673L3.2	0.314	g/kW-hr	Manufacturer[(a)]
	NL673L4E	0.27	g/kW-hr	Manufacturer[(b)]
SOx	--	0.00205	lb/hp-hr	AP-42, Table 3.3-1
VOC (as TOC)	--	0.0025141	lb/hp-hr	AP-42, Table 3.3-1
HAPs	--	0.0000027	lb/hp-hr	AP-42, Table 3.3-2; converted from lb/MMBtu based on 7,000 Btu/hp-hr

Unit ID	Name	Model Number	Serial Number	Size (hp)	Fuel Type	Unit Type and Location	Maximum Hourly Emissions						Operating Schedule[(f)] (hrs/yr)	Maximum Annual Emissions					
							NOx (lbs/hr)	CO (lbs/hr)	PM (lbs/hr)	SOx (lbs/hr)	VOC (lbs/hr)	HAPs (lbs/hr)		NOx (tons/yr)	CO (tons/yr)	PM (tons/yr)	SOx (tons/yr)	VOC (tons/yr)	HAPs (tons/yr)
LRAD 1	Radar Genset #1	Northern Lights NL673L3.2[(c)]	6733-44767C	8.0	Diesel	Primary Unit	0.077	0.030	0.0042	0.016	0.020	0.000021	8,760	0.34	0.13	0.018	0.072	0.089	0.000094
LRAD 2	Radar Genset #2	Northern Lights NL673L3.2[(c)]	6733-44766C	8.0	Diesel	Secondary Unit[(e)]	0.077	0.030	0.0042	0.016	0.020	0.000021	8,760	0.34	0.13	0.018	0.072	0.089	0.000094
LRAD 3	Sat 1 Genset #3	Northern Lights NL673L3.2[(c)]	6733-44847C	8.0	Diesel	Primary Unit	0.077	0.030	0.0042	0.016	0.020	0.000021	8,760	0.34	0.13	0.018	0.072	0.089	0.000094
LRAD 4	Sat 1 Genset #4	Northern Lights NL673L4E[(d)]	6733-51829	8.0	Diesel	Secondary Unit[(e)]	0.060	0.021	0.0036	0.016	0.020	0.000021	8,760	0.26	0.093	0.016	0.072	0.089	0.000094
LRAD 5	Sat 2 Genset #5	Northern Lights NL673L4E[(d)]	6733-51831	8.0	Diesel	Primary Unit	0.060	0.021	0.0036	0.016	0.020	0.000021	8,760	0.26	0.093	0.016	0.072	0.089	0.000094
LRAD 6	Sat 2 Genset #6	Northern Lights NL673L3.2[(c)]	6733-44843C	8.0	Diesel	Secondary Unit[(e)]	0.077	0.030	0.0042	0.016	0.020	0.000021	8,760	0.34	0.13	0.018	0.072	0.089	0.000094
						Total Emissions =	**0.43**	**0.16**	**0.024**	**0.099**	**0.12**	**0.00013**	--	**1.87**	**0.71**	**0.10**	**0.43**	**0.53**	**0.00056**

Footnotes:

[(a)] Based on 12/2/2010 email from Aaron Hayes (DeTect Inc.) to Eileen Hauser (formerly Mosaic).
[(b)] Based on 4/28/2016 email from Tracy Hach (Northern Lights Inc.) to John Falcetti (Arcadis).
[(c)] This model is part of EPA Engine Family AH3XL.507E2C.
[(d)] This model is part of EPA Engine Family GH3XL.761F1C.
[(e)] Only the primary units operates at a given time. The secondary units are not considered "emergency" units as these alternate as the primary unit on an annual basis to reduce wear and tear on any one engine.
[(f)] All six of the engines do not operate for 8,760 hrs/yr nor at the same time; however, to avoid having to track the hours, the emissions have been estimated as such.

Table 7
Diesel Non-Road Engine Emissions (GEN1)
Mosaic Potash Carlsbad, Inc.

Emission Factors

Pollutant	Emission Factor	Units	Source
NOx	0.00427	lb/hp-hr	EPA Engine Family Testing[a]
CO	0.00668	lb/hp-hr	AP-42, Table 3.3-1
PM (assumed equal to PM_{10} and $PM_{2.5}$)	0.000033	lb/hp-hr	EPA Engine Family Testing[a]
SOx	0.0021	lb/hp-hr	AP-42, Table 3.3-1
VOC (as NMHC)	0.000016	lb/hp-hr	EPA Engine Family Testing[a]
HAPs	0.000027	lb/hp-hr	AP-42, Table 3.3-2; converted from lb/MMBtu based on 7,000 Btu/hp-hr
CO_2	1.15	lb/hp-hr	AP-42, Table 3.3-1

Emission Calculations

Unit Name	Manufacturer	Model Year	Model Number	Serial Number	Size (hp)	Size (kW)	Fuel Type	Maximum Hourly Emissions NOx (lb/hr)	CO (lb/hr)	PM (lb/hr)	SO_x (lb/hr)	VOC (lb/hr)	HAPs (lb/hr)	Operating Schedule[b] (hr/yr)	Maximum Annual Emissions NOx (tpy)	CO (tpy)	PM (tpy)	SO_2 (tpy)	VOC (tpy)	HAPs (tpy)
Diesel Non-Road Engine (GEN1)	Cummins	2014	QSB4.5	73709480	138	103	Diesel	0.59	0.92	0.0045	0.28	0.0023	0.0037	8,760	2.58	4.04	0.020	1.24	0.0099	0.016

Footnotes:

[a] This model is part of EPA Engine Family ECEXL04.5AAE. The emissions data is based on certification level steady-state discrete modal test results in g/kW-hr that have been converted to lb/hp-hr. This engine is subject to the Tier 4 "transitional" or "interim" standards as opposed to the "final" standards.

[b] Based on operating 8,760 hr/yr. This non-road engine is usually used to power an air compressor at the abrasive blasting location, but sometimes it is used elsewhere at the facility on an as needed basis.

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	GDF1 (AS1)
City:	Carlsbad
State:	New Mexico
Company:	Mosaic Potash Carlsbad
Type of Tank:	Vertical Fixed Roof Tank
Description:	Unleaded Gasoline Tank at the Auto Shop
Tank Dimensions	
Shell Height (ft):	11.00
Diameter (ft):	8.00
Liquid Height (ft) :	11.00
Avg. Liquid Height (ft):	9.00
Volume (gallons):	4,136.14
Turnovers:	12.09
Net Throughput(gal/yr):	50,000.00
Is Tank Heated (y/n):	N
Paint Characteristics	
Shell Color/Shade:	Gray/Medium
Shell Condition	Good
Roof Color/Shade:	Gray/Medium
Roof Condition:	Good
Roof Characteristics	
Type:	Cone
Height (ft)	0.67
Slope (ft/ft) (Cone Roof)	0.17
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

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

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

GDF1 (AS1) - Vertical Fixed Roof Tank
Carlsbad, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 9)	All	72.26	58.28	86.25	63.90	5.8375	4.4571	7.5404	67.0000			92.00	Option 4: RVP=9, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

GDF1 (AS1) - Vertical Fixed Roof Tank
Carlsbad, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	900.3733
Vapor Space Volume (cu ft):	111.7569
Vapor Density (lb/cu ft):	0.0685
Vapor Space Expansion Factor:	0.5437
Vented Vapor Saturation Factor:	0.5925
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	111.7569
Tank Diameter (ft):	8.0000
Vapor Space Outage (ft):	2.2233
Tank Shell Height (ft):	11.0000
Average Liquid Height (ft):	9.0000
Roof Outage (ft):	0.2233
Roof Outage (Cone Roof)	
Roof Outage (ft):	0.2233
Roof Height (ft):	0.6700
Roof Slope (ft/ft):	0.1670
Shell Radius (ft):	4.0000
Vapor Density	
Vapor Density (lb/cu ft):	0.0685
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.8375
Daily Avg. Liquid Surface Temp. (deg. R):	531.9348
Daily Average Ambient Temp. (deg. F):	60.8167
Ideal Gas Constant R (psia cuft / (lb-mol-deg R)):	10.731
Liquid Bulk Temperature (deg. R):	523.5667
Tank Paint Solar Absorptance (Shell):	0.6800
Tank Paint Solar Absorptance (Roof):	0.6800
Daily Total Solar Insulation Factor (Btu/sqft day):	1,810.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.5437
Daily Vapor Temperature Range (deg. R):	55.9424
Daily Vapor Pressure Range (psia):	3.0833
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.8375
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.4571
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	7.5404
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:	0.5925
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	5.8375
Vapor Space Outage (ft):	2.2233
Working Losses (lb):	465.6089
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.8375
Annual Net Throughput (gal/yr.):	50,000.0000
Annual Turnovers:	12.0886
Turnover Factor:	1.0000
Maximum Liquid Volume (gal):	4,136.1448
Maximum Liquid Height (ft):	11.0000
Tank Diameter (ft):	8.0000
Working Loss Product Factor:	1.0000
Total Losses (lb):	1,365.9822

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

GDF1 (AS1) - Vertical Fixed Roof Tank
Carlsbad, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 9)	465.61	900.37	1,365.98

TANKS 4.0.9d
Emissions Report - Detail Format
Tank Indentification and Physical Characteristics

Identification	
User Identification:	GDF2 (LC1)
City:	Carlsbad
State:	New Mexico
Company:	Mosaic Potash Carlsbad
Type of Tank:	Horizontal Tank
Description:	Unleaded Gasoline Tank at the Lake Compound
Tank Dimensions	
Shell Length (ft):	6.20
Diameter (ft):	3.80
Volume (gallons):	500.00
Turnovers:	33.00
Net Throughput(gal/yr):	16,500.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	N
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition	Good
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig)	0.03

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

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

GDF2 (LC1) - Horizontal Tank
Carlsbad, New Mexico

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F) Avg.	Min.	Max.	Liquid Bulk Temp (deg F)	Vapor Pressure (psia) Avg.	Min.	Max.	Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 9)	All	63.26	55.73	70.78	60.84	4.9146	4.2369	5.6768	67.0000			92.00	Option 4: RVP=9, ASTM Slope=3

TANKS 4.0.9d
Emissions Report - Detail Format
Detail Calculations (AP-42)

GDF2 (LC1) - Horizontal Tank
Carlsbad, New Mexico

Annual Emission Calcaulations	
Standing Losses (lb):	150.2033
Vapor Space Volume (cu ft):	44.7867
Vapor Density (lb/cu ft):	0.0587
Vapor Space Expansion Factor:	0.2341
Vented Vapor Saturation Factor:	0.6689
Tank Vapor Space Volume:	
Vapor Space Volume (cu ft):	44.7867
Tank Diameter (ft):	3.8000
Effective Diameter (ft):	5.4784
Vapor Space Outage (ft):	1.9000
Tank Shell Length (ft):	6.2000
Vapor Density	
Vapor Density (lb/cu ft):	0.0587
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9146
Daily Avg. Liquid Surface Temp. (deg. R):	522.9287
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):	520.5067
Tank Paint Solar Absorptance (Shell):	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	1,810.0000
Vapor Space Expansion Factor	
Vapor Space Expansion Factor:	0.2341
Daily Vapor Temperature Range (deg. R):	30.0956
Daily Vapor Pressure Range (psia):	1.4398
Breather Vent Press. Setting Range(psia):	0.0600
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9146
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	4.2369
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	5.6768
Daily Avg. Liquid Surface Temp. (deg R):	522.9287
Daily Min. Liquid Surface Temp. (deg R):	515.4048
Daily Max. Liquid Surface Temp. (deg R):	530.4526
Daily Ambient Temp. Range (deg. R):	29.8333
Vented Vapor Saturation Factor	
Vented Vapor Saturation Factor:	0.6689
Vapor Pressure at Daily Average Liquid: Surface Temperature (psia):	4.9146
Vapor Space Outage (ft):	1.9000
Working Losses (lb):	129.3599
Vapor Molecular Weight (lb/lb-mole):	67.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9146
Annual Net Throughput (gal/yr.):	16,500.0000
Annual Turnovers:	33.0000
Turnover Factor:	1.0000
Tank Diameter (ft):	3.8000
Working Loss Product Factor:	1.0000
Total Losses (lb):	279.5631

TANKS 4.0.9d
Emissions Report - Detail Format
Individual Tank Emission Totals

Emissions Report for: Annual

GDF2 (LC1) - Horizontal Tank
Carlsbad, New Mexico

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 9)	129.36	150.20	279.56

Table of Contents
Fugitive Emission Calculations
Mosaic Potash Carlsbad Inc.

Mosaic

Table 1
LANG Hoist Circuit Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Baghouse-CON4 Operational: Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]	Baghouse-CON4 not Operational: Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[g]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[g]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[g]	Maximum Total Annual Emissions[h] TSP (TPY)	Maximum Total Annual Emissions[h] PM_{10} (TPY)	Maximum Total Annual Emissions[h] $PM_{2.5}$ (TPY)
LANG Hoist	FUG25	LANG Ore	1000 Ton Coarse Ore Bin (CS10000)	729.2	6,387,500	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	4.1E-03	1.8E-02	2.0E-03	8.6E-03	5.7E-04	2.4E-03	Ventilation Capture Full Equip. Enclosure	0 95	95.0	8.2E-02	7.2E-03	4.0E-02	3.5E-03	1.1E-02	9.9E-04	2.5E-02	1.2E-02	3.4E-03
LANG Hoist	FUG25	LANG Ore	South Coarse Ore Vibrating Feeder (CS10014)	364.6	3,193,750	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	4.1E-02	1.8E-01	2.0E-02	8.6E-02	5.7E-03	2.4E-02	Full Equip. Enclosure	95	95.0	4.1E-02	3.6E-03	2.0E-02	1.8E-03	5.7E-03	5.0E-04	1.8E-01	8.8E-02	2.5E-02
LANG Hoist	FUG25	LANG Ore	North Coarse Ore Vibrating Feeder (CS10005)	364.6	3,193,750	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	4.1E-02	1.8E-01	2.0E-02	8.6E-02	5.7E-03	2.4E-02	Full Equip. Enclosure	95	95.0	4.1E-02	3.6E-03	2.0E-02	1.8E-03	5.7E-03	5.0E-04	1.8E-01	8.8E-02	2.5E-02
LANG Hoist	FUG26	LANG Ore	Ore Transfer Belt Conveyor (CS10010)	729.2	6,387,500	Conveyor Transfer Point	Ventilation Capture Partial Equip. Enclosure	95 80	99.0	1.6E-02	7.0E-02	8.0E-03	3.4E-02	2.3E-03	9.7E-03	Ventilation Capture Partial Equip. Enclosure	0 80	80.0	3.3E-01	2.9E-02	1.6E-01	1.4E-02	4.5E-02	4.0E-03	9.9E-02	4.8E-02	1.4E-02
LANG Hoist	FUG3	LANG Ore	Crusher Feed Belt Conveyor (CS10030) (at feed end; transfer tower 1)	729.2	6,387,500	Conveyor Transfer Point	Partial Equip. Enclosure	80	80.0	3.3E-01	1.4E+00	1.6E-01	6.9E-01	4.5E-02	1.9E-01	Partial Equip. Enclosure	80	80.0	3.3E-01	2.9E-02	1.6E-01	1.4E-02	4.5E-02	4.0E-03	1.4E+00	7.0E-01	2.0E-01
							Total Fugitive Emissions (CON4 Operational)			**0.43**	**1.85**	**0.21**	**0.90**	**0.060**	**0.26**	**Total Fugitive Emissions (CON4 not Operational)**			**0.82**	**0.072**	**0.40**	**0.035**	**0.11**	**0.010**	**1.92**	**0.94**	**0.27**
																Fugitives as Stack Emissions[i,j] (CON4 not Operational)			**0.39**	**0.034**	**0.19**	**0.017**	**0.054**	**0.0047**			

Footnotes:

(a) Based on operating 8,760 hours per year.

(b) Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

(c) Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

(d) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

(e) Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

(f) Maximum Fugitive Emission Rate (TPY) = {(Maximum Throughput [TPY]) - (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH])} x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Annual Hours of Baghouse Downtime = 175 hrs/yr

As a worst-case scenario, it was assumed that all 175 hrs/yr of baghouse downtime is used. Therefore, the maximum annual throughput was subtracted by the maximum throughput during the 175 hrs/yr of baghouse downtime.

(g) Maximum Fugitive Emission Rate (TPY) = (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

(h) Maximum Total Annual Fugitive Emissions (TPY) = (Total Fugitive Emissions CON4 not Operational [TPY]) + (Total Fugitive Emissions CON4 Operational [TPY])

(i) Fugitives as Stack Emissions (lb/hr) = (Total Fugitive Emissions CON4 not Operational [lb/hr]) - (Total Fugitive Emissions CON4 Operational [lb/hr])

(j) Fugitives as Stack Emissions (TPY) = (Fugitives as Stack Emissions [lb/hr]) x (Annual Hours of Baghouse Downtime [hrs/yr]) / (2000 lbs/ton)

Table 2
LANG Crushing Circuit Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]
LANG Crusher	FUG27	LANG Ore	Crusher Feed Belt Conveyor (CS10030) (at recycle point, transfer tower 2)	371.9	3,257,844	Conveyor Transfer Point
LANG Crusher	FUG27	LANG Ore	Crusher Discharge Belt Conveyor (CS10075)	371.9	3,257,844	Conveyor Transfer Point
LANG Crusher	FUG28	LANG Ore	West Primary Crushing Screen (CS10040)	550.55	4,822,818	Screening
LANG Crusher	FUG28	LANG Ore	East Primary Crushing Screen (CS10041)	550.55	4,822,818	Screening
LANG Crusher	FUG28	LANG Ore	Primary Ore Crusher (CS10070)	371.9	3,257,844	Tertiary Crushing

Baghouse-CON5a Operational

Process/Source Description	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
Crusher Feed Belt Conveyor (CS10030) (at recycle point, transfer tower 2)	Partial Equip. Enclosure	80	80.0	1.7E-01	7.3E-01	8.2E-02	3.6E-01	2.3E-02	1.0E-01
Crusher Discharge Belt Conveyor (CS10075)	Ventilation Capture Partial Equip. Enclosure	95 85	99.25	6.3E-03	2.7E-02	3.1E-03	1.3E-02	8.7E-04	3.7E-03
West Primary Crushing Screen (CS10040)	Partial Equip. Enclosure	75	75.0	2.4E+00	1.0E+01	1.2E+00	5.1E+00	8.1E-02	3.5E-01
East Primary Crushing Screen (CS10041)	Partial Equip. Enclosure	75	75.0	2.4E+00	1.0E+01	1.2E+00	5.1E+00	8.1E-02	3.5E-01
Primary Ore Crusher (CS10070)	Ventilation Capture Full Equip. Enclosure	95 95	99.8	3.6E-03	1.5E-02	2.2E-03	9.6E-03	4.1E-04	1.8E-03
	Total Fugitive Emissions (CON5a Operational)			**4.92**	**21.15**	**2.48**	**10.66**	**0.19**	**0.80**

Baghouse-CON5a not Operational

Process/Source Description	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[g]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[g]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[g]
Crusher Feed Belt Conveyor (CS10030) (at recycle point, transfer tower 2)	Partial Equip. Enclosure	80	80.0	1.7E-01	1.5E-02	8.2E-02	7.2E-03	2.3E-02	2.0E-03
Crusher Discharge Belt Conveyor (CS10075)	Ventilation Capture Partial Equip. Enclosure	0 85	85.0	1.3E-01	1.1E-02	6.1E-02	5.4E-03	1.7E-02	1.5E-03
West Primary Crushing Screen (CS10040)	Partial Equip. Enclosure	75	75.0	2.4E+00	2.1E-01	1.2E+00	1.0E-01	8.1E-02	7.1E-03
East Primary Crushing Screen (CS10041)	Partial Equip. Enclosure	75	75.0	2.4E+00	2.1E-01	1.2E+00	1.0E-01	8.1E-02	7.1E-03
Primary Ore Crusher (CS10070)	Ventilation Capture Full Equip. Enclosure	0 95	95.0	7.1E-02	6.2E-03	4.5E-02	3.9E-03	8.3E-03	7.2E-04
	Total Fugitive Emissions (CON5a not Operational)			**5.11**	**0.45**	**2.58**	**0.23**	**0.21**	**0.018**
	Fugitives as Stack Emissions[i,j] (CON5a not Operational)			**0.19**	**0.016**	**0.10**	**0.0088**	**0.024**	**0.0021**

Maximum Total Annual Emissions[h]

Process/Source Description	TSP (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
Crusher Feed Belt Conveyor (CS10030) (at recycle point, transfer tower 2)	7.5E-01	3.7E-01	1.0E-01
Crusher Discharge Belt Conveyor (CS10075)	3.8E-02	1.9E-02	5.2E-03
West Primary Crushing Screen (CS10040)	1.0E+01	5.2E+00	3.5E-01
East Primary Crushing Screen (CS10041)	1.0E+01	5.2E+00	3.5E-01
Primary Ore Crusher (CS10070)	2.1E-02	1.3E-02	2.5E-03
Total	**21.60**	**10.89**	**0.82**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (TPY) = {(Maximum Throughput [TPY]) - (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH])} x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Annual Hours of Baghouse Downtime = 175 hrs/yr

As a worst-case scenario, it was assumed that all 175 hrs/yr of baghouse downtime is used. Therefore, the maximum annual throughput was subtracted by the maximum throughput during the 175 hrs/yr of baghouse downtime.

[g] Maximum Fugitive Emission Rate (TPY) = (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[h] Maximum Total Annual Fugitive Emissions (TPY) = (Total Fugitive Emissions CON5a not Operational [TPY]) + (Total Fugitive Emissions CON5a Operational [TPY])

[i] Fugitives as Stack Emissions (lb/hr) = (Total Fugitive Emissions CON5a not Operational [lb/hr]) - (Total Fugitive Emissions CON5a Operational [lb/hr])

[j] Fugitives as Stack Emissions (TPY) = (Fugitives as Stack Emissions [lb/hr]) x (Annual Hours of Baghouse Downtime [hrs/yr]) / (2000 lbs/ton)

Mosaic

Table 3
LANG Fine Ore Bin Circuit Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Baghouse-CON5b Operational

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[(a)] (TPH)	Maximum Throughput[(a)] (TPY)	Emission Factor Category[(b)]	Control Equipment / Measure	Unit Control Efficiency[(c)] (%)	Total Control Efficiency[(d)] (%)	Maximum TSP Emissions (lb/hr)[(e)]	Maximum TSP Emissions (TPY)[(f)]	Maximum PM_{10} Emissions (lb/hr)[(e)]	Maximum PM_{10} Emissions (TPY)[(f)]	Maximum $PM_{2.5}$ Emissions (lb/hr)[(e)]	Maximum $PM_{2.5}$ Emissions (TPY)[(f)]
LANG Fine Ore Bin	FUG29	LANG Ore	Fine Ore Bin (CS10055)	729.2	6,387,500	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	4.1E-03	1.8E-02	2.0E-03	8.6E-03	5.7E-04	2.4E-03
LANG Fine Ore Bin	FUG29	LANG Ore	Fine Ore Belt Feeder (CS10060)	825.0	7,227,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	4.6E-03	2.0E-02	2.3E-03	9.7E-03	6.4E-04	2.8E-03
LANG Fine Ore Bin	FUG29	LANG Ore	To K-Mag Wet Circuit	825.0	7,227,000	Conveyor Transfer Point	Partial Equip. Enclosure	75	75.0	4.6E-01	2.0E+00	2.3E-01	9.7E-01	6.4E-02	2.8E-01
							Total Fugitive Emissions (CON5b Operational)			**0.47**	**2.03**	**0.23**	**0.99**	**0.065**	**0.28**

Baghouse-CON5b Not Operational and **Maximum Total Annual Emissions[(h)]**

Process/Source Description	Control Equipment / Measure	Unit Control Efficiency[(c)] (%)	Total Control Efficiency[(d)] (%)	Maximum TSP Emissions (lb/hr)[(e)]	Maximum TSP Emissions (TPY)[(g)]	Maximum PM_{10} Emissions (lb/hr)[(e)]	Maximum PM_{10} Emissions (TPY)[(g)]	Maximum $PM_{2.5}$ Emissions (lb/hr)[(e)]	Maximum $PM_{2.5}$ Emissions (TPY)[(g)]	Maximum Total Annual Emissions[(h)] TSP (TPY)	Maximum Total Annual Emissions[(h)] PM_{10} (TPY)	Maximum Total Annual Emissions[(h)] $PM_{2.5}$ (TPY)
Fine Ore Bin (CS10055)	Ventilation Capture Full Equip. Enclosure	0 95	95.0	8.2E-02	7.2E-03	4.0E-02	3.5E-03	1.1E-02	9.9E-04	2.5E-02	1.2E-02	3.4E-03
Fine Ore Belt Feeder (CS10060)	Ventilation Capture Full Equip. Enclosure	0 95	95.0	9.3E-02	8.1E-03	4.5E-02	4.0E-03	1.3E-02	1.1E-03	2.8E-02	1.4E-02	3.9E-03
To K-Mag Wet Circuit	Partial Equip. Enclosure	75	75.0	4.6E-01	4.1E-02	2.3E-01	2.0E-02	6.4E-02	5.6E-03	2.0E+00	9.9E-01	2.8E-01
	Total Fugitive Emissions (CON5b not Operational)			**0.64**	**0.056**	**0.31**	**0.027**	**0.088**	**0.0077**	**2.08**	**1.02**	**0.29**
	Fugitives as Stack Emissions[(i,j)] (CON5b not Operational)			**0.17**	**0.015**	**0.081**	**0.0071**	**0.023**	**0.0020**			

Footnotes:

(a) Based on operating 8,760 hours per year.

(b) Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
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10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

(c) Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

(d) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

(e) Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

(f) Maximum Fugitive Emission Rate (TPY) = {(Maximum Throughput [TPY]) - (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH])} x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Annual Hours of Baghouse Downtime = 175 hrs/yr

As a worst-case scenario, it was assumed that all 175 hrs/yr of baghouse downtime is used. Therefore, the maximum annual throughput was subtracted by the maximum throughput during the 175 hrs/yr of baghouse downtime.

(g) Maximum Fugitive Emission Rate (TPY) = (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

(h) Maximum Total Annual Fugitive Emissions (TPY) = (Total Fugitive Emissions CON5b not Operational [TPY]) + (Total Fugitive Emissions CON5b Operational [TPY])

(i) Fugitives as Stack Emissions (lb/hr) = (Total Fugitive Emissions CON5b not Operational [lb/hr]) - (Total Fugitive Emissions CON5b Operational [lb/hr])

(j) Fugitives as Stack Emissions (TPY) = (Fugitives as Stack Emissions [lb/hr]) x (Annual Hours of Baghouse Downtime [hrs/yr]) / (2000 lbs/ton)

Table 4
LANG Screening Circuit Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a]		Emission Factor Category[b]	Baghouse-CON7 Operational									Baghouse-CON7 not Operational									Maximum Total Annual Emissions[h]		
				(TPH)	(TPY)		Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[g]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[g]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[g]	TSP (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
K-Mag Dryer	FUG30	K-Mag	K-Mag Dryer (CS10400)	225	1,971,000	Conveyor Transfer Point	Ventilation Capture[k] Full Equip. Enclosure	95 95	99.8	1.3E-03	5.4E-03	6.2E-04	2.7E-03	1.7E-04	7.5E-04	Ventilation Capture[k] Full Equip. Enclosure	95 95	99.8	1.3E-03	1.1E-04	6.2E-04	5.4E-05	1.7E-04	1.5E-05	5.5E-03	2.7E-03	7.7E-04
K-Mag Dryer	FUG30	K-Mag	K-Mag Dryer Dust Cyclone (CS10420)	3.4	29,784	Conveyor Transfer Point	Ventilation Capture[k] Full Equip. Enclosure	95 95	99.8	1.9E-05	8.2E-05	9.3E-06	4.0E-05	2.6E-06	1.1E-05	Ventilation Capture[k] Full Equip. Enclosure	95 95	99.8	1.9E-05	1.7E-06	9.3E-06	8.2E-07	2.6E-06	2.3E-07	8.4E-05	4.1E-05	1.2E-05
K-Mag Dryer	FUG30	K-Mag	Baghouse Discharge Screw Conveyor (CS10460)	1	8,760	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	1.1E-04	4.8E-04	5.5E-05	2.4E-04	1.6E-05	6.7E-05	Full Equip. Enclosure	95	95.0	1.1E-04	9.8E-06	5.5E-05	4.8E-06	1.6E-05	1.4E-06	4.9E-04	2.4E-04	6.8E-05
K-Mag Screening	FUG30	K-Mag	Dust Cyclone Screw Conveyor (CS11334)	3.2	28,032	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	1.8E-05	7.7E-05	8.8E-06	3.8E-05	2.5E-06	1.1E-05	Ventilation Capture Full Equip. Enclosure	0 95	95.0	3.6E-04	3.1E-05	1.8E-04	1.5E-05	5.0E-05	4.4E-06	1.1E-04	5.3E-05	1.5E-05
K-Mag Screening	FUG30	K-Mag	Screening Feed Bucket Elevator (CS10560)	257	2,251,320	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	1.4E-03	6.2E-03	7.1E-04	3.0E-03	2.0E-04	8.6E-04	Ventilation Capture Full Equip. Enclosure	0 95	95.0	2.9E-02	2.5E-03	1.4E-02	1.2E-03	4.0E-03	3.5E-04	8.7E-03	4.3E-03	1.2E-03
K-Mag Screening	FUG30	K-Mag	North Primary Mintex Screen (CS10486)	128.5	1,125,660	Fines Screening	Full Equip. Enclosure	95	95.0	6.0E-01	2.6E+00	4.6E-01	2.0E+00	2.9E-01	1.2E+00	Full Equip. Enclosure	95	95.0	6.0E-01	5.3E-02	4.6E-01	4.0E-02	2.9E-01	2.5E-02	2.6E+00	2.0E+00	1.3E+00
K-Mag Screening	FUG30	K-Mag	South Primary Mintex Screen (CS10487)	128.5	1,125,660	Fines Screening	Full Equip. Enclosure	95	95.0	6.0E-01	2.6E+00	4.6E-01	2.0E+00	2.9E-01	1.2E+00	Full Equip. Enclosure	95	95.0	6.0E-01	5.3E-02	4.6E-01	4.0E-02	2.9E-01	2.5E-02	2.6E+00	2.0E+00	1.3E+00
K-Mag Screening	FUG30	K-Mag	K-Mag Product Oversize Crusher (CS11402)	35	306,600	Tertiary Crushing	Ventilation Capture Full Equip. Enclosure	95 95	99.8	3.3E-04	1.4E-03	2.1E-04	9.0E-04	3.9E-05	1.7E-04	Ventilation Capture Full Equip. Enclosure	0 95	95.0	6.7E-03	5.9E-04	4.2E-03	3.7E-04	7.8E-04	6.8E-05	2.0E-03	1.3E-03	2.3E-04
K-Mag Screening	FUG30	K-Mag	South Secondary Screen (CS10565)	61	534,360	Fines Screening	Ventilation Capture Full Equip. Enclosure	95 95	99.8	1.4E-02	6.2E-02	1.1E-02	4.7E-02	6.8E-03	2.9E-02	Ventilation Capture Full Equip. Enclosure	0 95	95.0	2.9E-01	2.5E-02	2.2E-01	1.9E-02	1.4E-01	1.2E-02	8.7E-02	6.6E-02	4.1E-02
K-Mag Screening	FUG30	K-Mag	North Secondary Screen (CS10580)	61	534,360	Fines Screening	Ventilation Capture Full Equip. Enclosure	95 95	99.8	1.4E-02	6.2E-02	1.1E-02	4.7E-02	6.8E-03	2.9E-02	Ventilation Capture Full Equip. Enclosure	0 95	95.0	2.9E-01	2.5E-02	2.2E-01	1.9E-02	1.4E-01	1.2E-02	8.7E-02	6.6E-02	4.1E-02
K-Mag Screening	FUG30	K-Mag	Fines Screw Conveyor (CS10625)	37	324,120	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	2.1E-04	8.9E-04	1.0E-04	4.4E-04	2.9E-05	1.2E-04	Ventilation Capture Full Equip. Enclosure	0 95	95.0	4.2E-03	3.6E-04	2.0E-03	1.8E-04	5.8E-04	5.0E-05	1.3E-03	6.1E-04	1.7E-04
K-Mag Screening	FUG30	K-Mag	Standard Product Bin Screw Conveyor (CS10626)	20	175,200	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	1.1E-04	4.8E-04	5.5E-05	2.4E-04	1.6E-05	6.7E-05	Ventilation Capture Full Equip. Enclosure	0 95	95.0	2.2E-03	2.0E-04	1.1E-03	9.6E-05	3.1E-04	2.7E-05	6.8E-04	3.3E-04	9.4E-05
K-Mag Screening	FUG30	K-Mag	Granular Product Bin (CS10645)	100	876,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	5.6E-04	2.4E-03	2.7E-04	1.2E-03	7.8E-05	3.3E-04	Ventilation Capture Full Equip. Enclosure	0 95	95.0	1.1E-02	9.8E-04	5.5E-03	4.8E-04	1.6E-03	1.4E-04	3.4E-03	1.7E-03	4.7E-04
K-Mag Screening	FUG30	K-Mag	Granular Product Dispatch Belt (CS10650)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure	80	80.0	1.8E-01	7.7E-01	8.8E-02	3.8E-01	2.5E-02	1.1E-01	Partial Equip. Enclosure	80	80.0	1.8E-01	1.6E-02	8.8E-02	7.7E-03	2.5E-02	2.2E-03	7.9E-01	3.9E-01	1.1E-01
K-Mag Screening	FUG30	K-Mag	Special Standard Product Bin (CS10665)	10	87,600	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	5.6E-05	2.4E-04	2.7E-05	1.2E-04	7.8E-06	3.3E-05	Ventilation Capture Full Equip. Enclosure	0 95	95.0	1.1E-03	9.8E-05	5.5E-04	4.8E-05	1.6E-04	1.4E-05	3.4E-04	1.7E-04	4.7E-05
K-Mag Screening	FUG30	K-Mag	Tube Belt (K-Mag Pipe Conveyor) (CS11685)	125	1,095,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	7.0E-04	3.0E-03	3.4E-04	1.5E-03	9.7E-05	4.2E-04	Ventilation Capture Full Equip. Enclosure	0 95	95.0	1.4E-02	1.2E-03	6.9E-03	6.0E-04	1.9E-03	1.7E-04	4.2E-03	2.1E-03	5.9E-04
K-Mag Screening	FUG30	K-Mag	Special Standard Product Dispatch Screw Conveyor (CS10670)	200	1,752,000	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	2.2E-02	9.7E-02	1.1E-02	4.7E-02	3.1E-03	1.3E-02	Full Equip. Enclosure	95	95.0	2.2E-02	2.0E-03	1.1E-02	9.6E-04	3.1E-03	2.7E-04	9.8E-02	4.8E-02	1.4E-02
K-Mag Screening	FUG30	K-Mag	Fines Bin (CS10680)	197	1,727,472	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	1.1E-03	4.8E-03	5.4E-04	2.3E-03	1.5E-04	6.6E-04	Ventilation Capture Full Equip. Enclosure	0 95	95.0	2.2E-02	1.9E-03	1.1E-02	9.5E-04	3.1E-03	2.7E-04	6.7E-03	3.3E-03	9.3E-04
K-Mag Screening	FUG30	K-Mag	To Fines Disposal ***Wet***	3.2	28,032	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	3.6E-04	1.5E-03	1.8E-04	7.6E-04	5.0E-05	2.1E-04	Full Equip. Enclosure	95	95.0	3.6E-04	3.1E-05	1.8E-04	1.5E-05	5.0E-05	4.4E-06	1.6E-03	7.7E-04	2.2E-04
K-Mag Screening	FUG30	K-Mag	Fines Dispatch Screw Conveyor (CS10685)	75	657,000	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	8.4E-03	3.6E-02	4.1E-03	1.8E-02	1.2E-03	5.0E-03	Full Equip. Enclosure	95	95.0	8.4E-03	7.4E-04	4.1E-03	3.6E-04	1.2E-03	1.0E-04	3.7E-02	1.8E-02	5.1E-03
K-Mag Screening	FUG30	K-Mag	Standard Product Bin (CS10695)	40	350,400	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure	95 95	99.8	2.2E-04	9.7E-04	1.1E-04	4.7E-04	3.1E-05	1.3E-04	Ventilation Capture Full Equip. Enclosure	0 95	95.0	4.5E-03	3.9E-04	2.2E-03	1.9E-04	6.2E-04	5.4E-05	1.4E-03	6.6E-04	1.9E-04
K-Mag Screening	FUG30	K-Mag	Standard Product Dispatch Screw Conveyor (CS10700)	240	2,102,400	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	2.7E-02	1.2E-01	1.3E-02	5.7E-02	3.7E-03	1.6E-02	Full Equip. Enclosure	95	95.0	2.7E-02	2.4E-03	1.3E-02	1.2E-03	3.7E-03	3.3E-04	1.2E-01	5.8E-02	1.6E-02
							Total Fugitive Emissions (CON7 Operational)			**1.48**	**6.36**	**1.07**	**4.58**	**0.62**	**2.66**	**Total Fugitive Emissions (CON7 not Operational)**			**2.12**	**0.19**	**1.53**	**0.13**	**0.89**	**0.078**	**6.55**	**4.71**	**2.73**
																Fugitives as Stack Emissions[i,j] (CON7 not Operational)			**0.64**	**0.056**	**0.46**	**0.040**	**0.27**	**0.024**			

Mosaic

Table 4
LANG Screening Circuit Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (TPY) = {(Maximum Throughput [TPY]) - (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH])} x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Annual Hours of Baghouse Downtime = 175 hrs/yr

As a worst-case scenario, it was assumed that all 175 hrs/yr of baghouse downtime is used. Therefore, the maximum annual throughput was subtracted by the maximum throughput during the 175 hrs/yr of baghouse downtime.

[g] Maximum Fugitive Emission Rate (TPY) = (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[h] Maximum Total Annual Fugitive Emissions (TPY) = (Total Fugitive Emissions CON7 not Operational [TPY]) + (Total Fugitive Emissions CON7 Operational [TPY])

[i] Fugitives as Stack Emissions (lb/hr) = (Total Fugitive Emissions CON7 not Operational [lb/hr]) - (Total Fugitive Emissions CON7 Operational [lb/hr])

[j] Fugitives as Stack Emissions (TPY) = (Fugitives as Stack Emissions [lb/hr]) x (Annual Hours of Baghouse Downtime [hrs/yr]) / (2000 lbs/ton)

[k] The Dryer is vented to cyclone/scrubber CON6 not the baghouse CON7.

Table 5
Granulation Plant (Two Raymond Mills) Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[(a)] (TPH)	Maximum Throughput[(a)] (TPY)	Emission Factor Category[(b)]	Scrubber-CON10a and CON10b Operational: Control Equipment / Measure	Unit Control Efficiency[(c)] (%)	Total Control Efficiency[(d)] (%)	Maximum TSP Emissions (lb/hr)[(e)]	Maximum TSP Emissions (TPY)[(f)]	Maximum PM_{10} Emissions (lb/hr)[(e)]	Maximum PM_{10} Emissions (TPY)[(f)]	Maximum $PM_{2.5}$ Emissions (lb/hr)[(e)]	Maximum $PM_{2.5}$ Emissions (TPY)[(f)]
GRAN Process Vent. 10b	FUG33	K-Mag	SPM Storage Bin (CS9140)	400	3,504,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	2.2E-03	9.8E-03	1.1E-03	4.8E-03	3.1E-04	1.4E-03
GRAN Process Vent. 10b	FUG33	K-Mag	SOP Storage Bin[(h)] (CS9125)	400	3,504,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	2.2E-03	9.8E-03	1.1E-03	4.8E-03	3.1E-04	1.4E-03
GRAN Process Vent. 10b	FUG33	K-Mag	SOP Weigh Belt (CS9130)	125	1,095,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04
GRAN Process Vent. 10b	FUG33	K-Mag	SPM Mill Weigh Belt (CS9150)	125	1,095,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04
GRAN Process Vent. 10b	FUG33	K-Mag	SPM Gran Weigh Belt (CS9145)	85	744,600	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	4.8E-04	2.1E-03	2.3E-04	1.0E-03	6.6E-05	2.9E-04
GRAN Process Vent. 10b	FUG33	K-Mag	Raymond Mill Feed Drag (CS9245)	125	1,095,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04
GRAN Process Vent. 10b	FUG33	K-Mag	Raymond Mill Feed Elevator (CS9155)	125	1,095,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04
GRAN Process Vent. 10b	FUG33	K-Mag	North Raymond Mill Feed Bin (CS9160)	125	1,095,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04
GRAN Process Vent. 10b	FUG33	K-Mag	North Raymond Mill Vibratory Feeder (CS9165)	125	1,095,000	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
GRAN Process Vent. 10b	FUG33	K-Mag	North Raymond Mill (CS9170)	125	1,095,000	Tertiary Crushing	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	1.2E-03	5.2E-03	7.5E-04	3.3E-03	1.4E-04	6.1E-04
GRAN Process Vent. 10b	FUG33	K-Mag	North Raymond Mill Primary Cyclone (CS9190)	125	1,095,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04
GRAN Process Vent. 10b	FUG33	K-Mag	North Raymond Mill Secondary Cyclones (West/East) (CS9200 & CS9201)	6	52,560	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	3.4E-05	1.5E-04	1.6E-05	7.2E-05	4.7E-06	2.0E-05
GRAN Process Vent. 10b	FUG33	K-Mag	North Powdered SPM Storage Bin (CS9210)	125	1,095,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04
GRAN Process Vent. 10b	FUG33	K-Mag	North Powdered SPM Weigh Belt (CS9225)	85	744,600	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	4.8E-04	2.1E-03	2.3E-04	1.0E-03	6.6E-05	2.9E-04
GRAN Process Vent. 10b	FUG33	K-Mag	Gran Feed Drag (CS9250)	85	744,600	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	4.8E-04	2.1E-03	2.3E-04	1.0E-03	6.6E-05	2.9E-04

Table 5
Granulation Plant (Two Raymond Mills) Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

							Scrubber-CON10a and CON10b Operational								
Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[(a)]		Emission Factor Category[(b)]	Control Equipment / Measure	Unit Control Efficiency[(c)]	Total Control Efficiency[(d)]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
				(TPH)	(TPY)			(%)	(%)	(lb/hr)[(e)]	(TPY)[(f)]	(lb/hr)[(e)]	(TPY)[(f)]	(lb/hr)[(e)]	(TPY)[(f)]
GRAN Process Vent. 10b	FUG33	K-Mag	Recycle Weigh Belt (CS9235)	165	1,445,400	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	9.3E-04	4.1E-03	4.5E-04	2.0E-03	1.3E-04	5.6E-04
GRAN Process Vent. 10b	FUG33	K-Mag	Gran Feed Elevator (CS9255)	250	2,190,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	1.4E-03	6.2E-03	6.9E-04	3.0E-03	1.9E-04	8.5E-04
GRAN Process Vent. 10b	FUG33	K-Mag	Paddle Mixer (CS9260)	250	2,190,000	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	2.8E-02	1.2E-01	1.4E-02	6.0E-02	3.9E-03	1.7E-02
GRAN Dryer 10a	FUG33	GRAN	Rotary Granulator (CS9265)	250	2,190,000	Conveyor Transfer Point	Ventilation capture[(g)] Partial Equip. Enclosure	70 80	94.0	3.4E-02	1.5E-01	1.7E-02	7.2E-02	4.7E-03	2.0E-02
GRAN Dryer 10a	FUG33	GRAN	Rotary Dryer (CS9275)	250	2,190,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	1.4E-03	6.2E-03	6.9E-04	3.0E-03	1.9E-04	8.5E-04
GRAN Process Vent. 10b	FUG33	GRAN	Dryer Discharge Screw (CS9310)	250	2,190,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	1.4E-03	6.2E-03	6.9E-04	3.0E-03	1.9E-04	8.5E-04
GRAN Process Vent. 10b	FUG33	GRAN	Screen Feed Elevator (CS9320)	250	2,190,000	Conveyor Transfer Point	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	1.4E-03	6.2E-03	6.9E-04	3.0E-03	1.9E-04	8.5E-04
GRAN Process Vent. 10b	FUG33	GRAN	#1 TX Shaker Screen[(i)] (CS9330)	83.3	730,000	Fines Screening	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	2.0E-02	8.6E-02	1.5E-02	6.6E-02	9.3E-03	4.1E-02
GRAN Process Vent. 10b	FUG33	GRAN	#2 TX Shaker Screen[(i)] (CS9335)	83.3	730,000	Fines Screening	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	2.0E-02	8.6E-02	1.5E-02	6.6E-02	9.3E-03	4.1E-02
GRAN Process Vent. 10b	FUG33	GRAN	#3 TX Shaker Screen[(i)] (CS9340)	83.3	730,000	Fines Screening	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	2.0E-02	8.6E-02	1.5E-02	6.6E-02	9.3E-03	4.1E-02
GRAN Process Vent. 10b	FUG33	GRAN	#1 Chain Mill (CS9360; CS9361 East / CS9362 West)	10.3	90,228	Tertiary Crushing	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	9.8E-05	4.3E-04	6.2E-05	2.7E-04	1.1E-05	5.0E-05
GRAN Process Vent. 10b	FUG33	GRAN	#2 Chain Mill (CS9365; CS9366 East / CS9367 West)	10.3	90,228	Tertiary Crushing	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	9.8E-05	4.3E-04	6.2E-05	2.7E-04	1.1E-05	5.0E-05
GRAN Process Vent. 10b	FUG33	GRAN	#3 Chain Mill (CS9370; CS9371 East / CS9372 West)	10.3	90,228	Tertiary Crushing	Ventilation capture[(g)] Full Equip. Enclosure	95 95	99.8	9.8E-05	4.3E-04	6.2E-05	2.7E-04	1.1E-05	5.0E-05
GRAN Dryer 10a	FUG33	GRAN	Dryer Dust Screw Conveyor (CS9380)	10	87,600	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	1.1E-03	4.9E-03	5.5E-04	2.4E-03	1.6E-04	6.8E-04
GRAN Process Vent. 10b	FUG33	GRAN	Fugitive Dust Screw Conveyor (CS9451)	10	87,600	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	1.1E-03	4.9E-03	5.5E-04	2.4E-03	1.6E-04	6.8E-04

Table 5
Granulation Plant (Two Raymond Mills) Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Scrubber-CON10a and CON10b Operational: Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
GRAN Process Vent. 10b	FUG33	GRAN	Recycle Bin (CS9230)	185	1,620,600	Conveyor Transfer Point	Ventilation capture[g]	95	99.8	1.0E-03	4.6E-03	5.1E-04	2.2E-03	1.4E-04	6.3E-04
							Full Equip. Enclosure	95							
GRAN Process Vent. 10b	FUG33	GRAN	#1 Product Belt (CS9040)	85	744,600	Conveyor Transfer Point	Ventilation capture[g]	95	99.8	4.8E-04	2.1E-03	2.3E-04	1.0E-03	6.6E-05	2.9E-04
							Full Equip. Enclosure	95							
GRAN Process Vent. 10b	FUG33	GRAN	Premium Product Bin (CS9061)	85	744,600	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	9.6E-03	4.2E-02	4.7E-03	2.0E-02	1.3E-03	5.8E-03
GRAN Process Vent. 10b	FUG33	GRAN	Premium Product Dispatch Screw (CS9025)	400	3,504,000	Conveyor Transfer Point	Full Equip. Enclosure	95	99.5	4.5E-03	2.0E-02	2.2E-03	9.6E-03	6.2E-04	2.7E-03
							Product Coating	90							
GRAN Process Vent. 10b	FUG33	GRAN	Premium Product Dispatch Elevator (CS9055)	400	3,504,000	Conveyor Transfer Point	Full Equip. Enclosure	95	99.50	4.5E-03	2.0E-02	2.2E-03	9.6E-03	6.2E-04	2.7E-03
							Product Coating	90							
							Total Fugitive Emissions			**0.18**	**0.77**	**0.10**	**0.45**	**0.044**	**0.19**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (ton/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[g] The Second Raymond Mill is vented to a different baghouse with a maximum of 175 hrs/yr of baghouse downtime. See Table 6 for estimated fugitive emissions from the South Raymond Mill circuit.

[h] Worst-case emissions are generated via material going through the SOP Storage Bin and then into the North Raymond Mill. See the corresponding flow diagram for more information.

[i] No more than 250 tph can go through any one screen or all three screens operating together. Since these screens are exactly the same, we are showing the emissions as if each screen was processing a third of the total throughput for simplicity. However, each screen can process more than a third. Changing the throughput for each screen without changing the total throughput for all three screens (i.e., 250 tph) will not affect the total emissions from this circuit.

![Mosaic]

Table 6
Second Raymond Mill Circuit in the Granulation Plant Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Baghouse-CON14 Operational: Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]	Baghouse-CON14 not Operational: Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[g]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[g]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[g]	Maximum Total Annual Emissions[h] TSP (TPY)	Maximum Total Annual Emissions[h] PM_{10} (TPY)	Maximum Total Annual Emissions[h] $PM_{2.5}$ (TPY)
GRAN Process Vent. 10c	FUG24	K-Mag	South Raymond Mill Feed Bin (CS9775)	125	1,095,000	Conveyor Transfer Point	Ventilation capture Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04	Ventilation capture Full Equip. Enclosure	0 95	95.0	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03	6.5E-02	3.2E-02	8.9E-03
GRAN Process Vent. 10c	FUG24	K-Mag	South Raymond Mill Vibratory Feeder (CS9785)	125	1,095,000	Conveyor Transfer Point	Full Equip. Enclosure	95	95.0	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03	Full Equip. Enclosure	95	95.0	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03	1.2E-01	6.0E-02	1.7E-02
GRAN Process Vent. 10c	FUG24	K-Mag	South Raymond Mill (CS9790)	125	1,095,000	Tertiary Crushing	Ventilation capture Full Equip. Enclosure	95 95	99.8	1.2E-03	5.2E-03	7.5E-04	3.3E-03	1.4E-04	6.1E-04	Ventilation capture Full Equip. Enclosure	0 95	95.0	2.4E-02	1.0E-01	1.5E-02	6.6E-02	2.8E-03	1.2E-02	1.1E-01	6.9E-02	1.3E-02
GRAN Process Vent. 10c	FUG24	K-Mag	South Raymond Mill Primary Cyclone (CS9810)	125	1,095,000	Conveyor Transfer Point	Ventilation capture Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04	Full Equip. Enclosure	95	95.0	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03	6.5E-02	3.2E-02	8.9E-03
GRAN Process Vent. 10c	FUG24	K-Mag	South Powdered SPM Storage Bin (CS9835)	125	1,095,000	Conveyor Transfer Point	Ventilation capture Full Equip. Enclosure	95 95	99.8	7.0E-04	3.1E-03	3.4E-04	1.5E-03	9.7E-05	4.3E-04	Ventilation capture Full Equip. Enclosure	0 95	95.0	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03	6.5E-02	3.2E-02	8.9E-03
GRAN Process Vent. 10c	FUG24	K-Mag	South Powdered SPM Weigh Belt (CS9840)	85	744,600	Conveyor Transfer Point	Ventilation capture Full Equip. Enclosure	95 95	99.8	4.8E-04	2.1E-03	2.3E-04	1.0E-03	6.6E-05	2.9E-04	Ventilation capture Full Equip. Enclosure	0 95	95.0	9.6E-03	4.2E-02	4.7E-03	2.0E-02	1.3E-03	5.8E-03	4.4E-02	2.2E-02	6.1E-03
							Total Fugitive Emissions (CON14 Operational)			**0.018**	**0.078**	**0.0089**	**0.039**	**0.0024**	**0.011**	**Total Fugitive Emissions (CON14 not Operational)**			**0.090**	**0.39**	**0.047**	**0.21**	**0.012**	**0.052**	**0.47**	**0.25**	**0.063**
																Fugitives as Stack Emissions[i,j] (CON14 not Operational)			**0.072**	**0.0063**	**0.038**	**0.0033**	**0.0094**	**0.00083**			

Footnotes:

[a] The worst-case emissions are generated when all 125 tph of material goes through the North Raymond Mill, which is represented in Table 5.

[b] Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (TPY) = {(Maximum Throughput [TPY]) - (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH])} x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Annual Hours of Baghouse Downtime = 175 hrs/yr

As a worst-case scenario, it was assumed that all 175 hrs/yr of baghouse downtime is used. Therefore, the maximum annual throughput was subtracted by the maximum throughput during the 175 hrs/yr of baghouse downtime.

[g] Maximum Fugitive Emission Rate (TPY) = (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[h] Maximum Total Annual Fugitive Emissions (TPY) = (Total Fugitive Emissions CON14 not Operational [TPY]) + (Total Fugitive Emissions CON14 Operational [TPY])

[i] Fugitives as Stack Emissions (lb/hr) = (Total Fugitive Emissions CON14 not Operational [lb/hr]) - (Total Fugitive Emissions CON14 Operational [lb/hr])

[j] Fugitives as Stack Emissions (TPY) = (Fugitives as Stack Emissions [lb/hr]) x (Annual Hours of Baghouse Downtime [hrs/yr]) / (2000 lbs/ton)

Table 7
Nash Plant (formerly "Cuttings Circuit") Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
#1 Hoist	FUG1	Cuttings	Nash Dump Hopper (CS0029)	400	3,504,000	Conveyor Transfer Point	Partial Equip Enclosure	75	75.0	0.22	0.98	0.110	0.48	0.031	0.14
#1 Hoist	FUG1	Cuttings	Nash Ore Bin (CS0026)	400	3,504,000	Conveyor Transfer Point	Full Equip Enclosure	95	95.0	0.045	0.20	0.022	0.096	0.0062	0.027
#1 Hoist	FUG1	Cuttings	Nash Vibratory Feeder (CS0031)	400	3,504,000	Conveyor Transfer Point	Partial Equip Enclosure	80	80.0	0.18	0.79	0.088	0.39	0.025	0.11
#1 Hoist	FUG1	Cuttings	Nash Conveyor Belt (CS1023)	650	5,694,000	Conveyor Transfer Point	Partial Equip Enclosure	80	80.0	0.29	1.3	0.14	0.63	0.040	0.18
								TOTAL FUG1 Emissions		**0.74**	**3.25**	**0.36**	**1.59**	**0.10**	**0.45**
Screening	FUG2	Cuttings	Nash 6x20 Screen (CS1040)	650	5,694,000	Screening	Full Equip Enclosure	95	95.0	0.6	2.5	0.28	1.2	0.019	0.08
Screening	FUG2	Cuttings	Nash Recycle Vibratory Feeder (CS1055)	250	2,190,000	Conveyor Transfer Point	Full Equip Enclosure	95	95.0	0.028	0.123	0.0138	0.060	0.0039	0.017
Screening	FUG2	Cuttings	Nash Stationary Recycle Conveyor (CS1060)	250	2,190,000	Conveyor Transfer Point	Full Equip Enclosure	95	95.0	0.028	0.123	0.0138	0.060	0.0039	0.017
Screening	FUG2	Cuttings	Nash Conveyor Belt (CS1065)	400	3,504,000	Conveyor Transfer Point	Partial Equip Enclosure	80	80.0	0.18	0.79	0.088	0.39	0.025	0.11
								TOTAL FUG2 Emissions		**0.80**	**3.49**	**0.40**	**1.74**	**0.052**	**0.23**
							Total Fugitive Emissions			**1.54**	**6.74**	**0.76**	**3.33**	**0.15**	**0.68**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (ton/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Mosaic

Table 8
Dispatch Fugitive Material Handling Emissions - With Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Location	Process/Source Description	Maximum Throughput[a,h]		Emission Factor Category[b]	Baghouse-CON11 Operational: Control Equipment / Measure	Unit Control Efficiency[c]	Total Control Efficiency[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions		Baghouse-CON11 not Operational: Control Equipment / Measure	Unit Control Efficiency[c]	Total Control Efficiency[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions		Maximum Total Annual Emissions[i]		
					(TPH)	(TPY)			(%)	(%)	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]		(%)	(%)	(lb/hr)[e]	(TPY)[g]	(lb/hr)[e]	(TPY)[g]	(lb/hr)[e]	(TPY)[g]	TSP (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Primary Dispatch Conveyor #1 (CS11490)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure	50	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure	50	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Secondary Dispatch Conveyor #2 (CS11515)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure	50	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure	50	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
Dispatch Transfer Tower	FUG32	K-Mag (Standard, Special Standard, Granular, Fines)	Transfer Tower	Granulation #3 Feed Belt (CS9015)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Partial Equip. Enclosure	95 50	97.5	2.2E-02	9.7E-02	1.1E-02	4.7E-02	3.1E-03	1.3E-02	Ventilation Capture Partial Equip. Enclosure	0 50	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	1.4E-01	6.6E-02	1.9E-02
								Total Standard, Special Standard, Granular, Fines K-Mag to Granulation Plant Fugitive Emissions w/ Coating (CON11 Operational)			**9.2E-01**	**4.0E+00**	**4.5E-01**	**1.9E+00**	**1.3E-01**	**5.5E-01**	**Total Standard, Special Standard, Granular, Fines K-Mag to Granulation Plant Fugitive Emissions w/ Coating (CON11 not Operational)**			**1.3E+00**	**1.2E-01**	**6.6E-01**	**5.8E-02**	**1.9E-01**	**1.6E-02**	**4.1E+00**	**2.0E+00**	**5.6E-01**
GRAN Process Vent. 10b	FUG33	K-Mag (Premium)	Granulation Plant	Granulation #2 Product Belt (CS9045)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 90	95.0	4.5E-02	1.9E-01	2.2E-02	9.4E-02	6.2E-03	2.7E-02	Partial Equip. Enclosure Product Coating	50 90	95.0	4.5E-02	3.9E-03	2.2E-02	1.9E-03	6.2E-03	5.4E-04	2.0E-01	9.6E-02	2.7E-02
Dispatch Transfer Tower	FUG32	K-Mag (Premium)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating	95 95 90	100.0	2.2E-04	9.7E-04	1.1E-04	4.7E-04	3.1E-05	1.3E-04	Ventilation Capture Full Equip. Enclosure Product Coating	0 95 90	99.5	4.5E-03	3.9E-04	2.2E-03	1.9E-04	6.2E-04	5.4E-05	1.4E-03	6.6E-04	1.9E-04
S&L Warehouse 2	FUG8	K-Mag (Premium)	Warehouse #2	#2 Warehouse Shuttle Belt (CS7415)	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	1.2E-01	1.3E-02	5.7E-02	3.7E-03	1.6E-02	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	2.4E-03	1.3E-02	1.2E-03	3.7E-03	3.3E-04	1.2E-01	5.8E-02	1.6E-02
S&L Warehouse 2	FUG8	K-Mag (Premium)	Warehouse #2	To #2 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	1.2E-01	1.3E-02	5.7E-02	3.7E-03	1.6E-02	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	2.4E-03	1.3E-02	1.2E-03	3.7E-03	3.3E-04	1.2E-01	5.8E-02	1.6E-02
								Total Premium K-Mag to Warehouse #2 Fugitive Emissions w/ Coating (CON11 Operational)			**9.9E-02**	**4.3E-01**	**4.9E-02**	**2.1E-01**	**1.4E-02**	**5.9E-02**	**Total Premium K-Mag to Warehouse #2 Fugitive Emissions w/ Coating (CON11 not Operational)**			**1.0E-01**	**9.1E-03**	**5.1E-02**	**4.4E-03**	**1.4E-02**	**1.3E-03**	**4.3E-01**	**2.1E-01**	**6.0E-02**
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Primary Dispatch Conveyor #1 (CS11490)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	3.7E-01	4.2E-02	1.8E-01	1.2E-02	5.1E-02	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	7.5E-03	4.2E-02	3.7E-03	1.2E-02	1.0E-03	3.7E-01	1.8E-01	5.2E-02
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Secondary Dispatch Conveyor #2 (CS11515)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	3.7E-01	4.2E-02	1.8E-01	1.2E-02	5.1E-02	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	7.5E-03	4.2E-02	3.7E-03	1.2E-02	1.0E-03	3.7E-01	1.8E-01	5.2E-02
Dispatch Transfer Tower	FUG32	K-Mag (Standard, Special Standard, Granular, Fines)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating[l]	95 95 81	99.95	4.3E-04	1.8E-03	2.1E-04	9.0E-04	5.9E-05	2.5E-04	Ventilation Capture Full Equip. Enclosure Product Coating[l]	0 95 81	99.1	8.5E-03	7.5E-04	4.2E-03	3.7E-04	1.2E-03	1.0E-04	2.6E-03	1.3E-03	3.6E-04
S&L Warehouse 2	FUG8	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #2	#2 Warehouse Shuttle Belt (CS7415)	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	2.2E-01	2.5E-02	1.1E-01	7.1E-03	3.0E-02	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	4.5E-03	2.5E-02	2.2E-03	7.1E-03	6.2E-04	2.2E-01	1.1E-01	3.1E-02
S&L Warehouse 2	FUG8	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #2	To #2 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	2.2E-01	2.5E-02	1.1E-01	7.1E-03	3.0E-02	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	4.5E-03	2.5E-02	2.2E-03	7.1E-03	6.2E-04	2.2E-01	1.1E-01	3.1E-02
								Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #2 Fugitive Emissions w/ Coating (CON11 Operational)			**2.7E-01**	**1.2E+00**	**1.3E-01**	**5.8E-01**	**3.8E-02**	**1.6E-01**	**Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #2 Fugitive Emissions w/ Coating (CON11 not Operational)**			**2.8E-01**	**2.5E-02**	**1.4E-01**	**1.2E-02**	**3.9E-02**	**3.4E-03**	**1.2E+00**	**5.9E-01**	**1.7E-01**

Mosaic

Table 8
Dispatch Fugitive Material Handling Emissions - With Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Location	Process/Source Description	Maximum Throughput[a,h] (TPH)	Maximum Throughput[a,h] (TPY)	Emission Factor Category[b]	Baghouse-CON11 Operational: Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]	Baghouse-CON11 not Operational: Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[g]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[g]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[g]	Maximum Total Annual Emissions[i] TSP (TPY)	Maximum Total Annual Emissions[i] PM_{10} (TPY)	Maximum Total Annual Emissions[i] $PM_{2.5}$ (TPY)
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Primary Dispatch Conveyor #1 (CS11490)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	3.7E-01	4.2E-02	1.8E-01	1.2E-02	5.1E-02	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	7.5E-03	4.2E-02	3.7E-03	1.2E-02	1.0E-03	3.7E-01	1.8E-01	5.2E-02
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Secondary Dispatch Conveyor #2 (CS11515)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	3.7E-01	4.2E-02	1.8E-01	1.2E-02	5.1E-02	Partial Equip. Enclosure Product Coating[l]	50 81	90.5	8.5E-02	7.5E-03	4.2E-02	3.7E-03	1.2E-02	1.0E-03	3.7E-01	1.8E-01	5.2E-02
Dispatch Transfer Tower	FUG32	K-Mag (Standard, Special Standard, Granular, Fines)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating[l]	95 95 81	100.0	4.3E-04	1.8E-03	2.1E-04	9.0E-04	5.9E-05	2.5E-04	Ventilation Capture Full Equip. Enclosure Product Coating[l]	0 95 81	99.1	8.5E-03	7.5E-04	4.2E-03	3.7E-04	1.2E-03	1.0E-04	2.6E-03	1.3E-03	3.6E-04
S&L Warehouse 2	FUG8	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #2	#19 Dispatch Belt (CS9655)	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	2.2E-01	2.5E-02	1.1E-01	7.1E-03	3.0E-02	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	4.5E-03	2.5E-02	2.2E-03	7.1E-03	6.2E-04	2.2E-01	1.1E-01	3.1E-02
S&L Warehouse 3	FUG11	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #3	#3 Warehouse Shuttle Belt (CS9659)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating[l]	70 70 81	98.3	1.5E-02	6.6E-02	7.5E-03	3.2E-02	2.1E-03	9.1E-03	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating[l]	70 70 81	98.3	1.5E-02	1.3E-03	7.5E-03	6.6E-04	2.1E-03	1.9E-04	6.7E-02	3.3E-02	9.3E-03
S&L Warehouse 3	FUG11	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #3	To #3 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	2.2E-01	2.5E-02	1.1E-01	7.1E-03	3.0E-02	Partial Bldg. Enclosure Product Coating[l]	70 81	94.3	5.1E-02	4.5E-03	2.5E-02	2.2E-03	7.1E-03	6.2E-04	2.2E-01	1.1E-01	3.1E-02
								Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #3 Fugitive Emissions w/ Coating (CON11 Operational)			**2.9E-01**	**1.2E+00**	**1.4E-01**	**6.1E-01**	**4.0E-02**	**1.7E-01**	**Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #3 Fugitive Emissions w/ Coating (CON11 not Operational)**			**3.0E-01**	**2.6E-02**	**1.5E-01**	**1.3E-02**	**4.1E-02**	**3.6E-03**	**1.3E+00**	**6.2E-01**	**1.8E-01**
GRAN Process Vent. 10b	FUG33	K-Mag (Premium)	Granulation Plant	Granulation #2 Product Belt (CS9045)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 90	95.0	4.5E-02	1.9E-01	2.2E-02	9.4E-02	6.2E-03	2.7E-02	Partial Equip. Enclosure Product Coating	50 90	95.0	4.5E-02	3.9E-03	2.2E-02	1.9E-03	6.2E-03	5.4E-04	2.0E-01	9.6E-02	2.7E-02
Dispatch Transfer Tower	FUG32	K-Mag (Premium)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating	95 95 90	99.98	2.2E-04	9.7E-04	1.1E-04	4.7E-04	3.1E-05	1.3E-04	Ventilation Capture Full Equip. Enclosure Product Coating	0 95 90	99.5	4.5E-03	3.9E-04	2.2E-03	1.9E-04	6.2E-04	5.4E-05	1.4E-03	6.6E-04	1.9E-04
S&L Warehouse 2	FUG8	K-Mag (Premium)	Warehouse #2	#19 Dispatch Belt (CS9655)	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	1.2E-01	1.3E-02	5.7E-02	3.7E-03	1.6E-02	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	2.4E-03	1.3E-02	1.2E-03	3.7E-03	3.3E-04	1.2E-01	5.8E-02	1.6E-02
S&L Warehouse 3	FUG11	K-Mag (Premium)	Warehouse #3	#3 Warehouse Shuttle Belt (CS9659)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating	70 70 90	99.1	8.1E-03	3.5E-02	4.0E-03	1.7E-02	1.1E-03	4.8E-03	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating	70 70 90	99.1	8.1E-03	7.1E-04	4.0E-03	3.5E-04	1.1E-03	9.8E-05	3.5E-02	1.7E-02	4.9E-03
S&L Warehouse 3	FUG11	K-Mag (Premium)	Warehouse #3	To #3 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	1.2E-01	1.3E-02	5.7E-02	3.7E-03	1.6E-02	Partial Bldg. Enclosure Product Coating	70 90	97.0	2.7E-02	2.4E-03	1.3E-02	1.2E-03	3.7E-03	3.3E-04	1.2E-01	5.8E-02	1.6E-02
								Total Premium K-Mag to Warehouse #3 Fugitive Emission w/ Coating (CON11 Operational)			**1.1E-01**	**4.6E-01**	**5.2E-02**	**2.3E-01**	**1.5E-02**	**6.4E-02**	**Total Premium K-Mag to Warehouse #3 Fugitive Emission w/ Coating (CON11 not Operational)**			**1.1E-01**	**9.8E-03**	**5.5E-02**	**4.8E-03**	**1.5E-02**	**1.3E-03**	**4.7E-01**	**2.3E-01**	**6.5E-02**
								Total Dispatch Fugitive Emissions w/ Coating (CON11 Operational)			**1.69**	**7.26**	**0.83**	**3.55**	**0.23**	**1.00**	**Total Dispatch Fugitive Emissions w/ Coating (CON11 not Operational)**			**2.14**	**0.19**	**1.05**	**0.092**	**0.30**	**0.026**	**7.45**	**3.64**	**1.03**
																	Fugitives as Stack Emissions[j,k] (CON11 not Operational)			**0.45**	**0.040**	**0.22**	**0.019**	**0.062**	**0.0055**			

Footnotes:

(a) Based on operating 8,760 hours per year.

(b) Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (µm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

(c) Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

(d) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

(e) Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

(f) Maximum Fugitive Emission Rate (TPY) = {(Maximum Throughput [TPY]) - (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH])} x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Annual Hours of Baghouse Downtime = 175 hrs/yr

As a worst-case scenario, it was assumed that all 175 hrs/yr of baghouse downtime is used. Therefore, the maximum annual throughput was subtracted by the maximum throughput during the 175 hrs/yr of baghouse downtime.

(g) Maximum Fugitive Emission Rate (TPY) = (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

(h) The simultaneous operation of sending Premium K-Mag to Warehouse #1, sending K-Mag to the Granulation Plant, and sending Granular to Warehouse #3 creates the worst-case emissions scenario.

(i) Maximum Total Annual Fugitive Emissions (TPY) = (Total Fugitive Emissions CON11 not Operational [TPY]) + (Total Fugitive Emissions CON11 Operational [TPY])

(j) Fugitives as Stack Emissions (lb/hr) = (Total Fugitive Emissions CON11 not Operational [lb/hr]) - (Total Fugitive Emissions CON11 Operational [lb/hr])

(k) Fugitives as Stack Emissions (TPY) = (Fugitives as Stack Emissions [lb/hr]) x (Annual Hours of Baghouse Downtime [hrs/yr]) / (2000 lbs/ton)

(l) Product coating control efficiency is estimated to be 90%, but Warehouse Nos. 2 and 3 store Special Standard K-Mag (animal feed), which is not coated. Approximately 10% of the product dispatched to Warehouse Nos. 2 and 3 is Special Standard K-Mag; therefore, the coating provides a control efficiency of [90% x (100% - 10%)] = 81%.

Table 9
Dispatch Fugitive Material Handling Emissions - No Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Location	Process/Source Description	Maximum Throughput[a,h]		Emission Factor Category[b]	Baghouse-CON11 Operational									Baghouse-CON11 not Operational									Maximum Total Annual Emissions[i]		
								Control Equipment /	Unit Control Efficiency[c]	Total Control Efficiency[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions		Control Equipment /	Unit Control Efficiency[c]	Total Control Efficiency[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions		TSP	PM_{10}	$PM_{2.5}$
					(TPH)	(TPY)		Measure	(%)	(%)	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	Measure	(%)	(%)	(lb/hr)[e]	(TPY)[g]	(lb/hr)[e]	(TPY)[g]	(lb/hr)[e]	(TPY)[g]	(TPY)	(TPY)	(TPY)
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Fines, and Granular)	K-Mag Plant	K-Mag Primary Dispatch Conveyor #1 (CS11490)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure	50	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure	50	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Fines, and Granular)	K-Mag Plant	K-Mag Secondary Dispatch Conveyor #2 (CS11515)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure	50	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure	50	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
Dispatch Transfer Tower	FUG32	K-Mag (Standard, Special Standard, Fines, and Granular)	Transfer Tower	Granulation #3 Feed Belt (CS9015)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Partial Equip. Enclosure	95 50	97.5	2.2E-02	9.7E-02	1.1E-02	4.7E-02	3.1E-03	1.3E-02	Ventilation Capture Partial Equip. Enclosure	0 50	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	1.4E-01	6.6E-02	1.9E-02
								Total Standard, Special Standard, Granular, Fines K-Mag to Granulation Plant Fugitive Emissions w/ No Coating (CON11 Operational)			**9.2E-01**	**4.0E+00**	**4.5E-01**	**1.9E+00**	**1.3E-01**	**5.5E-01**	**Total Standard, Special Standard, Granular, Fines K-Mag to Granulation Plant Fugitive Emissions w/ No Coating (CON11 not Operational)**			**1.3E+00**	**1.2E-01**	**6.6E-01**	**5.8E-02**	**1.9E-01**	**1.6E-02**	**4.1E+00**	**2.0E+00**	**5.6E-01**
GRAN Process Vent. 10b	FUG33	K-Mag (Premium)	Granulation Plant	Granulation #2 Product Belt (CS9045)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
Dispatch Transfer Tower	FUG32	K-Mag (Premium)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating	95 95 0	99.8	2.2E-03	9.7E-03	1.1E-03	4.7E-03	3.1E-04	1.3E-03	Ventilation Capture Full Equip. Enclosure Product Coating	0 95 0	95.0	4.5E-02	3.9E-03	2.2E-02	1.9E-03	6.2E-03	5.4E-04	1.4E-02	6.6E-03	1.9E-03
S&L Warehouse 2	FUG8	K-Mag (Premium)	Warehouse #2	#2 Warehouse Shuttle Belt (CS7415)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
S&L Warehouse 2	FUG8	K-Mag (Premium)	Warehouse #2	To #2 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
								Total Premium K-Mag to Warehouse #2 Fugitive Emissions w/ No Coating (CON11 Operational)			**9.9E-01**	**4.3E+00**	**4.9E-01**	**2.1E+00**	**1.4E-01**	**5.9E-01**	**Total Premium K-Mag to Warehouse #2 Fugitive Emissions w/ No Coating (CON11 not Operational)**			**1.0E+00**	**9.1E-02**	**5.1E-01**	**4.4E-02**	**1.4E-01**	**1.3E-02**	**4.3E+00**	**2.1E+00**	**6.0E-01**
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Primary Dispatch Conveyor #1 (CS11490)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Secondary Dispatch Conveyor #2 (CS11515)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
Dispatch Transfer Tower	FUG32	K-Mag (Standard, Special Standard, Granular, Fines)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating	95 95 0	99.8	2.2E-03	9.7E-03	1.1E-03	4.7E-03	3.1E-04	1.3E-03	Ventilation Capture Full Equip. Enclosure Product Coating	0 95 0	95.0	4.5E-02	3.9E-03	2.2E-02	1.9E-03	6.2E-03	5.4E-04	1.4E-02	6.6E-03	1.9E-03
S&L Warehouse 2	FUG8	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #2	#2 Warehouse Shuttle Belt (CS7415)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
S&L Warehouse 2	FUG8	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #2	To #2 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
								Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #2 Fugitive Emissions w/ No Coating (CON11 Operational)			**1.4E+00**	**6.2E+00**	**7.1E-01**	**3.0E+00**	**2.0E-01**	**8.6E-01**	**Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #2 Fugitive Emissions w/ No Coating (CON11 not Operational)**			**1.5E+00**	**1.3E-01**	**7.3E-01**	**6.4E-02**	**2.1E-01**	**1.8E-02**	**6.3E+00**	**3.1E+00**	**8.7E-01**

Mosaic

Table 9
Dispatch Fugitive Material Handling Emissions - No Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Location	Process/Source Description	Maximum Throughput[a,h]		Emission Factor Category[b]	Baghouse-CON11 Operational									Baghouse-CON11 not Operational									Maximum Total Annual Emissions[i]		
								Control Equipment /	Unit Control Efficiency[c]	Total Control Efficiency[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions		Control Equipment /	Unit Control Efficiency[c]	Total Control Efficiency[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions		TSP	PM_{10}	$PM_{2.5}$
					(TPH)	(TPY)		Measure	(%)	(%)	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	Measure	(%)	(%)	(lb/hr)[e]	(TPY)[g]	(lb/hr)[e]	(TPY)[g]	(lb/hr)[e]	(TPY)[g]	(TPY)	(TPY)	(TPY)
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Primary Dispatch Conveyor #1 (CS11490)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
S&L Dispatch	FUG31	K-Mag (Standard, Special Standard, Granular, Fines)	K-Mag Plant	K-Mag Secondary Dispatch Conveyor #2 (CS11515)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
Dispatch Transfer Tower	FUG32	K-Mag (Standard, Special Standard, Granular, Fines)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating	95 95 0	99.8	2.2E-03	9.7E-03	1.1E-03	4.7E-03	3.1E-04	1.3E-03	Ventilation Capture Full Equip. Enclosure Product Coating	0 95 0	95.0	4.5E-02	3.9E-03	2.2E-02	1.9E-03	6.2E-03	5.4E-04	1.4E-02	6.6E-03	1.9E-03
S&L Warehouse 2	FUG8	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #2	#19 Dispatch Belt (CS9655)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
S&L Warehouse 3	FUG11	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #3	#3 Warehouse Shuttle Belt (CS9659)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating	70 70 0	91.0	8.1E-02	3.5E-01	4.0E-02	1.7E-01	1.1E-02	4.8E-02	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating	70 70 0	91.0	8.1E-02	7.1E-03	4.0E-02	3.5E-03	1.1E-02	9.8E-04	3.5E-01	1.7E-01	4.9E-02
S&L Warehouse 3	FUG11	K-Mag (Standard, Special Standard, Granular, Fines)	Warehouse #3	To #3 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
								Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #3 Fugitive Emissions w/ No Coating (CON11 Operational)			**1.5E+00**	**6.5E+00**	**7.4E-01**	**3.2E+00**	**2.1E-01**	**9.0E-01**	**Total Standard, Special Standard, Granular, Fines K-Mag to Warehouse #3 Fugitive Emissions w/ No Coating (CON11 not Operational)**			**1.6E+00**	**1.4E-01**	**7.7E-01**	**6.7E-02**	**2.2E-01**	**1.9E-02**	**6.7E+00**	**3.3E+00**	**9.2E-01**
GRAN Process Vent. 10b	FUG33	K-Mag (Premium)	Granulation Plant	Granulation #2 Product Belt (CS9045)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	1.9E+00	2.2E-01	9.4E-01	6.2E-02	2.7E-01	Partial Equip. Enclosure Product Coating	50 0	50.0	4.5E-01	3.9E-02	2.2E-01	1.9E-02	6.2E-02	5.4E-03	2.0E+00	9.6E-01	2.7E-01
Dispatch Transfer Tower	FUG32	K-Mag (Premium)	Transfer Tower	Dispatch to Storage Belt (CS11535)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Full Equip. Enclosure Product Coating	95 95 0	99.8	2.2E-03	9.7E-03	1.1E-03	4.7E-03	3.1E-04	1.3E-03	Ventilation Capture Full Equip. Enclosure Product Coating	0 95 0	95.0	4.5E-02	3.9E-03	2.2E-02	1.9E-03	6.2E-03	5.4E-04	1.4E-02	6.6E-03	1.9E-03
S&L Warehouse 2	FUG8	K-Mag (Premium)	Warehouse #2	#19 Dispatch Belt (CS9655)	400	3,504,000	Conveyor Transfer Point	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Ventilation Capture Partial Bldg. Enclosure Product Coating	 70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
S&L Warehouse 3	FUG11	K-Mag (Premium)	Warehouse #3	#3 Warehouse Shuttle Belt (CS9659)	400	3,504,000	Conveyor Transfer Point	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating	70 70 0	91.0	8.1E-02	3.5E-01	4.0E-02	1.7E-01	1.1E-02	4.8E-02	Partial Equip. Enclosure Partial Bldg. Enclosure Product Coating	70 70 0	91.0	8.1E-02	7.1E-03	4.0E-02	3.5E-03	1.1E-02	9.8E-04	3.5E-01	1.7E-01	4.9E-02
S&L Warehouse 3	FUG11	K-Mag (Premium)	Warehouse #3	To #3 Warehouse	400	3,504,000	Conveyor Transfer Point	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	1.2E+00	1.3E-01	5.7E-01	3.7E-02	1.6E-01	Partial Bldg. Enclosure Product Coating	70 0	70.0	2.7E-01	2.4E-02	1.3E-01	1.2E-02	3.7E-02	3.3E-03	1.2E+00	5.8E-01	1.6E-01
								Total Premium K-Mag to Warehouse #3 Fugitive Emission w/ No Coating (CON11 Operational)			**1.1E+00**	**4.6E+00**	**5.2E-01**	**2.3E+00**	**1.5E-01**	**6.4E-01**	**Total Premium K-Mag to Warehouse #3 Fugitive Emissions w/ No Coating (CON11 not Operational)**			**1.1E+00**	**9.8E-02**	**5.5E-01**	**4.8E-02**	**1.5E-01**	**1.3E-02**	**4.7E+00**	**2.3E+00**	**6.5E-01**
								Total Dispatch Fugitive Emissions w/ No Coating (CON11 Operational)			**5.95**	**25.54**	**2.91**	**12.49**	**0.82**	**3.53**	**Total Dispatch Fugitive Emissions w/ No Coating (CON11 not Operational)**			**6.55**	**0.57**	**3.20**	**0.28**	**0.91**	**0.079**	**26.12**	**12.77**	**3.61**
																	Fugitives as Stack Emissions[j,k] (CON11 not Operational)			**0.60**	**0.052**	**0.29**	**0.026**	**0.083**	**0.0072**			

Footnotes:

(a) Based on operating 8,760 hours per year.

(b) Uncontrolled emission factors in lbs/ton for screening, tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

(c) Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

(d) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

(e) Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

(f) Maximum Fugitive Emission Rate (TPY) = {(Maximum Throughput [TPY]) - (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH])} x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Annual Hours of Baghouse Downtime = 175 hrs/yr

As a worst-case scenario, it was assumed that all 175 hrs/yr of baghouse downtime is used. Therefore, the maximum annual throughput was subtracted by the maximum throughput during the 175 hrs/yr of baghouse downtime.

(g) Maximum Fugitive Emission Rate (TPY) = (Annual Hours of Baghouse Downtime [hrs/yr]) x (Maximum Hourly Throughput [TPH]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

(h) The simultaneous operation of sending Premium K-Mag to Warehouse #1, sending K-Mag to the Granulation Plant, and sending Granular to Warehouse #3 creates the worst-case emissions scenario.

(i) Maximum Total Annual Fugitive Emissions (TPY) = (Total Fugitive Emissions CON11 not Operational [TPY]) + (Total Fugitive Emissions CON11 Operational [TPY])

(j) Fugitives as Stack Emissions (lb/hr) = (Total Fugitive Emissions CON11 not Operational [lb/hr]) - (Total Fugitive Emissions CON11 Operational [lb/hr])

(k) Fugitives as Stack Emissions (TPY) = (Fugitives as Stack Emissions [lb/hr]) x (Annual Hours of Baghouse Downtime [hrs/yr]) / (2000 lbs/ton)

Table 10
Nos. 1, 2, and 3 Warehouses Fugitive Aggregate Handling Emissions - With Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Location	Process/Source Description	Maximum Throughput[a]		Moisture Content[b]	Wind Speed[c]	TSP Emission Factor[d]	PM_{10} Emission Factor[d]	$PM_{2.5}$ Emission Factor[d]	Control Equipment / Measure	Unit Control Efficiency[e]	Total Control Efficiency[f]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
					(TPH)	(TPY)	(%)	(mph)	(lb/ton)	(lb/ton)	(lb/ton)		(%)	(%)	(lb/hr)[g]	(TPY)[h]	(lb/hr)[g]	(TPY)[h]	(lb/hr)[g]	(TPY)[h]
S&L Warehouse 1	FUG6	K-Mag (Premium, Standard, Special Standard, Granular, Fines)	No. 1 Warehouse	Aggregate Handling	100	876,000	0.15	1.3	0.015	0.0073	0.0011	Partial Bldg. Enclosure	50	90.5	0.15	0.64	0.069	0.30	0.011	0.046
												Product Coating[i]	81							
S&L Warehouse 2	FUG8	K-Mag (Premium, Standard, Special Standard, Granular, Fines)	No. 2 Warehouse	Aggregate Handling	330	2,890,800	0.15	1.3	0.015	0.0073	0.0011	Partial Bldg. Enclosure	70	94.3	0.29	1.27	0.14	0.60	0.021	0.091
												Product Coating[i]	81							
S&L Warehouse 3	FUG11	K-Mag (Premium, Standard, Special Standard, Granular, Fines)	No. 3 Warehouse	Aggregate Handling	330	2,890,800	0.15	1.3	0.015	0.0073	0.0011	Partial Bldg. Enclosure	70	94.3	0.29	1.27	0.14	0.60	0.021	0.091
												Product Coating[i]	81							
												Total Nos. 1, 2, and 3 Fugitive Aggregate Handling Emissions with Coating			**0.73**	**3.19**	**0.34**	**1.51**	**0.052**	**0.23**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] The average product moisture content.

[c] Based on using the minimum wind speed allowed by the Section 13.2.4 equation (see footnote "d" below) since this is higher than the wind speed expected in an enclosed building.

[d] Calculated using the following equation presented in Section 13.2.4 of AP-42, Compilation of Air Pollutant Emission Factors, November 2006.

$$E = k\,(0.0032)(U/5)^{1.3}/(M/2)^{1.4}$$

where,

E = emission factor [lb/ton]

k = particulate size multiplier [dimensionless]

= 0.74 for total suspended particulate, 0.35 for particles smaller than 10 microns, and 0.053 for particles smaller than 2.5 microns

U = mean wind speed [mph]

M = moisture content [%]

[e] Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[f] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[g] Maximum Fugitive Emission Rate (lb/hr) = (Number of Transfer Points) x (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[h] Maximum Fugitive Emission Rate (ton/yr) = (Number of Transfer Points) x (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[i] Product coating control efficiency is estimated to be 90%, but Warehouse Nos. 2 and 3 store Special Standard K-Mag (animal feed), which is not coated. Approximately 10% of the product dispatched to Warehouse Nos. 2 and 3 is Special Standard K-Mag; therefore, the coating provides a control efficiency of [90% x (100% - 10%)] = 81%.

Mosaic

Table 11
Nos. 1, 2, and 3 Warehouses Fugitive Aggregate Handling Emissions - No Coating
Mosaic Potash Carlsbad Inc.

Unit No.	Stack No.	Material Processed	Location	Process/Source Description	Maximum Throughput[a]		Moisture Content[b]	Wind Speed[c]	TSP Emission Factor[d]	PM_{10} Emission Factor[d]	$PM_{2.5}$ Emission Factor[d]	Control Equipment / Measure	Unit Control Efficiency[e]	Total Control Efficiency[f]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
					(TPH)	(TPY)	(%)	(mph)	(lb/ton)	(lb/ton)	(lb/ton)		(%)	(%)	(lb/hr)[g]	(TPY)[h]	(lb/hr)[g]	(TPY)[h]	(lb/hr)[g]	(TPY)[h]
S&L Warehouse 1	FUG6	K-Mag (Premium, Standard, Special Standard, Granular, Fines)	No. 1 Warehouse	Aggregate Handling	100	876,000	0.15	1.3	0.015	0.0073	0.0011	Partial Bldg. Enclosure	50	50.0	0.77	3.38	0.37	1.60	0.055	0.24
												Product Coating	0							
S&L Warehouse 2	FUG8	K-Mag (Premium, Standard, Special Standard, Granular, Fines)	No. 2 Warehouse	Aggregate Handling	330	2,890,800	0.15	1.3	0.015	0.0073	0.0011	Partial Bldg. Enclosure	70	70.0	1.53	6.70	0.72	3.17	0.11	0.48
												Product Coating	0							
S&L Warehouse 3	FUG11	K-Mag (Premium, Standard, Special Standard, Granular, Fines)	No. 3 Warehouse	Aggregate Handling	330	2,890,800	0.15	1.3	0.015	0.0073	0.0011	Partial Bldg. Enclosure	70	70.0	1.53	6.70	0.72	3.17	0.11	0.48
												Product Coating	0							
												Total Nos. 1, 2, and 3 Fugitive Aggregate Handling Emissions No Coating			**3.83**	**16.78**	**1.81**	**7.93**	**0.27**	**1.20**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] The average product moisture content.

[c] Based on using the minimum wind speed allowed by the Section 13.2.4 equation (see footnote "d" below) since this is higher than the wind speed expected in an enclosed building.

[d] Calculated using the following equation presented in Section 13.2.4 of AP-42, Compilation of Air Pollutant Emission Factors, November 2006.

$$E = k\,(0.0032)(U/5)^{1.3}/(M/2)^{1.4}$$

where,

E = emission factor [lb/ton]

k = particulate size multiplier [dimensionless]

= 0.74 for total suspended particulate, 0.35 for particles smaller than 10 microns, and 0.053 for particles smaller than 2.5 microns

U = mean wind speed [mph]

M = moisture content [%]

[e] Control efficiencies are based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[f] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[g] Maximum Fugitive Emission Rate (lb/hr) = (Number of Transfer Points) x (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[h] Maximum Fugitive Emission Rate (ton/yr) = (Number of Transfer Points) x (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Table 12
No. 4 Railcar Loadout Fugitive Material Handling Emissions - With Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr) [e]	Maximum TSP Emissions (TPY) [f]	Maximum PM_{10} Emissions (lb/hr) [e]	Maximum PM_{10} Emissions (TPY) [f]	Maximum $PM_{2.5}$ Emissions (lb/hr) [e]	Maximum $PM_{2.5}$ Emissions (TPY) [f]
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Feed Belt (CS9691)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating[h]	90 81	98.1	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
S&L Loadout 4	FUG9	K-Mag	No. 4 Tunnel Back Belt (CS7423)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating[h]	90 81	98.1	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
S&L Loadout 4	FUG9	K-Mag	No. 4 Tunnel Incline Belt (CS7429)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating[h]	90 81	98.1	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Elevator (CS7432)	330	2,890,800	Conveyor Transfer Point	Partial Equip Enclosure Product Coating[h]	80 81	96.2	2.8E-02	1.2E-01	1.4E-02	6.0E-02	3.9E-03	1.7E-02
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Hummer Screen (CS7438)	330	2,890,800	Fines Screening	Partial Equip Enclosure Partial Bldg Enclosure Product Coating[h]	70 70 81	98.3	5.3E-01	2.3E+00	4.1E-01	1.8E+00	2.5E-01	1.1E+00
S&L Loadout 4	FUG9	K-Mag	Lower Long Belt (CS7697)	150	1,314,000	Conveyor Transfer Point	Partial Equip Enclosure Product Coating[h]	50 81	90.5	3.2E-02	1.4E-01	1.6E-02	6.9E-02	4.4E-03	1.9E-02
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Fines Screw (CS7445)	30	262,800	Conveyor Transfer Point	Full Equip Enclosure Product Coating[h]	95 81	99.1	6.4E-04	2.8E-03	3.1E-04	1.4E-03	8.9E-05	3.9E-04
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Fines Bin (CS7446)	30	262,800	Conveyor Transfer Point	Ventilation Capture Full Equip Enclosure	95 95	99.8	1.7E-04	7.4E-04	8.2E-05	3.6E-04	2.3E-05	1.0E-04
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Mixing Screw (CS7442)	300	2,628,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating[h]	95 81	99.1	6.4E-03	2.8E-02	3.1E-03	1.4E-02	8.9E-04	3.9E-03
S&L Loadout 4	FUG9	K-Mag	Railcar Loading	300	2,628,000	Conveyor Transfer Point	Wind Break Product Coating[h]	40 81	88.6	7.7E-02	3.4E-01	3.8E-02	1.6E-01	1.1E-02	4.7E-02
									Total Fugitive Emissions with Coating	**0.72**	**3.14**	**0.50**	**2.18**	**0.28**	**1.21**

Footnotes:

[a] Based on the maximum production rate.

[b] Uncontrolled emission factors in lbs/ton for tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, August 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (ton/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[g] The full building control efficiency of 90% is based on these equipment being underground within the warehouse.

[h] Product coating control efficiency is estimated to be 90%, but Warehouse Nos. 2 and 3 store Special Standard K-Mag (animal feed), which is not coated. Approximately 10% of the throughput to Warehouse Nos. 2 and 3 is Special Standard K-Mag; therefore, the coating provides a control efficiency of [90% x (100% - 10%)] = 81%.

Table 13
No. 4 Railcar Loadout Fugitive Material Handling Emissions - No Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Feed Belt (CS9691)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating	90 0	90.0	7.4E-02	3.3E-01	3.6E-02	1.6E-01	1.0E-02	4.5E-02
S&L Loadout 4	FUG9	K-Mag	No. 4 Tunnel Back Belt (CS7423)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating	90 0	90.0	7.4E-02	3.3E-01	3.6E-02	1.6E-01	1.0E-02	4.5E-02
S&L Loadout 4	FUG9	K-Mag	No. 4 Tunnel Incline Belt (CS7429)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating	90 0	90.0	7.4E-02	3.3E-01	3.6E-02	1.6E-01	1.0E-02	4.5E-02
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Elevator (CS7432)	330	2,890,800	Conveyor Transfer Point	Partial Equip Enclosure Product Coating	80 0	80.0	1.5E-01	6.5E-01	7.3E-02	3.2E-01	2.1E-02	9.0E-02
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Hummer Screen (CS7438)	330	2,890,800	Fines Screening	Partial Equip Enclosure Partial Bldg Enclosure Product Coating	70 70 0	91.0	2.8E+00	1.2E+01	2.1E+00	9.4E+00	1.3E+00	5.8E+00
S&L Loadout 4	FUG9	K-Mag	Lower Long Belt (CS7697)	150	1,314,000	Conveyor Transfer Point	Partial Equip Enclosure Product Coating	50 0	50.0	1.7E-01	7.4E-01	8.3E-02	3.6E-01	2.3E-02	1.0E-01
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Fines Screw (CS7445)	30	262,800	Conveyor Transfer Point	Full Equip Enclosure Product Coating	95 0	95.0	3.4E-03	1.5E-02	1.7E-03	7.2E-03	4.7E-04	2.0E-03
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Fines Bin (CS7446)	30	262,800	Conveyor Transfer Point	Ventilation Capture Full Equip Enclosure	95 95	99.8	1.7E-04	7.4E-04	8.2E-05	3.6E-04	2.3E-05	1.0E-04
S&L Loadout 4	FUG9	K-Mag	No. 4 Loadout Mixing Screw (CS7442)	300	2,628,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating	95 0	95.0	3.4E-02	1.5E-01	1.7E-02	7.2E-02	4.7E-03	2.0E-02
S&L Loadout 4	FUG9	K-Mag	Railcar Loading	300	2,628,000	Conveyor Transfer Point	Wind Break Product Coating	40 0	40.0	4.0E-01	1.8E+00	2.0E-01	8.7E-01	5.6E-02	2.5E-01
									Total Fugitive Emissions No Coating	**3.78**	**16.54**	**2.62**	**11.47**	**1.46**	**6.38**

Footnotes:

[a] Based on the maximum production rate.

[b] Uncontrolled emission factors in lbs/ton for tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, August 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (ton/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[g] The full building control efficiency of 90% is based on these equipment being underground within the warehouse.

Mosaic

Table 14
No. 5 Railcar Loadout Fugitive Material Handling Emissions - With Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Feed Belt (CS9692)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating[h]	90 81	98.1	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Tunnel Back Belt (CS7308)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating[h]	90 81	98.1	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Tunnel Cross Belt (CS7305)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating[h]	90 81	98.1	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Tunnel Incline Belt (CS7311)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating[h]	90 81	98.1	1.4E-02	6.2E-02	6.9E-03	3.0E-02	1.9E-03	8.5E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Elevator (CS7314)	330	2,890,800	Conveyor Transfer Point	Full Equip Enclosure Product Coating[h]	95 81	99.1	7.1E-03	3.1E-02	3.4E-03	1.5E-02	9.7E-04	4.3E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Mintex Screen (CS7322)	330	2,890,800	Fines Screening	Full Equip Enclosure Partial Bldg Enclosure Product Coating[h]	95 70 81	99.7	8.8E-02	3.9E-01	6.8E-02	3.0E-01	4.2E-02	1.8E-01
S&L Loadout 5	FUG10	K-Mag	Lower Long Belt (CS7697)	150	1,314,000	Conveyor Transfer Point	Partial Equip Enclosure Product Coating[h]	50 81	90.5	3.2E-02	1.4E-01	1.6E-02	6.9E-02	4.4E-03	1.9E-02
S&L Loadout 5	FUG10	K-Mag	No. 2 Warehouse Incline Belt (CS7753)	150	1,314,000	Conveyor Transfer Point	Partial Equip Enclosure Product Coating[h]	70 81	94.3	1.9E-02	8.4E-02	9.4E-03	4.1E-02	2.7E-03	1.2E-02
S&L Loadout 5	FUG10	K-Mag	No. 2 Truck Loadout Feed Belt (AG Belt) (CS7750)	400	3,504,000	Conveyor Transfer Point	Full Equip Enclosure Partial Bldg Enclosure Product Coating[h]	95 70 81	99.7	2.6E-03	1.1E-02	1.3E-03	5.5E-03	3.5E-04	1.6E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Fines Screw (CS7365)	30	262,800	Conveyor Transfer Point	Full Equip Enclosure Product Coating[h]	95 81	99.1	6.4E-04	2.8E-03	3.1E-04	1.4E-03	8.9E-05	3.9E-04
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Fines Bin (CS7350)	30	262,800	Conveyor Transfer Point	Ventilation Capture Full Equip Enclosure	95 95	99.8	1.7E-04	7.4E-04	8.2E-05	3.6E-04	2.3E-05	1.0E-04
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Mixing Screw (CS7317)	300	2,628,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating[h]	95 81	99.1	6.4E-03	2.8E-02	3.1E-03	1.4E-02	8.9E-04	3.9E-03
S&L Loadout 5	FUG10	K-Mag	Railcar Loading	300	2,628,000	Conveyor Transfer Point	Wind Break Product Coating[h]	40 81	88.6	7.7E-02	3.4E-01	3.8E-02	1.6E-01	1.1E-02	4.7E-02
							Total Fugitive Emissions with Coating			**0.29**	**1.27**	**0.17**	**0.73**	**0.070**	**0.31**

Footnotes:

[a] Based on the maximum amount of product that remains after Truck Loadout and No. 1 Railcar Loadout, which is split evenly between No. 4 Railcar Loadout and No. 5 Railcar Loadout.

[b] Uncontrolled emission factors in lbs/ton for tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, August 2004. See Table 38 for more details.

Particle Size (µm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (ton/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[g] The full building control efficiency of 90% is based on these equipment being underground within the warehouse.

[h] Product coating control efficiency is estimated to be 90%, but Warehouse Nos. 2 and 3 store Special Standard K-Mag (animal feed), which is not coated. Approximately 10% of the throughput to Warehouse Nos. 2 and 3 is Special Standard K-Mag; therefore, the coating provides a control efficiency of [90% x (100% - 10%)] = 81%.

Table 15
No. 5 Railcar Loadout Fugitive Material Handling Emissions - No Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Feed Belt (CS9692)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating	90 0	90.0	7.4E-02	3.3E-01	3.6E-02	1.6E-01	1.0E-02	4.5E-02
S&L Loadout 5	FUG10	K-Mag	No. 5 Tunnel Back Belt (CS7308)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating	90 0	90.0	7.4E-02	3.3E-01	3.6E-02	1.6E-01	1.0E-02	4.5E-02
S&L Loadout 5	FUG10	K-Mag	No. 5 Tunnel Cross Belt (CS7305)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating	90 0	90.0	7.4E-02	3.3E-01	3.6E-02	1.6E-01	1.0E-02	4.5E-02
S&L Loadout 5	FUG10	K-Mag	No. 5 Tunnel Incline Belt (CS7311)	330	2,890,800	Conveyor Transfer Point	Full Bldg Enclosure[g] Product Coating	90 0	90.0	7.4E-02	3.3E-01	3.6E-02	1.6E-01	1.0E-02	4.5E-02
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Elevator (CS7314)	330	2,890,800	Conveyor Transfer Point	Full Equip Enclosure Product Coating	95 0	95.0	3.7E-02	1.6E-01	1.8E-02	7.9E-02	5.1E-03	2.2E-02
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Mintex Screen (CS7322)	330	2,890,800	Fines Screening	Full Equip Enclosure Partial Bldg Enclosure Product Coating	95 70 0	98.5	4.7E-01	2.0E+00	3.6E-01	1.6E+00	2.2E-01	9.6E-01
S&L Loadout 5	FUG10	K-Mag	Lower Long Belt (CS7697)	150	1,314,000	Conveyor Transfer Point	Partial Equip Enclosure Product Coating	50 0	50.0	1.7E-01	7.4E-01	8.3E-02	3.6E-01	2.3E-02	1.0E-01
S&L Loadout 5	FUG10	K-Mag	No. 2 Warehouse Incline Belt (CS7753)	150	1,314,000	Conveyor Transfer Point	Partial Equip Enclosure Product Coating	75 0	75.0	8.4E-02	3.7E-01	4.1E-02	1.8E-01	1.2E-02	5.1E-02
S&L Loadout 5	FUG10	K-Mag	No. 2 Truck Loadout Feed Belt (AG Belt) (CS7750)	400	3,504,000	Conveyor Transfer Point	Full Equip Enclosure Partial Bldg Enclosure Product Coating	95 70 0	98.5	1.3E-02	5.9E-02	6.6E-03	2.9E-02	1.9E-03	8.2E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Fines Screw (CS7365)	30	262,800	Conveyor Transfer Point	Full Equip Enclosure Product Coating	95 0	95.0	3.4E-03	1.5E-02	1.7E-03	7.2E-03	4.7E-04	2.0E-03
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Fines Bin (CS7350)	30	262,800	Conveyor Transfer Point	Ventilation Capture Full Equip Enclosure	95 95	99.8	1.7E-04	7.4E-04	8.2E-05	3.6E-04	2.3E-05	1.0E-04
S&L Loadout 5	FUG10	K-Mag	No. 5 Loadout Mixing Screw (CS7317)	300	2,628,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating	95 0	95.0	3.4E-02	1.5E-01	1.7E-02	7.2E-02	4.7E-03	2.0E-02
S&L Loadout 5	FUG10	K-Mag	Railcar Loading	300	2,628,000	Conveyor Transfer Point	Wind Break Product Coating	40 0	40.0	4.0E-01	1.8E+00	2.0E-01	8.7E-01	5.6E-02	2.5E-01
							Total Fugitive Emissions No Coating			**1.51**	**6.61**	**0.87**	**3.79**	**0.36**	**1.60**

Footnotes:

[a] Based on the maximum amount of product that remains after Truck Loadout and No. 1 Railcar Loadout, which is split evenly between No. 4 Railcar Loadout and No. 5 Railcar Loadout.

[b] Uncontrolled emission factors in lbs/ton for tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, August 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (ton/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[g] The full building control efficiency of 90% is based on these equipment being underground within the warehouse.

Table 16
Truck Loadout Fugitive Material Handling Emissions - With Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
S&L Truck Loadout	FUG12	K-Mag	Truck Loadout Distributor (CS7774)	400	3,504,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating[g]	95 81	99.1	8.5E-03	3.7E-02	4.2E-03	1.8E-02	1.2E-03	5.2E-03
S&L Truck Loadout	FUG12	K-Mag	Truck Loadout Bin (CS7757)	400	3,504,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating[g]	95 81	99.1	8.5E-03	3.7E-02	4.2E-03	1.8E-02	1.2E-03	5.2E-03
S&L Truck Loadout	FUG12	K-Mag	Truck Loadout Shuttle Belt (CS7765)	300	2,628,000	Conveyor Transfer Point	Partial Equip Enclosure Partial Wind Break Product Coating[g]	75 20 81	96.2	2.6E-02	1.1E-01	1.3E-02	5.5E-02	3.5E-03	1.6E-02
S&L Truck Loadout	FUG12	K-Mag	Bulk Truck Loading	300	2,628,000	Conveyor Transfer Point	Partial Equip Enclosure Partial Wind Break Product Coating[g]	75 20 81	96.2	2.6E-02	1.1E-01	1.3E-02	5.5E-02	3.5E-03	1.6E-02
								Total Fugitive Emissions with Coating		**0.068**	**0.30**	**0.033**	**0.15**	**0.0095**	**0.041**

Footnotes:

[a] Based on the maximum production rate.

[b] Uncontrolled emission factors in lbs/ton for tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, August 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (tons/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[g] Product coating control efficiency is estimated to be 90%, but Warehouse Nos. 2 and 3 store Special Standard K-Mag (animal feed), which is not coated. Approximately 10% of the throughput to Warehouse Nos. 2 and 3 is Special Standard K-Mag; therefore, the coating provides a control efficiency of [90% x (100% - 10%)] = 81%.

Table 17
Truck Loadout Fugitive Material Handling Emissions - No Coating
Mosaic Potash Carlsbad, Inc.

Unit No.	Stack No.	Material Processed	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency[c] (%)	Total Control Efficiency[d] (%)	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
S&L Truck Loadout	FUG12	K-Mag	Truck Loadout Distributor (CS7774)	400	3,504,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating	95 0	95.0	4.5E-02	2.0E-01	2.2E-02	9.6E-02	6.2E-03	2.7E-02
S&L Truck Loadout	FUG12	K-Mag	Truck Loadout Bin (CS7757)	400	3,504,000	Conveyor Transfer Point	Full Equip Enclosure Product Coating	95 0	95.0	4.5E-02	2.0E-01	2.2E-02	9.6E-02	6.2E-03	2.7E-02
S&L Truck Loadout	FUG12	K-Mag	Truck Loadout Shuttle Belt (CS7765)	300	2,628,000	Conveyor Transfer Point	Partial Equip Enclosure Partial Wind Break Product Coating	75 20 0	80.0	1.3E-01	5.9E-01	6.6E-02	2.9E-01	1.9E-02	8.2E-02
S&L Truck Loadout	FUG12	K-Mag	Bulk Truck Loading	300	2,628,000	Conveyor Transfer Point	Partial Equip Enclosure Partial Wind Break Product Coating	75 20 0	80.0	1.3E-01	5.9E-01	6.6E-02	2.9E-01	1.9E-02	8.2E-02
								Total Fugitive Emissions No Coating		**0.36**	**1.58**	**0.18**	**0.77**	**0.050**	**0.22**

Footnotes:

[a] Based on the maximum production rate.

[b] Uncontrolled emission factors in lbs/ton for tertiary crushing, fines screening, and conveyor transfer points obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, August 2004. See Table 38 for more details.

Particle Size (μm)	Tertiary Crushing	Screening	Conveyor Transfer Point	Fines Screening
2.5	0.00044	0.00059	0.00031	0.044
10	0.0024	0.0087	0.0011	0.072
30	0.0038	0.017	0.0022	0.094

[c] Control efficiencies based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Maximum Fugitive Emission Rate (lb/hr) = (Maximum Throughput [tons/hr]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Maximum Fugitive Emission Rate (tons/yr) = (Maximum Throughput [tons/yr]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

Table 18
Nos. 1, 2, and 3 Warehouses Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Material Processed	Process / Source Description	Fugitive ID	Maximum Throughput		Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency (%)[c]	Total Control Efficiency (%)[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
			(TPH)	(TPY)[a]					(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]
K-Mag Rehandling Material	Truck Loading in WH1, WH2, or WH3	FUG6 or FUG8 or FUG11 ***(FUG11 used in model with FUG6 control efficiency)***	85	744,600	Material Transfer	Partial Building Enclosure	50	50	0.096	0.42	0.047	0.20	0.013	0.058
GRAN Reclaim Material	Front-Loader Loading in WH1, WH2, or WH3		85	744,600	Material Transfer	Partial Building Enclosure	50	50	0.096	0.42	0.047	0.20	0.013	0.058
GRAN Reclaim Oversize Material	Front-Loader Unloading in WH1, WH2, or WH3		0.85	7,446	Material Transfer	Partial Building Enclosure	50	50	0.00096	0.0042	0.00047	0.0020	0.00013	0.00058
Off-Spec Material	Truck Unloading in WH1, WH2, or WH3		85	744,600	Material Transfer	Partial Building Enclosure	50	50	0.096	0.42	0.047	0.20	0.013	0.058
All Material	Front-Loader Loading in WH1, WH2, or WH3	FUG6, FUG8, or FUG11 ***(FUG11 used in model with FUG6 control efficiency)***	100	876,000	Material Transfer	Partial Building Enclosure	50	50	0.11	0.49	0.055	0.24	0.016	0.068
All Material	Front-Loader Unloading in WH1, WH2, or WH3	FUG6, FUG8, or FUG11 ***(FUG11 used in model with FUG6 control efficiency)***	100	876,000	Material Transfer	Partial Building Enclosure	50	50	0.11	0.49	0.055	0.24	0.016	0.068
All Material	Loading the Gran Reclaim Belt in WH1	FUG6	85	744,600	Material Transfer	Partial Building Enclosure	50	50	0.096	0.42	0.047	0.20	0.013	0.058
								Total =	**0.61**	**2.66**	**0.30**	**1.30**	**0.084**	**0.37**

Footnotes:

[a] Based on operating 8,760 hrs/yr.

[b] Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (µm)	Transfer Point (lbs/ton)	Screening
2.5	0.00031	0.00059
10	0.0011	0.0087
30	0.0022	0.017

[c] Control efficiencies based on best engineering judgment and reflect Table 105.C in the NSR permit. See Table 37 for more details.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) / 2000 lbs/ton x (1 - Total Control Efficiency [%] / 100)

Mosaic

Table 19
Nos. 1, 2, and 3 Warehouses Fugitive Hauling Emissions
Mosaic Potash Carlsbad Inc.

Table 19a: Hauling Emissions Inside the No. 1 Warehouse (FUG6)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Partial Building Enclosure	50		0.395	0.8	0.30	1.31
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speed ≤ 5 mph	88	94.0	0.101	0.8	0.076	0.33
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.0101	0.8	0.0076	0.033

Table 19b: Hauling Emissions Inside the No. 2 Warehouse (FUG8)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Partial Building Enclosure	70		0.237	2.5	0.59	2.59
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speed ≤ 5 mph	88	96.4	0.060	2.5	0.15	0.66
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.0060	2.5	0.015	0.066

Table 19c: Hauling Emissions Inside the No. 3 Warehouse (FUG11)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[j]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Partial Building Enclosure	70		0.237	2.5	0.59	2.59
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speed ≤ 5 mph	88	96.4	0.060	2.5	0.15	0.66
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.0060	2.5	0.015	0.066

Table 19d: Hauling Emissions Between the No. 2 and 3 Warehouse (FUG57)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[j]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.0079	1.5	0.012	0.042
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speed ≤ 5 mph	88	99.9	0.0020	1.5	0.0030	0.011
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00020	1.5	0.00030	0.0011

Table 19e: Hauling Emissions Between the No. 1 and 2 Warehouse (FUG63)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[j]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.0079	1.5	0.012	0.042
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speed ≤ 5 mph	88	99.9	0.0020	1.5	0.0030	0.011
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00020	1.5	0.00030	0.0011

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

[b] From AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value) = 4.8 % silt content

[c] Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the truck/loader loaded and empty weights.

[d] Control efficiencies based on best engineering judgment and have been approved by NMED. See Table 37 for a description of each type of control.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[f] From AP-42, Section 13.2.2, Equation 1a, Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Control Efficiency (%) / 100]

[g] Inside WH1: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) = 100
No. of Roundtrips per Hour = 20
Vehicle Miles Traveled (VMT/hr) = 0.8

Inside WH2 and WH3: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) = 100
No. of Roundtrips per Hour = 66
Vehicle Miles Traveled (VMT/hr) = 2.5

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr).

[i] Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" = 70
Annual Hours of Operation (hrs/yr) = 8,760

[j] Between warehouses: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) = 200
No. of Roundtrips per Hour = 20
Vehicle Miles Traveled (VMT/hr) = 1.5

Table 20
Main Haul Road Fugitive Emissions
Mosaic Potash Carlsbad, Inc.

Table 20a: Haul Road Emission Inputs (FUG22)

Road Description	Paved customer truck loading road	
Length of Haul Road (one way)	4917	feet
Truck Loadout Capacity	300	tons/hr
Average Haul Road Truck Load Capacity	25	tons
Average Haul Road Truck Empty Weight	15	tons
Mean Vehicle Weight	27.5	tons
Haul Road Surface Silt Content	4.8	%
Avg. No. of Round Trips/Hour	12	
Hours of Operation per Year	8,760	hr/yr

Table 20b: Haul Road Emission Factors (FUG22)

	TSP	PM_{10}	$PM_{2.5}$	units
k = particle size multiplier[(a)]	4.9	1.5	0.15	unitless
a = empirical constant[(a)]	0.7	0.9	0.9	unitless
b = empirical constant[(a)]	0.45	0.45	0.45	unitless
Emission factor with no controls[(b)]	6.99	1.78	0.18	lb/VMT
Emission factor with controls[(c)]	0.016	0.0041	0.00041	lb/VMT

Footnotes:

(a) From AP-42, Chapter 13.2.2 "Unpaved Roads" November, 2006.

(b) Emission Factor (lb/VMT) = k x (s/12)^a x (W/3)^b

s - surface silt content (%) = 4.8 AP-42, Table 13.2.2-1 (Sand and gravel processing mean)

W - mean vehicle weight (tons) = 27.5

(c) Emission Factor (lb/VMT) = Uncontrolled Emission Factor (lb/VMT) x (1 - Total Control Efficiency [%] / 100)

Control Efficiency 1 (%) = 99 Paved Roads with Sweeping/Cleaning

Control Efficiency 2 (%) = 77 Speed Limit of 10 mph

Total Control Efficiency (%) = 99.8

Table 20c: Haul Road Maximum Emission Calculations (FUG22)

Pollutant	Controlled Emissions			Uncontrolled Emissions		
	(g/s)	(lb/hr)[(a)]	(ton/yr)[(b)]	(g/s)	(lb/hr)[(a)]	(ton/yr)[(b)]
TSP	0.045	0.36	1.27	19.7	156	553
PM_{10}	0.012	0.092	0.32	5.0	40	141
$PM_{2.5}$	0.0012	0.0092	0.032	0.50	4.0	14.1

Footnotes:

(a) PM Emissions (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

Vehicle Miles Traveled (VMT/hr) = 22.4 (c)

(b) PM Emissions (ton/yr) = PM Emissions (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" = 70 AP-42, Figure 13.2.2-1

Annual Hours of Operation (hrs/yr) = 8,760

(c) Vehicle Miles Traveled (VMT/hr) = 2 x Length of Haul Road - one way (feet) / (5,280 feet/mi) x Average no. of round trips per hour (trips/hı

Average no. of round trips per hour = 12

Length of Haul Road - one way (feet) = 4,917

Table 21
Abrasive Blasting Fugitive Emissions
Mosaic Potash Carlsbad Inc.

Pollutant	Emission Factor[a] (lb/1000 lb abrasive)	Maximum Annual Emissions[b] (TPY)	Maximum Hourly Emissions[c] (lb/hr)
Permanent Abrasive Blasting (FUG20)			
TSP	13.2	1.98	13.20
PM_{10}	3.1	0.47	3.12
$PM_{2.5}$	0.31	0.047	0.31
Portable Abrasive Blasting (FUG40)			
TSP	13.2	1.98	13.20
PM_{10}	3.1	0.47	3.12
$PM_{2.5}$	0.31	0.047	0.31

Footnotes:

[a] From AP-42, Section 13.2.6 Abrasive Blasting, Table 13.2.6-1 "Particulate Emission Factors for Abrasive Blasting", September 1997. Mosaic uses a garnet mineral abrasive. According to AP-42 Section 13.2.6.2 "mineral abrasives are reported to create significantly less dust than sand and slag abrasives". AP-42 only gives uncontrolled emission factors for abrasive blasting with sand, not mineral abrasives like used at Mosaic. Section 13.2.6.3 of AP-42 states that "total PM emissions from abrasive blasting using grit are about 24% of total PM emissions from abrasive blasting with sand. The study also indicates that total PM emissions from abrasive blasting using shot are about 10% of total PM emissions from abrasive blasting with sand". Based upon the statement that mineral abrasives create significantly less dust than sand abrasives, it is assumed that total PM emissions from abrasive blasting using a mineral abrasive is the same as abrasive blasting using grit which is 24% of total PM emissions from abrasive blasting with sand. This methodology is applied to the TSP, PM10, and PM2.5 emission factors.

[b] Annual Emissions (TPY) = Emission Factor (lb/1,000 lb abrasive) x Annual Abrasive Usage (lbs/yr) / 1,000 / (2,000 lbs/ton) / 2

Maximum Total Annual Abrasive Usage (lbs/yr) = 600,000

Maximum Total Annual Abrasive Usage (tons/yr) = 300

[c] Hourly Emissions (lbs/hr) = Emission Factor (lb/1,000 lb abrasive) x Hourly Abrasive Usage (lbs/hr) / 1,000

Hourly Abrasive Usage (lbs/hr) = 1,000

Table 22
Railcar Offloading (formerly "Railcar Unloading") Fugitive Material Handling Emissions
Mosaic Potash Carlsbad Inc.

Material Processed	Process / Source Description	Fugitive ID	Maximum Throughput		Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency (%)[c]	Total Control Efficiency (%)[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
			(TPH)	(TPY)[a]					(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]
Potash Material	Railcar to Conveyor Belt (CS9700)	FUG43	85	744,600	Conveyor Transfer Point	Partial Equipment Enclosure	75	95.0	0.010	0.042	0.0047	0.020	0.0013	0.0058
						Dust Control Agent	80							
Potash Material	To Truck/Loader		85	744,600	Conveyor Transfer Point	Dust Control Agent	80	80.0	0.038	0.17	0.019	0.082	0.0053	0.023
								Total =	**0.048**	**0.21**	**0.023**	**0.10**	**0.0066**	**0.029**

Footnotes:

[a] Based on operating 8,760 hrs/yr.

[b] Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Transfer Point (lbs/ton)	Screening (lbs/ton)
2.5	0.00031	0.00059
10	0.0011	0.0087
30	0.0022	0.017

[c] The railcar provides inherent dust control because the material exits beneath the railcar. In addition, the material in the railcars arrives at Mosaic already coated with a dust control agent. However, because the material has been sitting in the railcars, we have reduced the approved dust coating control efficiency of 90% to 80% to be more conservative in our emission estimates.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) / 2000 lbs/ton x (1 - Total Control Efficiency [%] / 100)

Table 23
Railcar Offloading (formerly "Railcar Unloading") Fugitive Hauling Emissions
Mosaic Potash Carlsbad, Inc.

Table 23a: Railcar Offloading to the Warehouses (FUG47)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	22.5	Paved Roads	99		0.015	3.6	0.053	0.19
PM_{10}	1.5	0.9	0.45	4.8	22.5	Max Speeds ≤ 10 mph	77	99.8	0.0037	3.6	0.013	0.048
$PM_{2.5}$	0.15	0.9	0.45	4.8	22.5				0.00037	3.6	0.0013	0.0048

Table 23b: Railcar Offloading to Granulation Reclaim (FUG58)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[j]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.015	9.7	0.15	0.52
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speeds ≤ 10 mph	77	99.8	0.0039	9.7	0.037	0.13
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00039	9.7	0.0037	0.013

Table 23c: Railcar Offloading to K-Mag Rehandling (FUG59)

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[k]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.022	0.6	0.014	0.051
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speeds ≤ 15 mph	66	99.7	0.0057	0.6	0.0037	0.013
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00057	0.6	0.00037	0.0013

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value)

[c] Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the truck/loader loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[f] Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

[g] To No. 1, No. 2, or No. 3 Warehouse: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) = 1,670
No. of Roundtrips per Hour = 6
Vehicle Miles Traveled (VMT/hr) = 3.6

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" = 70
Annual Hours of Operation (hrs/yr) = 8,760

[j] To Granulation Reclaim: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) = 1,500
No. of Roundtrips per Hour = 17
Vehicle Miles Traveled (VMT/hr) = 9.7

[k] To K-Mag Rehandling: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) = 100
No. of Roundtrips per Hour = 17
Vehicle Miles Traveled (VMT/hr) = 0.6

Table 24
Granulation Reclaim Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Material Processed	Process / Source Description	Fugitive ID	Maximum Throughput		Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency (%)[c]	Total Control Efficiency (%)[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
			(TPH)	(TPY)[a]					(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]
Granulation Reclaim	Loader to Reclaim Hopper	FUG44	85	744,600	Material Transfer Point	Partial Equipment Enclosure	50	50	0.096	0.42	0.047	0.20	0.013	0.058
Granulation Reclaim	Belt from WH1 to Chute	FUG44	85	744,600	Material Transfer Point	Full Equipment Enclosure	95	95	0.010	0.04	0.005	0.02	0.001	0.006
Granulation Reclaim	Reclaim Bucket Elevator (CS9070)	FUG44	85	744,600	Material Transfer Point	Full Equipment Enclosure Ventilation Capture	95 95	99.8	0.00048	0.0021	0.00023	0.0010	0.000066	0.00029
Granulation Reclaim	To Ground	FUG44	2	17,520	Material Transfer Point	None	0	0.0	0.00450	0.0197	0.00220	0.0096	0.000622	0.00272
Granulation Reclaim	Recycle Scalper Screen (CS9080)	FUG44	85	744,600	Material Transfer Point	Full Equipment Enclosure	95	95	0.0096	0.042	0.0047	0.020	0.0013	0.0058
Granulation Reclaim	Recycle Scalper Screen (CS9080)	FUG44	85	744,600	Screening	Full Equipment Enclosure	95	95	0.072	0.32	0.037	0.16	0.0025	0.011
Granulation Reclaim	Secondary Feed Belt (CS9075)	FUG44	84.15	737,154	Material Transfer Point	Partial Equipment Enclosure	70	70	0.057	0.25	0.028	0.122	0.0078	0.034
Granulation Reclaim	To Oversize Pile	FUG44	0.85	7,446	Material Transfer Point	None	0	0	0.0019	0.0084	0.00094	0.0041	0.00026	0.0012
								Total =	**0.25**	**1.10**	**0.12**	**0.54**	**0.027**	**0.12**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (µm)	Transfer Point (lbs/ton)	Screening (lbs/ton)
2.5	0.00031	0.00059
10	0.0011	0.0087
30	0.0022	0.017

[c] Control efficiencies based on best engineering judgment and reflect Table 105.C in the NSR permit. See Table 37 for more details.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) ÷ (2000 lb/ton) x (1 - Total Control Efficiency [%] / 100)

Table 25
Granulation Reclaim Fugitive Hauling Emissions (FUG48)
Mosaic Potash Carlsbad, Inc.

Pollutant	k (lb/VMT)[(a)]	a[(a)]	b[(a)]	Surface Material Silt Content, s (%)[(b)]	Mean Vehicle Weight, W (tons)[(c)]	Control Equipment / Measure	Unit Control Efficiency (%)[(d)]	Total Control Efficiency (%)[(e)]	Particulate Emission Factor (lb/VMT)[(f)]	VMT/hr[(g)]	Maximum Hourly Emissions (lb/hr)[(h)]	Maximum Annual Emissions (TPY)[(i)]
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.015	4.9	0.074	0.26
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speeds ≤ 10 mph	77	99.8	0.0039	4.9	0.019	0.067
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00039	4.9	0.0019	0.0067

Footnotes:

(a) From AP-42, Chapter 13.2.2 "Unpaved Roads", Table 13.2.2-2, November 2006.

(b) AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

(c) Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the truck/loader loaded and empty weights.

(d) Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Note that these controls are intrinsic to the operations at Mosaic Potash and are not add-on controls.

(e) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

(f) Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

(g) Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) =	750
No. of Roundtrips per Hour =	17
Vehicle Miles Traveled (VMT/hr) =	4.9

(h) Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

(i) Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

Table 26
K-Mag Rehandling Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Material Processed	Process / Source Description	Fugitive ID	Maximum Throughput		Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency (%)[c]	Total Control Efficiency (%)[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
			(TPH)	(TPY)[a]					(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]
K-Mag	Loader to Reclaim Hopper (CS10080)	FUG50	85	744,600	Material Transfer Point	Partial Equipment Enclosure	50	50	0.094	0.41	0.047	0.20	0.013	0.058
K-Mag	Vibratory Feeder (CS10082)	FUG50	85	744,600	Material Transfer Point	Full Equipment Enclosure	95	95	0.0094	0.041	0.0047	0.020	0.0013	0.0058
K-Mag	Rehandling Belt (CS10084)	FUG50	85	744,600	Conveyor Transfer Point	Full Equipment Enclosure	95	95	0.0094	0.041	0.0047	0.020	0.0013	0.0058
K-Mag	Crusher Feed Belt (CS10030)	FUG50	85	744,600	Conveyor Transfer Point	Partial Equipment Enclosure	75	75	0.047	0.20	0.023	0.10	0.0066	0.029
								Total =	**0.16**	**0.70**	**0.079**	**0.35**	**0.022**	**0.098**

Footnotes:

(a) Based on operating 8,760 hours per year.

(b) Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (µm)	Transfer Point (lbs/ton)
2.5	0.00031
10	0.0011
30	0.0022

(c) Control efficiencies based on best engineering judgment and reflect Table 105.C in the NSR permit. See Table 37 for more details.

(d) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

(e) Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

(f) Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) ÷ (2000 lb/ton) x (1 - Total Control Efficiency [%] / 100)

Table 27
K-Mag Rehandling Fugitive Hauling Emissions (FUG49)
Mosaic Potash Carlsbad, Inc.

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, s (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.022	11.3	0.25	0.89
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speeds ≤ 15 mph	66	99.7	0.0057	11.3	0.064	0.23
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00057	11.3	0.0064	0.023

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads", Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

[c] Based on a loader being full half of the time and empty half of the time. A loader is used in the calculations to generate wost-case emissions since loaders require more trips and have a higher mean vehicle weight than a truck.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Note that these controls are intrinsic to the operations at Mosaic Potash and are not add-on controls.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency (%)1 / 100) x (1 - Control Efficiency (%)2 / 100)

[f] Emission Factor (lb/VMT) = [k x (S/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

[g] Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) =	1,750
No. of Roundtrips per Hour =	17
Vehicle Miles Traveled (VMT/hr) =	11.3

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

Mosaic

Table 28
Brine Circuit Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Material Processed	Process / Source Description	Fugitive ID	Maximum Throughput		Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency (%)[c]	Total Control Efficiency (%)[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
			(TPH)	(TPY)[a]					(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]
KCl Salt / Potash	Haul Truck/Front Loader Unloading	FUG52	100	876,000	Material Transfer Point	None	0	0	0.225	0.985	0.110	0.48	0.031	0.14
KCl Salt / Potash	Loader to Storage Pile[g]	FUG52	100	876,000	Material Transfer Point	None	0	0	0.225	0.985	0.110	0.48	0.031	0.14
KCl Salt / Potash	Hopper with Vibratory Feeder (CS1422/CS1410)	FUG52	100	876,000	Material Transfer Point	Partial Equipment Enclosure	50	50	0.112	0.49	0.055	0.24	0.0155	0.068
KCl Salt / Potash	Conveyor Belt (CS1412)	FUG52	100	876,000	Conveyor Transfer Point	Partial Equipment Enclosure	50	50	0.112	0.49	0.055	0.24	0.0155	0.068
KCl Salt / Potash	Wet Scrub Tank (CS1416)	FUG52	100	876,000	Conveyor Transfer Point	Partial Equipment Enclosure	85	85	0.034	0.15	0.017	0.072	0.0047	0.020
								Total =	**0.71**	**3.10**	**0.35**	**1.52**	**0.098**	**0.43**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Transfer Point (lbs/ton)
2.5	0.00031
10	0.0011
30	0.0022

[c] Control efficiencies based on best engineering judgment and reflect Table 105.C in the NSR permit. See Table 37 for more details.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) ÷ (2000 lb/ton) x (1 - Total Control Efficiency [%] / 100)

[g] Brine material is naturally hygroscopic and pulls moisture out of the air. Due to the daytime/nighttime humidity cycles, any brine material that is sitting outside will absorb enough moisture to dissolve the very small particles that would otherwise become airborn; therefore, particulate emissions from the storage pile itself are not estimated.

Table 29
Brine Circuit Fugitive Hauling Emissions
Mosaic Potash Carlsbad, Inc.

Table 29a: Brine Circuit Fugitive Hauling Emissions - Haul Trucks (FUG51a)

Pollutant	k (lb/VMT)(a)	a(a)	b(a)	Surface Material Silt Content, s (%)(b)	Mean Vehicle Weight, W (tons)(c)	Control Equipment / Measure	Unit Control Efficiency (%)(d)	Total Control Efficiency (%)(e)	Particulate Emission Factor (lb/VMT)(f)	VMT/hr(g)	Maximum Hourly Emissions (lb/hr)(h)	Maximum Annual Emissions (TPY)(i)
TSP	4.9	0.7	0.45	4.8	27.5	Paved Roads	99		0.0084	3.0	0.025	0.090
PM_{10}	1.5	0.9	0.45	4.8	27.5	Max Speeds ≤ 5 mph	88	99.9	0.0021	3.0	0.0065	0.023
$PM_{2.5}$	0.15	0.9	0.45	4.8	27.5				0.00021	3.0	0.00065	0.0023

Table 29b: Brine Circuit Fugitive Hauling Emissions - Front Loaders (FUG51b)

Pollutant	k (lb/VMT)(a)	a(a)	b(a)	Surface Material Silt Content, s (%)(b)	Mean Vehicle Weight, W (tons)(c)	Control Equipment / Measure	Unit Control Efficiency (%)(d)	Total Control Efficiency (%)(e)	Particulate Emission Factor (lb/VMT)(f)	VMT/hr(j)	Maximum Hourly Emissions (lb/hr)(h)	Maximum Annual Emissions (TPY)(i)
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.0079	1.5	0.012	0.042
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speeds ≤ 5 mph	88	99.9	0.0020	1.5	0.0030	0.011
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00020	1.5	0.00030	0.0011

Footnotes:

(a) From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

(b) AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

(c) Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the truck/loader loaded and empty weights.

(d) Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Due to a higher number of pedestrians in the area, the maximum speed will be posted at 5 mph. Note that these controls are intrinsic to the operations at Mosaic Potash and are not add-on controls.

(e) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

(f) Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

(g) Haul Trucks: Vehicle Miles Traveled (VMT/hr) = Roundtrip Distance (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - roundtrip (feet) =	4,000
No. of Roundtrips per Hour =	4
Vehicle Miles Traveled (VMT/hr) =	3.0

(h) Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

(i) Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

(j) Front Loaders: Vehicle Miles Traveled (VMT/hr) = Roundtrip Distance (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - roundtrip (feet) =	400
No. of Roundtrips per Hour =	20
Vehicle Miles Traveled (VMT/hr) =	1.5

Mosaic

Table 30
Reagent Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Material Processed	Process / Source Description	Fugitive ID	Maximum Throughput		Emission Factor Category[b]	Control Equipment / Measure	Unit Control Efficiency (%)[c]	Total Control Efficiency (%)[d]	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
			(TPH)	(TPY)[a]					(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]	(lb/hr)[e]	(TPY)[f]
Reagent	Pile to Loader	FUG60	5	43,800	Material Transfer Point	Partial Equipment Enclosure	50	50	0.0056	0.025	0.0028	0.012	0.00078	0.0034
Reagent	Loader to Grate	FUG61	5	43,800	Material Transfer Point	Partial Equipment Enclosure	25	25	0.0084	0.037	0.0041	0.018	0.0012	0.0051
								Total =	**0.014**	**0.062**	**0.0069**	**0.030**	**0.0019**	**0.0085**

Footnotes:

[a] Based on operating 8,760 hours per year.

[b] Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (µm)	Transfer Point (lbs/ton)
2.5	0.00031
10	0.0011
30	0.0022

[c] Control efficiencies based on best engineering judgment and reflect Table 105.C in the NSR permit. See Table 37 for more details.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) ÷ (2000 lb/ton) x (1 - Total Control Efficiency [%] / 100)

Table 31
Reagent Fugitive Hauling Emissions (FUG62)
Mosaic Potash Carlsbad, Inc.

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, b (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Particulate Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.015	0.32	0.0049	0.017
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speeds ≤ 10 mph	77	99.8	0.0039	0.32	0.0012	0.0044
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00039	0.32	0.00012	0.00044

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads", Table 13.2.2-2, November 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

[c] Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the loader loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Note that these controls are intrinsic to the operations at Mosaic Potash and are not add-on controls.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[f] Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

[g] Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Length of Road - one way (feet) =	850
No. of Roundtrips per Hour =	1
Vehicle Miles Traveled (VMT/hr) =	0.32

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

Table 32
Reagent Stockpile Fugitive Wind Erosion Emissions (FUG60)
Mosaic Potash Carlsbad, Inc.

Pollutant	Fastest Mile (mph)[(a)]	Fastest Mile (m/sec)	Number of Active Disturbances per Hour, N[(b)]	Number of Active Disturbances per Year, N[(b)]	Particle Size Multiplier, k[(c)]	Surface Roughness Height (cm)[(d)]	u^{10+} (m/s)[(e)]	Friction Velocity, u* (m/s)[(f)]	Threshold Velocity u_t (m/s)[(g)]	P_i (g/m^2)[(h)]	Emission Factor (g/m^2)[(i)]	Active Surface Area (m^2)[(j)]	Maximum Hourly Emissions (lb/hr)[(k)]	Maximum Annual Emissions (TPY)
TSP	52	23.2	1.0	8,760	1	0.3	27.2	1.44	1.23	8.2	8.16	7.4	0.13	0.59
PM_{10}	52	23.2	1.0	8,760	0.5	0.3	27.2	1.44	1.23	8.2	4.08	7.4	0.067	0.29
$PM_{2.5}$	52	23.2	1.0	8,760	0.075	0.3	27.2	1.44	1.23	8.2	0.61	7.4	0.010	0.044

Footnotes:

(a) The fastest mile of wind speed data measured near Paduca (approximately 20.5 miles SE of Mosaic) based on 2-minute wind speed averages. Using this maximum wind speed value as an average for the entire year greatly over-predicts the annual emissions.

(b) This hourly value is based on 1 loader trip per hour and the annual value is based on the hourly number multiplied by 24 hours a day and 365 days per year.

(c) Based on AP-42, Section 13.2.5, from table on page 13.2.5-3. For TSP (30µm), k=1.0. For PM_{10} (<10µm), k=0.5. For $PM_{2.5}$ (<2.5µm), k=0.075.

(d) The surface roughness is obtained from AP-42 Table 13.2.5-2 and is based on an average of the uncrusted coal pile (0.3 cm) and scoria (roadbed material) (0.3 cm) values, which is the most representative of the reagent material.

(e) The fastest mile corrected to the fastest mile of reference anemometer (10m) for each period between the disturbances. The anemometer in Paduca is at 6 m (20 ft).

(f) The equation used to calculate the friction velocity assumes a typical roughness height of 0.5 cm for open terrain. Equation: $u^* = 0.053(u^{10+})$ (Equation 4 in AP-42 Section 13.2.5.).

(g) Based on an average of the uncrusted coal pile and scoria (roadbed material) threshold velocities from Table 13.2.5-2 in AP-42, which is the most representative of the reagent material.

(h) P_i is the erosion potential function for a dry exposed surface. $P_i = 58 (u^*-u_t)^2 + 25 (u^*-u_t)$. (Equation 3 in AP-42 Section 13.2.5.). Pi = 0 if u* is less than or equal to u_t.

(i) The emission factor equation is based on Equation 2 in AP-42, Section 13.2.5.

(j) The average dimensions of the pile are roughly 100 ft in diameter by 10 ft high; however, only 1% of the pile will be actively disturbed. The surface area is calculated using the following equation: S = PI * r * (sq. rt. $(r^2 + h^2)$)

(k) Based on multiplying the emission factor in g/m^2 by the active surface area in m^2 and then converting to pounds based on 453.6 g/lb.

Mosaic

Table 33
Potash Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Unit Name	Unit No.	Process/Source Description	Maximum Throughput[a] (TPH)	Maximum Throughput[a] (TPY)	TSP Emission Factor (lb/ton)[b]	PM_{10} Emission Factor (lb/ton)[b]	$PM_{2.5}$ Emission Factor (lb/ton)[b]	Control Equipment Measure	Unit Control Efficiency (%)[c]	Total Control Efficiency (%)[d]	Maximum TSP Emissions (lb/hr)[e]	Maximum TSP Emissions (TPY)[f]	Maximum PM_{10} Emissions (lb/hr)[e]	Maximum PM_{10} Emissions (TPY)[f]	Maximum $PM_{2.5}$ Emissions (lb/hr)[e]	Maximum $PM_{2.5}$ Emissions (TPY)[f]
Scenario 1 - Hauling Between Railcar Offloading[g] and the Brine Circuit																
Unloading at the Brine Circuit	FUG52	Truck/Loader Unloading	85	744,600	0.0022	0.0011	0.00031	None	0	0	0.187	0.82	0.0935	0.41	0.0264	0.12
Total Material Handling Emissions for Scenario 1 =											***0.19***	***0.82***	***0.094***	***0.41***	***0.026***	***0.12***
Scenario 2 - Hauling Between the Warehouses and the Brine Circuit																
Loading in Nos. 1, 2, or 3 Warehouses	FUG6, FUG8, or FUG11	Truck/Loader Loading[h]	85	744,600	0.0022	0.0011	0.00031	Partial Building Enclosure	70	70	0.056	0.25	0.028	0.12	0.0079	0.035
Unloading at the Brine Circuit	FUG52	Truck/Loader Unloading[i]	85	744,600	0.0022	0.0011	0.00031	None	0	0	0.187	0.82	0.0935	0.41	0.0264	0.12
Total Material Handling Emissions for Scenario 2 =											***0.24***	***1.06***	***0.12***	***0.53***	***0.034***	***0.15***
Total Material Handling Emissions[j] =											**0.43**	**1.88**	**0.22**	**0.94**	**0.061**	**0.27**

Footnotes:

[a] Based on operating 8,760 hours per year. The 85 TPH maximum throughput is based on the maximum rate that material can be moved from Railcar Offloading (formerly Railcar Unloading), which was set equal to the maximum rate that potash material will be moved from the warehouses for consistent tracking purposes. No changes were made to the currently permitted Brine Circuit capacity of 100 tph, Warehouse 1 capacity of 100 tph, Warehouse 2 capacity of 400 tph, or Warehouse 3 capacity of 400 tph as listed in Table 104.A (Regulated Equipment List) of the current NSR permit.

[b] Uncontrolled emission factors in lbs/ton for transfer points are obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug. 2004. The emission factors have been interpolated for the corresponding particle sizes (see Table 38 for more details). These material handling emission factors represent transfer points in the AP-42 table, but are the most representative emission factors for this type of loading and unloading operation, relative to aggregate handling, since only a small amount of dust forms from brine handling. These emission factors are also more conservative than the truck loading (conveyor, crushed stone) and unloading (fragmented stone) emission factors in the same AP-42 table. In addition, these emission factors are being used to maintain consistency with the existing permitted Brine Circuit emissions.

[c] Control efficiencies reflect the approved control efficiencies as listed in Tables 105.B and 105.C of the NSR and Title V permits.

[d] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

[e] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[f] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) / (2000 lbs/ton) x (1 - Total Control Efficiency [%] / 100)

[g] Material handling emissions associated with offloading material from the railcars (formerly under Railcar Unloading) are already included in the permit.

[h] Material handling emissions associated with unloading in WH1, WH2, and WH3 are already included in the permit.

[i] Even though material handling emissions associated with unloading at the Brine Circuit are already in the permit, Mosaic requested the flexibility to unload material that originates from the railcar or warehouses at the same time as unloading material that originates from the currently permitted trucked in material. Therefore, additional material handling emissions are included in the table above.

[j] Mosaic requested the flexibility to move material under each scenario at the same time; therefore, the emissions for each scenario are summed. Given the assumptions that went into the individual calculations, this summation represents the worst-case emissions

Mosaic

Table 34
Potash Fugitive Hauling Emissions
Mosaic Potash Carlsbad, Inc.

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, b (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure[d]	Unit Control Efficiency (%)[e]	Total Control Efficiency (%)[f]	Controlled Particulate Emission Factor (lb/VMT)[g]	VMT/hr[h]	Maximum Hourly Emissions (lb/hr)[i]	Maximum Annual Emissions (TPY)[j]
Scenario 1 - Hauling Between Railcar Offloading[k] and the Brine Circuit (FUG64)												
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.0079	22.2	0.18	0.62
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speed ≤ 5 mph	88	99.9	0.0020	22.2	0.045	0.16
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00020	22.2	0.0045	0.016
Scenario 2 - Hauling Between the Warehouses[l] and the Brine Circuit (FUG65)												
TSP	4.9	0.7	0.45	4.8	24.0	Paved Roads	99		0.0079	12.9	0.10	0.36
PM_{10}	1.5	0.9	0.45	4.8	24.0	Max Speed ≤ 5 mph	88	99.9	0.0020	12.9	0.026	0.092
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0				0.00020	12.9	0.0026	0.0092
										Total TSP Hauling Emissions =	**0.28**	**0.98**
										Total PM_{10} Hauling Emissions =	**0.071**	**0.25**
										Total $PM_{2.5}$ Hauling Emissions =	**0.0071**	**0.025**

Footnotes:

(a) From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

(b) From AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

(c) Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the truck and loader loaded and empty weights. For the haul truck, the loaded weight is 30 tons and the empty weight is 15 tons for a mean weight of 22.5 tons. For the loader, the loaded weight is 26.5 tons and the empty weight is 21.5 tons for a mean weight of 24.0 tons. The maximum mean vehicle weight is used in the calculations to maximize the emissions.

(d) Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Note that these controls are approved controls at the facility.

(e) Control efficiencies reflect the approved control efficiencies as listed in Tables 105.B and 105.C of the NSR and Title V permits.

(f) Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100) x (1 - Control Efficiency $(\%)_3$ / 100)

(g) From AP-42, Section 13.2.2, Equation 1a, Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Control Efficiency (%) / 100]

(h) Vehicle Miles Traveled (VMT/hr) = No. of Trips per Hour (trips/hr) x Length of Road (one-way, feet) x 2 ÷ (5,280 feet/mi)

Scenario No.	Activity	Material Throughput Rate (TPH)	One-Way Length of Road (feet/trip)	Maximum **Truck** Trips per Hour (trips/hr)[m]	Maximum **Truck** Miles Traveled (VMT/hr)	Maximum **Loader** Trips per Hour (trips/hr)[m]	Maximum **Loader** Miles Traveled (VMT/hr)	Maximum Vehicle Miles Traveled (VMT/hr)[n]
Scenario 1	Truck/Loader from Railcar Offloading to the Brine Circuit	85	3,450	5.7	7.4	17.0	22.2	22.2
Scenario 2	Truck/Loader from WH1, WH2, or WH3 to the Brine Circuit	85	2,000	5.7	4.3	17.0	12.9	12.9

Note that these roundtrip distances are based on the worst-case distance a truck or loader would have to travel in order to maximize the emissions. In most instances, access points that are closer together that minimize distance, hauling time, and emissions will be used.

(i) Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Maximum Vehicle Miles Traveled (VMT/hr)

(j) Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton). Multiply this value by (365-P) / 365 to account for precipitation for outside hauling.

P - no. of days w/ precip. > 0.01" = 70 *From AP-42 Figure 13.2.2-1, Mean number of days with 0.01 inch or more of precipitation in United States, November 2006.*

Annual Hours of Operation (hrs/yr) = 8,760

(k) Railcar Offloading is formerly referred to as Railcar Unloading.

(l) Hauling emissions from Railcar Offloading (formerly Railcar Unloading) to the warehouses are already included in the permit.

(m) Based on a loader capacity of 5 tons and a haul truck capacity of 15 tons.

(n) Based on the worst-case miles traveled by either a haul truck or loader.

Table 35
TMA Fugitive Material Handling Emissions
Mosaic Potash Carlsbad, Inc.

Material Processed	Process / Source Description	Fugitive ID	Maximum Throughput		Emission Factor Category[b]	Control Equipment / Measure[c]	Unit Control Efficiency[d] (%)	Total Control Efficiency[e] (%)	Maximum TSP Emissions		Maximum PM_{10} Emissions		Maximum $PM_{2.5}$ Emissions	
			TPH	TPY[a]					(lb/hr)[f]	(TPY)[g]	(lb/hr)[f]	(TPY)[g]	(lb/hr)[f]	(TPY)[g]
Scenario 1 - Hauling Between the Warehouses and the TMA														
Misc. Material	Loading between WH2 and WH3	FUG8	50	438,000	Material Transfer	Wind Break	40.0	40.0	0.066	0.29	0.033	0.14	0.0093	0.041
Misc. Material	Unloading at TMA	FUG66	50	438,000	Material Transfer	None	0.0	0.0	0.11	0.48	0.055	0.24	0.016	0.068
								Total Emissions (Scenario 1) =	**0.18**	**0.77**	**0.088**	**0.39**	**0.025**	**0.11**
Scenario 2 - Hauling Between Railcar Offloading and the TMA														
Misc. Material	Loading at Railcar Offloading	FUG43	50	438,000	Material Transfer	None	0.0	0.0	0.11	0.48	0.055	0.24	0.016	0.068
Misc. Material	Unloading at TMA	FUG66	50	438,000	Material Transfer	None	0.0	0.0	0.11	0.48	0.055	0.24	0.016	0.068
								Total Emissions (Scenario 2) =	**0.22**	**0.96**	**0.11**	**0.48**	**0.031**	**0.14**
Scenario 3 - Hauling Between Truck Loadout and the TMA														
Misc. Material	Unloading near Truck Loadout	FUG12	50	438,000	Material Transfer	None	0.0	0.0	0.11	0.48	0.055	0.24	0.016	0.068
Misc. Material	Loading near Truck Loadout	FUG12	50	438,000	Material Transfer	None	0.0	0.0	0.11	0.48	0.055	0.24	0.016	0.068
Misc. Material	Unloading at TMA	FUG66	50	438,000	Material Transfer	None	0.0	0.0	0.11	0.48	0.055	0.24	0.016	0.068
								Total Emissions (Scenario 3) =	**0.33**	**1.45**	**0.17**	**0.72**	**0.047**	**0.20**

Footnotes:

(a) Based on 8,760 hours a year, which is a highly unlikely scenario.

(b) Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See Table 38 for more details.

Particle Size (μm)	Transfer Point (lbs/ton)
2.5	0.00031
10	0.0011
30	0.0022

(c) Unit controls include only equipment or building controls, no add-on controls, that are inherent to the design and location of the equipment.

(d) Capture efficiencies are based on best engineering judgment and reflect Table 105.C in the NSR permit.

(e) Total Control Efficiency (%) = 100% - 100% x (1 - Unit Control Efficiency $(\%)_1$ / 100) x (1 - Unit Control Efficiency $(\%)_2$ / 100)

(f) Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

(g) Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) ÷ (2000 lb/ton) x (1 - Total Control Efficiency [%] / 100)

Mosaic

Table 36
TMA Fugitive Hauling Emissions (FUG67)
Mosaic Potash Carlsbad, Inc.

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, S (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (TPY)[i]
Scenario 1 - Hauling Between the Warehouses and the TMA												
TSP	4.9	0.7	0.45	4.8	24.0				0.2941	10.34	3.04	10.77
PM_{10}	1.5	0.9	0.45	4.8	24.0	Paved Roads	62.7	95.5	0.0750	10.34	0.78	2.74
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0	Max Speeds ≤ 5 mph	88.0		0.00750	10.34	0.078	0.27
Scenario 2 - Hauling Between Railcar Offloading and the TMA												
TSP	4.9	0.7	0.45	4.8	24.0				0.323	9.39	3.03	10.74
PM_{10}	1.5	0.9	0.45	4.8	24.0	Paved Roads	59.1	95.1	0.082	9.39	0.77	2.74
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0	Max Speeds ≤ 5 mph	88.0		0.0082	9.39	0.077	0.27
Scenario 3 - Hauling Between Truck Loadout and the TMA[j]												
TSP	4.9	0.7	0.45	4.8	24.0				0.387	7.81	3.02	10.70
PM_{10}	1.5	0.9	0.45	4.8	24.0	Paved Roads	51.0	94.1	0.099	7.81	0.77	2.73
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0	Max Speeds ≤ 5 mph	88.0		0.0099	7.81	0.077	0.27

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads", Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

[c] Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the loaded and empty weights. Either loaders and/or haul trucks can move the material, but loaders were chosen for the emission calculations due to their higher average vehicle weight, which results in higher emission rates.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Note that these controls are intrinsic to the operations at Mosaic and are not add-on controls. Since a portion of the road will remain unpaved (i.e., 1,000 feet), the paved control efficiency of 99% has been adjusted based on the percentage of road that is paved and assuming no control efficiency for the unpaved portion.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Unit Control Efficiency $(\%)_1$ / 100) x (1 - Unit Control Efficiency $(\%)_2$ / 100)

[f] Emission Factor (lb/VMT) = [k x (S/12)^a x (W/3)^b] x [1 - Inherent Control Efficiency (%) / 100]

[g] Vehicle miles traveled (VMT/hr) = 2 x Length of haul road - one way (feet) / (5,280 feet/mi) x Maximum no. of round trips per hour (trips/hr). Even though loaders and/or haul trucks can move the material, loaders are used in the emission calculations because they require more trips, which results in higher emission rates.

Scenario 1:

Maximum length of road - one way (feet) =	2,730
Maximum no. of round trips per hour =	10.0
Vehicle Miles Traveled (VMT/hr) =	10.34

Scenario 2:

Maximum length of road - one way (feet) =	2,480
Maximum no. of round trips per hour =	10.0
Vehicle Miles Traveled (VMT/hr) =	9.39

Scenario 3:

Maximum length of road - one way (feet) =	2,062
Maximum no. of round trips per hour =	10.0
Vehicle Miles Traveled (VMT/hr) =	7.81

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (ton/yr) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

[j] Most of the material from Truck Loadout that breaks grade is returned to the warehouses and not the TMA. However, we are representing the movement of material from Truck Loadout to the TMA in these calculations because it yields worst-case emission rates.

Table 37
Fugitive Emission Control Efficiencies
Mosaic Potash Carlsbad, Inc.

Type of Fugitive Dust Control	Description	Control Efficiency[a]
Ventilation Capture	An active pick-up point that vents to a control device.	100 to 95%
Full Equipment Enclosure	Equipment or transfer points that are completely enclosed (e.g., gravity feed pipes, tube belt conveyors).	95%
Partial Equipment Enclosure	Equipment or transfer points that are partially enclosed (e.g., hoods covering belts).	50-85%
Full Building Enclosure	A building that has no openings to the atmosphere (e.g., no open doors or windows).	90%
Limited Building Enclosure	A building that has a door or a window opening to the atmosphere, but no cross ventilation (e.g., one open door or one window, or one panel missing).	80%
Partial Building Enclosure	A building with several openings to the atmosphere (e.g., open doors, open windows, missing panels).	70%
Wind Break	A three-sided wind screen.	40%
Product Coating	Application of coating compound to the product prior to dispatch. (per CAV # MOS-0196-0701).	80 to 90%
Fully Enclosed Fines Bin with bin vent filter	S&L Loadout 4 Undersize Bin (per CAV # MOS-0196-0701). Replaces undersized discharge pipe with enclosed screw conveyor to an enclosed storage bin with vent sock.	99.99% (emissions calculated at 95%)

Footnotes:
[a] When multiple controls are used on a fugitive emission point, an overall control efficiency was determined as follows:
[1-[(1-0.95)]] X 100 = 99.8%.

Table 38
Material Handling Emission Factors
Mosaic Potash Carlsbad, Inc.

Particle Size (µm)	Controlled Emission Factors (lbs/ton)							
	Tertiary Crushing		Screening		Transfer Point		Fines Screening	
2.5	0.00010	(1)	0.000050	(1)	0.000013	(1)	0.00136	(2)
10	0.00054	(1)	0.00074	(1)	0.000046	(1)	0.0022	(1)
100	0.0012	(1)	0.0022	(1)	0.00014	(1)	0.0036	(1)
30	0.00086	(3)	0.00147	(3)	0.00009	(3)	0.00287	(2)
PM_{10} Control Efficiency	77.5	(5)	91.5	(5)	95.8	(5)	96.9	(5)

Particle Size (µm)	Uncontrolled Emission Factors (lbs/ton)							
	Tertiary Crushing		Screening		Transfer Point		Fines Screening	
2.5	0.00044	(4)	0.00059	(4)	0.00031	(4)	0.044	(4)
10	0.0024	(1)	0.0087	(1)	0.00110	(1)	0.072	(1)
100	0.0054	(1)	0.025	(1)	0.0030	(1)	0.30	(1)
30	0.0038	(6)	0.017	(6)	0.0022	(6)	0.094	(6)

References:

(1) From AP-42, Table 11.19.2-2.

(2) Calculated from PM_{10} and PM_{100} interpolation: $y = m * \ln(x) + b$, where x is particle size and y is emission factor. See Figure 1.

	Fines Screening
m =	0.00061
b =	0.00080

(3) Calculated from PM_{100}, PM_{10} and $PM_{2.5}$ interpolation: $y = m * \ln(x) + b$, where x is particle size and y is emission factor. See Figure 1.

	Tertiary Crushing	Screening	Transfer Point
m =	0.00030	0.00059	0.000035
b =	-0.00016	-0.00054	-0.000025

(4) Calculated using the control efficiency for PM_{10}. This approach is the same as used in AP-42 to calculate PM_{100} values from the PM_{10} control efficiencies for Tertiary Crushing, Screening, and Transfer Points. $PM_{2.5}$ uncontrolled = $PM_{2.5}$ controlled / (1 - PM_{10} Control Efficiency [%] / 100).

(5) PM_{10} control efficiency = (PM_{10} uncontrolled - PM_{10} controlled) / PM_{10} uncontrolled x 100

(6) Calculated using the control efficiency for PM_{10}. This approach is the same as used in AP-42 to calculate PM_{100} values from the PM_{10} control efficiency. PM_{30} uncontrolled = PM_{30} controlled / (1 - PM_{10} Control Efficiency [%] / 100).

Table 39
Summary of Fugitive Emissions
Mosaic Potash Carlsbad, Inc.

Fugitive Source Description	Scrubber ID	Baghouse ID	Fugitive ID	Hourly Fugitive Emissions (lb/hr) Case 1 (With Baghouses & With Coating)			Case 2 (With Baghouses & No Coating)			Case 3 (No Baghouses and No Coating)			Case 4 (No Baghouses & With Coating)			Annual Fugitive Emissions (TPY) - assuming 175 hrs/yr of baghouse and coating down time		
				TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$	TSP	PM_{10}	$PM_{2.5}$
LANG Hoist	--	CON4	FUG25	8.61E-02	4.21E-02	1.19E-02	8.61E-02	4.21E-02	1.19E-02	1.64E-01	8.02E-02	2.27E-02	1.64E-01	8.02E-02	2.27E-02	3.84E-01	1.88E-01	5.31E-02
LANG Hoist	--	CON4	FUG26	1.64E-02	8.02E-03	2.27E-03	1.64E-02	8.02E-03	2.27E-03	3.28E-01	1.60E-01	4.53E-02	3.28E-01	1.60E-01	4.53E-02	9.91E-02	4.85E-02	1.37E-02
LANG Hoist	--	CON4	FUG3	3.28E-01	1.60E-01	4.53E-02	3.28E-01	1.60E-01	4.53E-02	3.28E-01	1.60E-01	4.53E-02	3.28E-01	1.60E-01	4.53E-02	1.44E+00	7.03E-01	1.99E-01
LANG Crusher	--	CON5a	FUG27	1.74E-01	8.49E-02	2.40E-02	1.74E-01	8.49E-02	2.40E-02	2.93E-01	1.43E-01	4.05E-02	2.93E-01	1.43E-01	4.05E-02	7.85E-01	3.84E-01	1.09E-01
LANG Crusher	--	CON5a	FUG28	4.75E+00	2.40E+00	1.62E-01	4.75E+00	2.40E+00	1.62E-01	4.82E+00	2.44E+00	1.70E-01	4.82E+00	2.44E+00	1.70E-01	2.08E+01	1.05E+01	7.11E-01
LANG Fine Ore Bin	--	CON5b	FUG29	4.73E-01	2.31E-01	6.53E-02	4.73E-01	2.31E-01	6.53E-02	6.39E-01	3.12E-01	8.83E-02	6.39E-01	3.12E-01	8.83E-02	2.08E+00	1.02E+00	2.88E-01
LANG Dryer; LANG Screens	CON6	CON7	FUG30	1.48E+00	1.07E+00	6.19E-01	1.48E+00	1.07E+00	6.19E-01	2.12E+00	1.53E+00	8.89E-01	2.12E+00	1.53E+00	8.89E-01	6.55E+00	4.71E+00	2.73E+00
GRAN Process Vent. 10b; GRAN Dryer 10a	CON10ab	--	FUG33	2.66E-01	1.47E-01	5.64E-02	1.08E+00	5.43E-01	1.68E-01	1.08E+00	5.43E-01	1.68E-01	2.66E-01	1.47E-01	5.64E-02	1.24E+00	6.76E-01	2.57E-01
GRAN Process Vent. 10c	--	CON14	FUG24	1.78E-02	8.89E-03	2.44E-03	1.78E-02	8.89E-03	2.44E-03	8.97E-02	4.72E-02	1.19E-02	8.97E-02	4.72E-02	1.19E-02	4.71E-01	2.46E-01	6.27E-02
S&L Dispatch	--	--	FUG31	1.24E+00	6.07E-01	1.72E-01	2.70E+00	1.32E+00	3.73E-01	2.70E+00	1.32E+00	3.73E-01	1.24E+00	6.07E-01	1.72E-01	5.56E+00	2.72E+00	7.69E-01
Dispatch Transfer Tower	--	CON11	FUG32	2.38E-02	1.16E-02	3.29E-03	3.15E-02	1.54E-02	4.35E-03	6.30E-01	3.08E-01	8.70E-02	4.76E-01	2.33E-01	6.58E-02	1.57E-01	7.69E-02	2.17E-02
S&L Warehouse 1 (Aggregate Handling)	--	--	FUG6	1.47E-01	6.94E-02	1.05E-02	7.72E-01	3.65E-01	5.53E-02	7.72E-01	3.65E-01	5.53E-02	1.47E-01	6.94E-02	1.05E-02	6.97E-01	3.30E-01	4.99E-02
S&L Warehouse 1 (Hauling)	--	--	FUG6	2.99E-01	7.62E-02	7.62E-03	2.99E-01	7.62E-02	7.62E-03	2.99E-01	7.62E-02	7.62E-03	2.99E-01	7.62E-02	7.62E-03	1.31E+00	3.34E-01	3.34E-02
S&L Warehouse 1 (Material Handling)	--	--	FUG6	9.56E-02	4.68E-02	1.32E-02	9.56E-02	4.68E-02	1.32E-02	9.56E-02	4.68E-02	1.32E-02	9.56E-02	4.68E-02	1.32E-02	4.19E-01	2.05E-01	5.77E-02
S&L Warehouse 1 - TOTAL	--	--	FUG6	5.41E-01	1.92E-01	3.13E-02	1.17E+00	4.88E-01	7.61E-02	1.17E+00	4.88E-01	7.61E-02	5.41E-01	1.92E-01	3.13E-02	2.43E+00	8.68E-01	1.41E-01
S&L Warehouse 2 (Dispatch)	--	--	FUG8	2.35E-01	1.15E-01	3.25E-02	1.62E+00	7.92E-01	2.24E-01	1.62E+00	7.92E-01	2.24E-01	2.35E-01	1.15E-01	3.25E-02	1.15E+00	5.62E-01	1.59E-01
S&L Warehouse 2 (Aggregate Handling)	--	--	FUG8	2.91E-01	1.37E-01	2.08E-02	1.53E+00	7.23E-01	1.10E-01	1.53E+00	7.23E-01	1.10E-01	2.91E-01	1.37E-01	2.08E-02	1.38E+00	6.53E-01	9.89E-02
S&L Warehouse 2 (Hauling)	--	--	FUG8	5.92E-01	1.51E-01	1.51E-02	5.92E-01	1.51E-01	1.51E-02	5.92E-01	1.51E-01	1.51E-02	5.92E-01	1.51E-01	1.51E-02	2.59E+00	6.61E-01	6.61E-02
S&L Warehouse 2 (Material Handling)	--	--	FUG8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
S&L Warehouse 2 - TOTAL	--	--	FUG8	1.12E+00	4.03E-01	6.83E-02	3.74E+00	1.67E+00	3.48E-01	3.74E+00	1.67E+00	3.48E-01	1.12E+00	4.03E-01	6.83E-02	5.12E+00	1.88E+00	3.24E-01
S&L Warehouse 3 (Dispatch)	--	--	FUG11	1.02E-01	4.98E-02	1.41E-02	7.02E-01	3.43E-01	9.70E-02	7.02E-01	3.43E-01	9.70E-02	1.02E-01	4.98E-02	1.41E-02	4.98E-01	2.44E-01	6.89E-02
S&L Warehouse 3 (Aggregate Handling)	--	--	FUG11	2.91E-01	1.37E-01	2.08E-02	1.53E+00	7.23E-01	1.10E-01	1.53E+00	7.23E-01	1.10E-01	2.91E-01	1.37E-01	2.08E-02	1.38E+00	6.53E-01	9.89E-02
S&L Warehouse 3 (Hauling)	--	--	FUG11	5.92E-01	1.51E-01	1.51E-02	5.92E-01	1.51E-01	1.51E-02	5.92E-01	1.51E-01	1.51E-02	5.92E-01	1.51E-01	1.51E-02	2.59E+00	6.61E-01	6.61E-02
S&L Warehouse 3 (Material Handling)	--	--	FUG11	5.69E-01	2.79E-01	7.86E-02	5.69E-01	2.79E-01	7.86E-02	5.69E-01	2.79E-01	7.86E-02	5.69E-01	2.79E-01	7.86E-02	2.49E+00	1.22E+00	3.44E-01
S&L Warehouse 3 - TOTAL	--	--	FUG11	1.55E+00	6.17E-01	1.29E-01	3.39E+00	1.50E+00	3.00E-01	3.39E+00	1.50E+00	3.00E-01	1.55E+00	6.17E-01	1.29E-01	6.96E+00	2.78E+00	5.78E-01
S&L Truck Loadout	--	--	FUG12	2.88E-01	1.43E-01	4.05E-02	5.80E-01	2.86E-01	8.07E-02	5.80E-01	2.86E-01	8.07E-02	2.88E-01	1.43E-01	4.05E-02	1.29E+00	6.41E-01	1.81E-01
S&L Loadout 4	--	--	FUG9	7.18E-01	4.98E-01	2.77E-01	3.78E+00	2.62E+00	1.46E+00	3.78E+00	2.62E+00	1.46E+00	7.18E-01	4.98E-01	2.77E-01	3.41E+00	2.37E+00	1.32E+00
S&L Loadout 5	--	--	FUG10	2.90E-01	1.66E-01	6.97E-02	1.51E+00	8.66E-01	3.64E-01	1.51E+00	8.66E-01	3.64E-01	2.90E-01	1.66E-01	6.97E-02	1.38E+00	7.89E-01	3.31E-01
Nash Plant Hoist	--	--	FUG1	7.42E-01	3.63E-01	1.03E-01	7.42E-01	3.63E-01	1.03E-01	7.42E-01	3.63E-01	1.03E-01	7.42E-01	3.63E-01	1.03E-01	3.25E+00	1.59E+00	4.49E-01
Nash Plant Screening	--	--	FUG2	7.97E-01	3.98E-01	5.17E-02	7.97E-01	3.98E-01	5.17E-02	7.97E-01	3.98E-01	5.17E-02	7.97E-01	3.98E-01	5.17E-02	3.49E+00	1.74E+00	2.27E-01
Main Haul Road	--	--	FUG22	3.59E-01	9.16E-02	9.16E-03	3.59E-01	9.16E-02	9.16E-03	3.59E-01	9.16E-02	9.16E-03	3.59E-01	9.16E-02	9.16E-03	1.27E+00	3.24E-01	3.24E-02
Permanent Abrasive Blasting	--	--	FUG20	1.32E+01	3.12E+00	3.12E-01	1.32E+01	3.12E+00	3.12E-01	1.32E+01	3.12E+00	3.12E-01	1.32E+01	3.12E+00	3.12E-01	1.98E+00	4.68E-01	4.68E-02
Portable Abrasive Blasting	--	--	FUG40	1.32E+01	3.12E+00	3.12E-01	1.32E+01	3.12E+00	3.12E-01	1.32E+01	3.12E+00	3.12E-01	1.32E+01	3.12E+00	3.12E-01	1.98E+00	4.68E-01	4.68E-02
Railcar Offloading (material handling)	--	--	FUG43	4.78E-02	2.34E-02	6.61E-03	4.78E-02	2.34E-02	6.61E-03	4.78E-02	2.34E-02	6.61E-03	4.78E-02	2.34E-02	6.61E-03	2.09E-01	1.02E-01	2.89E-02
GRAN Reclaim (material handling)	--	--	FUG44	2.51E-01	1.24E-01	2.72E-02	2.51E-01	1.24E-01	2.72E-02	2.51E-01	1.24E-01	2.72E-02	2.51E-01	1.24E-01	2.72E-02	1.10E+00	5.44E-01	1.19E-01
Railcar Offloading (haul road)	--	--	FUG47	5.27E-02	1.34E-02	1.34E-03	5.27E-02	1.34E-02	1.34E-03	5.27E-02	1.34E-02	1.34E-03	5.27E-02	1.34E-02	1.34E-03	1.86E-01	4.75E-02	4.75E-03
GRAN Reclaim (haul road)	--	--	FUG48	7.38E-02	1.88E-02	1.88E-03	7.38E-02	1.88E-02	1.88E-03	7.38E-02	1.88E-02	1.88E-03	7.38E-02	1.88E-02	1.88E-03	2.61E-01	6.66E-02	6.66E-03
K-Mag Rehandling (haul road)	--	--	FUG49	2.52E-01	6.42E-02	6.42E-03	2.52E-01	6.42E-02	6.42E-03	2.52E-01	6.42E-02	6.42E-03	2.52E-01	6.42E-02	6.42E-03	8.92E-01	2.27E-01	2.27E-02
K-Mag Rehandling (material handling)	--	--	FUG50	1.59E-01	7.95E-02	2.24E-02	1.59E-01	7.95E-02	2.24E-02	1.59E-01	7.95E-02	2.24E-02	1.59E-01	7.95E-02	2.24E-02	6.96E-01	3.48E-01	9.81E-02
Brine Circuit (haul road)	--	--	FUG51a	2.54E-02	6.48E-03	6.48E-04	2.54E-02	6.48E-03	6.48E-04	2.54E-02	6.48E-03	6.48E-04	2.54E-02	6.48E-03	6.48E-04	9.00E-02	2.29E-02	2.29E-03
Brine Circuit (haul road)	--	--	FUG51b	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	4.23E-02	1.08E-02	1.08E-03
Brine Circuit (material handling)	--	--	FUG52	1.08E+00	5.34E-01	1.51E-01	1.08E+00	5.34E-01	1.51E-01	1.08E+00	5.34E-01	1.51E-01	1.08E+00	5.34E-01	1.51E-01	4.74E+00	2.34E+00	6.60E-01
General Hauling between WH2 and WH3	--	--	FUG57	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	4.23E-02	1.08E-02	1.08E-03
Railcar Offloading (haul road to GRAN Reclaim)	--	--	FUG58	1.46E-01	3.72E-02	3.72E-03	1.46E-01	3.72E-02	3.72E-03	1.46E-01	3.72E-02	3.72E-03	1.46E-01	3.72E-02	3.72E-03	5.17E-01	1.32E-01	1.32E-02
Railcar Offloading (haul road to K-Mag Rehandling)	--	--	FUG59	1.44E-02	3.67E-03	3.67E-04	1.44E-02	3.67E-03	3.67E-04	1.44E-02	3.67E-03	3.67E-04	1.44E-02	3.67E-03	3.67E-04	5.10E-02	1.30E-02	1.30E-03
Reagent (material handling, wind erosion at pile)	--	--	FUG60	1.40E-01	6.97E-02	1.08E-02	1.40E-01	6.97E-02	1.08E-02	1.40E-01	6.97E-02	1.08E-02	1.40E-01	6.97E-02	1.08E-02	6.11E-01	3.05E-01	4.74E-02
Reagent (material handling at grate)	--	--	FUG61	8.43E-03	4.13E-03	1.17E-03	8.43E-03	4.13E-03	1.17E-03	8.43E-03	4.13E-03	1.17E-03	8.43E-03	4.13E-03	1.17E-03	3.69E-02	1.81E-02	5.11E-03
Reagent (hauling)	--	--	FUG62	4.87E-03	1.24E-03	1.24E-04	4.87E-03	1.24E-03	1.24E-04	4.87E-03	1.24E-03	1.24E-04	4.87E-03	1.24E-03	1.24E-04	1.72E-02	4.39E-03	4.39E-04
General Hauling between WH1 and WH2	--	--	FUG63	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	1.20E-02	3.05E-03	3.05E-04	4.23E-02	1.08E-02	1.08E-03
Potash Hauling (Railcar Offloading to Brine Circuit)	--	--	FUG64	1.75E-01	4.47E-02	4.47E-03	1.75E-01	4.47E-02	4.47E-03	1.75E-01	4.47E-02	4.47E-03	1.75E-01	4.47E-02	4.47E-03	6.21E-01	1.58E-01	1.58E-02
Potash Hauling (WH1, WH2,or WH3 to Brine Circuit)	--	--	FUG65	1.02E-01	2.59E-02	2.59E-03	1.02E-01	2.59E-02	2.59E-03	1.02E-01	2.59E-02	2.59E-03	1.02E-01	2.59E-02	2.59E-03	3.60E-01	9.17E-02	9.17E-03
TMA (material handling)	--	--	FUG66	3.30E-01	1.65E-01	4.65E-02	3.30E-01	1.65E-01	4.65E-02	3.30E-01	1.65E-01	4.65E-02	3.30E-01	1.65E-01	4.65E-02	1.45E+00	7.23E-01	2.04E-01
TMA (hauling)	--	--	FUG67	3.02E+00	7.70E-01	7.70E-02	3.02E+00	7.70E-01	7.70E-02	3.02E+00	7.70E-01	7.70E-02	3.02E+00	7.70E-01	7.70E-02	1.07E+01	2.73E+00	2.73E-01
Fugitive Emission Totals				**47.6**	**15.9**	**2.9**	**59.5**	**22.4**	**5.3**	**61.6**	**23.6**	**5.7**	**49.5**	**17.0**	**3.4**	**94.8**	**43.1**	**10.4**

Note that the gray rows above represent a portion of the emission unit total and should not be double-counted.

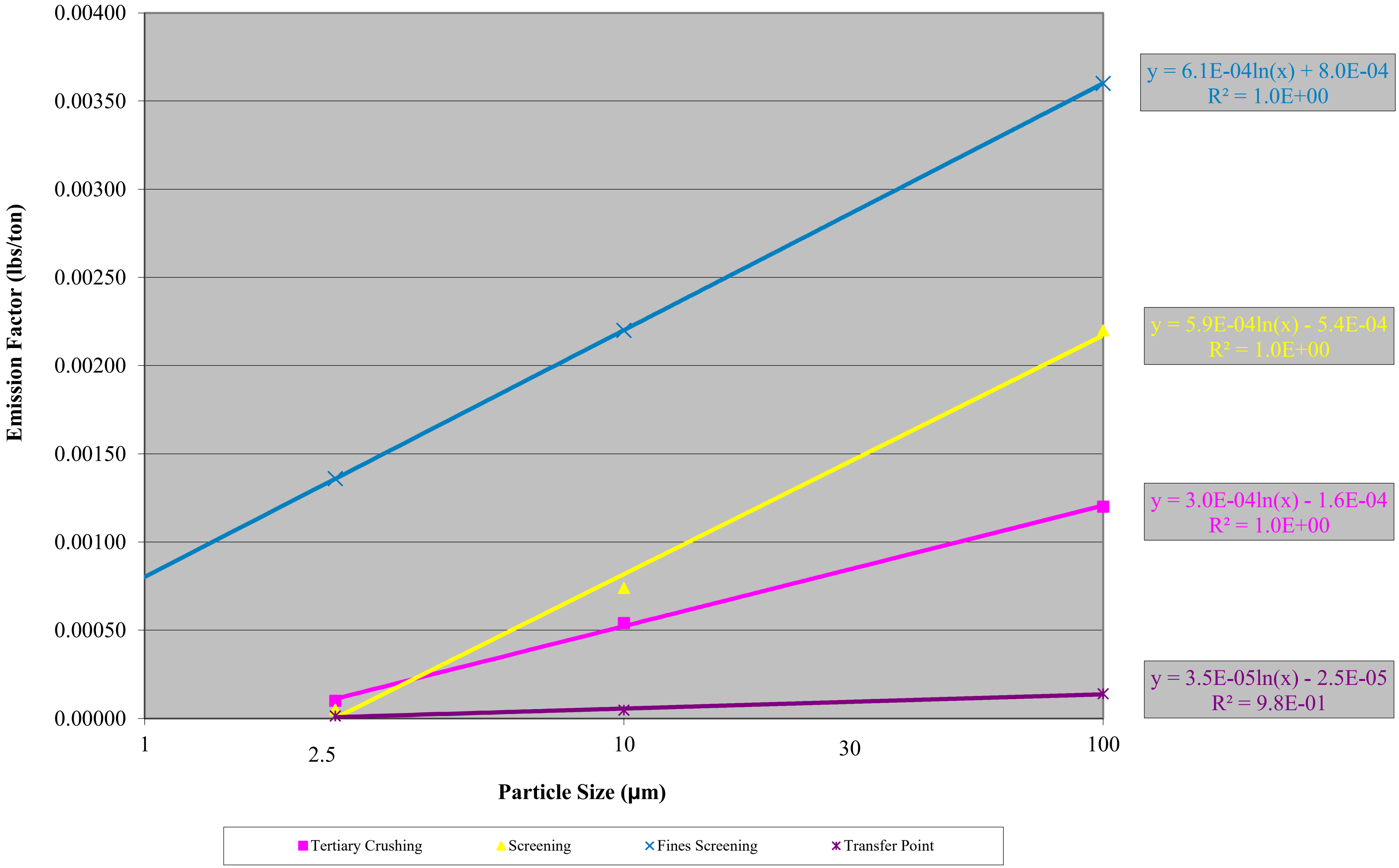
Table 40
Fugitive Emissions as Stack Emissions
Mosaic Potash Carlsbad, Inc.

Baghouse ID	Source Description	Current TSP/PM_{10}/$PM_{2.5}$ Permit Limits (lb/hr)	Estimated Fugitive Emissions as Stack Emissions (lb/hr)[a]		
			TSP	PM_{10}	$PM_{2.5}$
CON4	LANG Hoist	0.75	0.39	0.19	0.054
CON5a	LANG Crusher	1	0.19	0.10	0.024
CON5b	LANG Fine Ore Bin	1	0.17	0.081	0.023
CON7	LANG Screens	4	0.64	0.46	0.27
CON11	Dispatch Transfer Tower	1	0.60	0.29	0.083
CON14	GRAN Process Vent. 10c	2.5	0.072	0.038	0.0094

Footnotes:

[a] Estimated additional fugitive emissions due to turning off the baghouse during process operations for a maximum of 175 hr/yr. These are emissions that would normally be pulled into the stack at ventilation pickup points when the baghouses are operating and must be counted toward the stack cap ton per year emission limits.

Figure 1
Controlled Emission Factors for Crushed Stone Processing Operations
Mosaic Potash Carlsbad Inc.



Permitting Administrative Multi-Form

Use for NSR administrative permit revisions (including GCPs), TV administrative amendments, TV responsible official notifications, and other submittals required by a permit condition. Refer to Section 4 for instructions, acronyms, and mailing addresses.

For Department use only:		For Department use only:
Reviewed by: Joe Kimbrell	NEW MEXICO ENVIRONMENT DEPARTMENT	Received Date
Permit revision number: 0495-M13R2		Received MAR 16 2020 Air Quality Bureau
Date: March 18, 2020		
☒ Approved ☐ Completed ☐ Denied		

Section 1: General Information – Required for All Submittals

1	Facility Name: **Mosaic Potash Carlsbad, Inc.**		
2	Preparer/Consultant Name: **Claire Booth**	Title: **Senior Environmental Engineer**	
3	Email: claire@arrayenvironmental.com	Phone: **(720) 316-9935**	
4	Address: **1496 Conestoga Circle, Steamboat Springs, CO 80487**		
5	Air Permit Contact: **Haskins Hobson**	Title: **Senior Environmental Engineer**	
6	Email: **Haskins.Hobson@mosaicco.com**	Phone: **(575) 628-6267**	
7	Address: **P.O. Box 71, Carlsbad, NM 88220**		
8	Check all boxes below for which this submittal applies:	AI #: **196**	Permit #: **495-M13**

X NSR Construction Permit (20.2.72 NMAC)	☐ NOI (20.2.73 NMAC) (Sections 2-B, 2-D)	☐ PSD Permit (20.2.74 NMAC)
☐ TV Operating Permit (20.2.70 NMAC)	☐ Notice of Exemption (20.2.72.202.B NMAC) (Section 2-F)	☐ Nonattainment Permit (20.2.79 NMAC)

Section 2: Details of Submittal

Only print and submit the pages necessary for your submittal. Print double sided head-to-toe, flip on short end (tablet). The Permit Section responds to all TV Administrative amendments and responds only to denials of NSR administrative revisions. Courier proof of delivery is required if you want confirmation that the Department received this submittal. Check the box(es) applicable to this submittal:

☐ 2-A(i) & 2-A(ii): Identical Engine or Turbine Replacements

☐ 2-B: Owner, Operator, and Name Changes to NOIs or Construction Permits

☐ 2-C: Ownership or Operational Control Changes for Title V Permits

☐ 2-D: Closing a Facility or Removing Units from a Permit

☐ 2-E: Correct Typographical Error

☒ 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities

☐ 2-G: Add Minor NSR Exempt Equipment to Construction Permits for PSD or Nonattainment Sources

☐ 2-H: Title V Responsible Official Designations

☐ 2-I: Submittals to the Permit Programs Manager

Section 3: Certification – Required for All Changes

Section 4: Form Instructions

Section 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities

Certain equipment can be added to minor construction permits as exempt equipment under 20.2.72.202.B NMAC as an administrative permit revision. (This exemption does not apply to facilities subject to 20.2.70 NMAC (TV), 20.2.74 NMAC (PSD), or 20.2.79 NMAC Nonattainment Sources. In those cases, use Section 2-G of this form.)

Construction permit Part 72 exemptions are not the same as operating permit TV insignificant activities (20.2.70.7.Q NMAC). If you have a TV permit and want to claim Title V insignificant activities, they may be required to have authorization through a construction permit. Only the insignificant activities that meet the requirements of 20.2.72.202.B NMAC may be added using this form for an administrative permit revision.

The Potential to Emit (PTE) of regulated air contaminants from minor permit exempt equipment count toward the facility's total emissions under the PSD, nonattainment, and TV regulations therefore, the addition of equipment using this form could possibly result in the facility becoming PSD, Nonattainment, or TV major.

Check the box(es) to indicate if your facility has a permit or is a no permit required (NPR) facility, check the box(es) for the equipment being added, and complete the table(s), if applicable. Include attachments as required.

☐ Administrative Revision: This facility has a minor construction permit as designated in Section 1 of this application. This form is being submitted to add a piece(s) of equipment that qualifies as exempt under 20.2.72.202.B NMAC.

or

☐ Notice of Exemption: This facility does not require a 20.2.72 NMAC permit, so it is designated as a no permit required (NPR) facility. This exemption form is being submitted to record that this equipment qualifies as exempt under 20.2.72.202.B NMAC. (This exemption does not apply to (cannot be added to) NOI (20.2.73 NMAC), TV (20.2.70 NMAC), PSD (20.2.74 NMAC), or nonattainment (20.2.79 NMAC) facilities.)

AQB used to require either the Notice of Exemption Form or Exemption Application Form for these facilities. This form replaces both of those forms.

Only fill out the information in this table if your facility is an NPR facility, we already have the information for permitted sites.

Facility Name:	Plant primary SIC Code (4 digits):	
	Plant NAICS code (6 digits):	
Facility Street Address (If no facility street address, provide directions from a prominent landmark):		
Company Name:	Phone:	
Company Mailing Address:		
Air Contact:	Title:	
Email:	Phone:	
The facility is: ____ (distance) miles ____ (direction) of ____ (nearest New Mexico town or tribal community).	Zip Code:	County:
Status of land (check one): ☐ Private ☐ Indian/Pueblo ☐ Federal BLM ☐ Federal Forest Service ☐ State Land ☐ Bernalillo County		

Section 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities, continued

Minor Construction Permit (Part 72) or NPR Exempt Equipment

The equipment checked in this section meets the requirements of the exemption in 20.2.72.202 NMAC, will comply with all applicable federal requirements in 40 CFR Part 60 (NSPS) or 40 CFR Part 63 (MACT), and appropriate records will be created and retained for two (2) years (or five (5) years if a TV source):

Standby Generators

☐ Standby generators which are operated only during the unavoidable loss of commercial utility power and less than 500 hours per year. (20.2.72.202.B(3) NMAC). Potentially applicable federal regulations: 40 CFR 63 Subpart ZZZZ and 40 CFR 60 Subparts JJJJ or IIII. Emission rates from emergency standby generators should be calculated assuming operation throughout the year (i.e., 8760 hours per year) to verify that it does not make your facility PSD, Nonattainment, or TV major.

Standby Generator Manufacturer	Serial Number	Date of Manufacture	Date of Installation[1]	Capacity (hp)
Name of commercial power provider[2]:				

[1] Date of installation is the date the engine is placed and secured at the location where it is intended to be operated.
[2] Commercial power is purchased from a utility company, which specifically does not include power generated on-site for the sole purse of the user.

Abrasive Blasting

☐ Enclosed abrasive blasting operations; if no visible emissions from the building. (20.2.72.202.B(7) NMAC). Potentially applicable federal regulations: 40 CFR 63 Subpart XXXXXX - National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories. More information: www.env.nm.gov/air-quality/ind-sector-info/.

Surface Coating

☐ Surface coating of equipment, including spray painting, roll coating, and painting with aerosol spray cans and all coating and clean-up solvent; if VOCs from paints and solvents do not exceed ten (10) pounds per hour and two (2) tons per year. (20.2.72.202.B(6) NMAC). Potentially applicable federal regulations (more information: www.env.nm.gov/air-quality/ind-sector-info/):

40 CFR 63 Subpart HHHHHH - National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources or

40 CFR 63 Subpart XXXXXX - National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories.

Volatile Organic Compound (VOC) Handling and or Storage

☐ VOC emissions resulting from the handling or storing of any VOC emission source; if vapor pressure is less than two tenths (0.2) PSI at the storage and handling temperatures. (20.2.72.202.B(2) NMAC).

Fuel Burning Equipment

☐ Fuel burning equipment used solely for heating buildings for personal comfort or producing hot water for personal use; if gaseous or liquid fuel and rated 5 MMBtu or less, or if distillate oil and 1 MMBtu or less. (20.2.72.202.B(1) NMAC).

Repositioning Sources at Plant

☐ Repositioning or relocating sources of air emissions or emissions points within the plant site, but only when such change in physical configuration does not increase air emissions or the ambient impacts. (20.2.72.B(4) NMAC). Attach an updated plot plan. Permittees must ensure that relocation of any emissions source within the plant site does **not** increase the ambient impact and will not result in an exceedance of any National Ambient Air Quality Standard (NAAQS), New Mexico Ambient Air Quality Standard (NMAAQS), or PSD Increment. If not sure, please contact the Modeling Section Manager (505-476-4300).

Emissions Exempted Based on Quantity

☒ Any emissions unit, operation, or activity that has the potential to emit no more than one-half (1/2) ton per year of any regulated new source review pollutant. Units, operations, or activities of similar function shall be combined when calculating the emission rate. (20.2.72.202.B(5) NMAC).

Unit Description	Serial Number	Capacity (size)	Regulated Pollutants Emitted[3]	PER[4] tpy
Railcar Transloader	**TBD (rental unit)**	**225 tph**	**PM_{10}, $PM_{2.5}$**	**0.37 tpy**

[3] Particulate Matter (PM, PM_{10}, $PM_{2.5}$); Sulfur Dioxide (SO_2); Carbon Monoxide (CO); Nitrogen Dioxide (NO_2); Hydrogen Sulfide (H_2S); Lead (Pb); Total Reduced Sulfur; and Volatile Organic Compounds (VOC).

[4] Potential emission rate, as defined in 20.2.72 NMAC. The PER is the worst-case emission rate of the facility without controls or other limitations (unless the controls or limitations are federally enforceable) and as if the facility were operating continuously 8760 hours per year (24 hour/day, 365 days/year).

Mosaic

Mosaic Potash Carlsbad Inc.
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Carlsbad, NM 88221

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Fax (575) 887-0589
www.mosaicco.com

March 16, 2020

Electronic Submittal

New Mexico Environment Department
Air Quality Bureau
Permits Section
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico 87505-1816

Received
MAR 16 2020
Air Quality Bureau

RE: Mosaic Potash Carlsbad, Inc.
Railcar Transloader Exemption Request under 20.2.72.202.B(5) NMAC

Dear Mr. Kimbrell,

Mosaic Potash Carlsbad, Inc. (Mosaic) is submitting this Permitting Administrative Multi-Form to request NMED AQB approval for the use of a transloader, which is a portable conveyor belt that will be used to offload material from railcars. This transloader is needed to unload railcars that have become backlogged due to a damaged belt on our existing railcar unloading station.

Material will drop from the underside of a railcar onto the transloader and will be conveyed to a dump truck that will move the material into one of our warehouses. The transloader's maximum design capacity is 225 tph but it will typically be operated no higher than 150 to 175 tph. Regardless, the design capacity of 225 tph is used in the emission calculations. In addition, the transloader will be operated sporadically during daylight hours and for no more than a few weeks or months, but to calculate the potential emission rate (PER), the emission estimates are based on the transloader operating continuously for 8,760 hours a year. Under these conservative assumptions, the maximum emissions from the transloader are less than the 0.5 tons per year (tpy) NSR exemption found in 20.2.72.202.B(5) NMAC. See enclosed Tables 1 through 3.

If you have any questions or need additional information to process this request, please contact me at 575-628-6267 or Haskins.Hobson@mosaicco.com.

Regards,

Haskins Hobson, P.E.

Haskins Hobson, P.E.
Senior Environmental Engineer
MOSAIC POTASH CARLSBAD, INC.

Enclosures:
Emission Calculation Tables 1-3
Permitting Administrative Multi-Form (Sections 1, 2, and 2-F)
Signed Certification Page (Section 3)

Mosaic

TABLE 1: SUMMARY OF RAILCAR TRANSLOADER EMISSIONS

Source	Activity	PM_{10}		$PM_{2.5}$	
		lb/hr	tpy	lb/hr	tpy
Transloader	Material Handling [a]	0.077	0.34	0.022	0.095
	Hauling [b]	0.0089	0.031	0.00089	0.0031
	Total	**0.086**	**0.37**	**0.023**	**0.098**

Footnotes:

[a] See Table 2.

[b] See Table 3.

Mosaic

TABLE 2: RAILCAR TRANSLOADER MATERIAL HANDLING EMISSIONS

Process / Source Description	Maximum Throughput		Emission Factor Category [c]	Control Equipment / Measure	Unit Control Efficiency	Total Control Efficiency (%) [e]	PM_{10} Emission Rate		$PM_{2.5}$ Emission Rate	
	(TPH) [a]	(TPY) [b]			(%) [d]		(lb/hr) [f]	(TPY) [g]	(lb/hr) [f]	(TPY) [g]
Railcar to Transloader	225	1,971,000	Transfer Point	Partial Equipment Enclosure	75	95.0	0.012	0.054	0.0035	0.015
				Dust Control Agent	80					
Transloader to Truck	225	1,971,000	Transfer Point	Dust Control Agent	80	80.0	0.050	0.22	0.014	0.061
Truck Unloading in Warehouse	225	1,971,000	Transfer Point	Dust Control Agent	80	94.0	0.015	0.065	0.0042	0.018
				Partial Building Enclosure	70					
						Total =	**0.077**	**0.34**	**0.022**	**0.095**

Footnotes:

[a] Based on the maximum design rate of the transloader.

[b] Mosaic will only operate the transloader sporadically during daylight hours and for no more than a few months; but to be conservative, these emissions are based on the transloader operating continuously for 12 hours a day over 6 months.

[c] Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See table below.

Particle Size (µm)	Transfer Point (lbs/ton)
2.5	0.00031
10	0.0011

[d] The railcar provides inherent dust control because the material exits beneath the railcar. Therefore, the same railcar control efficiency that is approved for Railcar Unloading (FUG43) is used here because they have similar unloading configurations. In addition, the material in the railcars arrives at Mosaic already coated with a dust control agent. However, because the material has been sitting in the railcars, we have reduced the approved dust coating control efficiency of 90% to 80% to be more conservative in our emission estimates.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

[f] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[g] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) / 2000 lbs/ton x (1 - Total Control Efficiency [%] / 100)

Mosaic

TABLE 3: RAILCAR TRANSLOADER HAULING EMISSIONS

Pollutant	k (lb/VMT) [a]	a [a]	b [a]	Surface Material Silt Content, s (%) [b]	Mean Vehicle Weight, W (tons) [c]	Control Equipment / Measure	Unit Control Efficiency (%) [d]	Total Control Efficiency (%) [e]	Particulate Emission Factor (lb/VMT) [f]	VMT/hr [g]	Hourly Emission Rate (lb/hr) [h]	Annual Emission Rate (TPY) [i]
PM_{10}	1.5	0.9	0.45	4.8	22.5	Paved & Swept Roads	99	99.9	0.0020	4.5	0.0089	0.031
$PM_{2.5}$	0.15	0.9	0.45	4.8	22.5	Max Speeds ≤ 5 mph	88		0.00020	4.5	0.00089	0.0031

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value)

[c] Based on full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the truck's loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

[f] Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

[g] To No. 1, No. 2, or No. 3 Warehouse: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Maximum Length of Road - one way (feet) =	800
No. of Roundtrips per Hour =	15
Vehicle Miles Traveled (VMT/hr) =	4.5

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

Section 3: Certification – Required for All Applications

Company Name: Mosaic Potash Carlsbad, Inc.

I, Haskins Hobson, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 16th day of March, 2020, upon my oath or affirmation, before a notary of the State of New Mexico.

Haskins Hobson — 3/16/2020

Signature[1] — Date

Haskins Hobson — Sr. Environmental Engineer

Printed Name — Title

Scribed and sworn before me on this 16 day of March, 2020.

My authorization as a notary of the State of New Mexico expires on the 12 day of October, 2020.

Linda S. Baltzell — March 16, 2020

Notary's Signature — Date

Linda S. Baltzell

Notary's Printed Name

OFFICIAL SEAL
Linda S. Baltzell
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: October 12, 2020

[1] For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC:

Mosaic

TABLE 1: SUMMARY OF RAILCAR TRANSLOADER EMISSIONS

Source	Activity	TSP		PM_{10}		$PM_{2.5}$	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
Railcar Transloader	Material Handling [a]	0.16	0.69	0.077	0.34	0.022	0.095
	Hauling [b]	0.035	0.12	0.0089	0.031	0.00089	0.0031
	Total	**0.19**	**0.81**	**0.086**	**0.37**	**0.023**	**0.098**

Footnotes:

[a] See Table 2.

[b] See Table 3.

Mosaic

TABLE 2: RAILCAR TRANSLOADER MATERIAL HANDLING EMISSIONS

Process / Source Description	Maximum Throughput		Emission Factor Category [c]	Control Equipment / Measure	Unit Control Efficiency (%) [d]	Total Control Efficiency (%) [e]	TSP Emission Rate		PM_{10} Emission Rate		$PM_{2.5}$ Emission Rate	
	(TPH) [a]	(TPY) [b]					(lb/hr) [f]	(TPY) [g]	(lb/hr) [f]	(TPY) [g]	(lb/hr) [f]	(TPY) [g]
Railcar to Transloader	225	1,971,000	Transfer Point	Partial Equipment Enclosure	75	95.0	0.025	0.11	0.012	0.054	0.0035	0.015
				Dust Control Agent	80							
Transloader to Truck	225	1,971,000	Transfer Point	Dust Control Agent	80	80.0	0.10	0.44	0.050	0.22	0.014	0.061
Truck Unloading in Warehouse	225	1,971,000	Transfer Point	Dust Control Agent	80	94.0	0.030	0.13	0.015	0.065	0.0042	0.018
				Partial Building Enclosure	70							
						Total =	**0.16**	**0.69**	**0.077**	**0.34**	**0.022**	**0.095**

Footnotes:

a Based on the maximum design rate of the transloader.

b Mosaic will only operate the transloader sporadically during daylight hours and for no more than a few months; but to be conservative, these emissions are based on the transloader operating continuously for 24 hours a day, 365 days a year (i.e., 8,760 hrs/yr).

c Uncontrolled emission factors in lbs/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See table below.

Particle Size (µm)	Transfer Point (lbs/ton)
2.5	0.00031
10	0.0011
30	0.0022

d The railcar provides inherent dust control because the material exits beneath the railcar. Therefore, the same railcar control efficiency that is approved for Railcar Unloading (FUG43) is used here because they have similar unloading configurations. In addition, the material in the railcars arrives at Mosaic already coated with a dust control agent. However, because the material has been sitting in the railcars, we have reduced the approved dust coating control efficiency of 90% to 80% to be more conservative in our emission estimates.

e Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

f Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

g Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) / 2000 lbs/ton x (1 - Total Control Efficiency [%] / 100)

Mosaic

TABLE 3: RAILCAR TRANSLOADER HAULING EMISSIONS

Pollutant	k (lb/VMT) [a]	a [a]	b [a]	Surface Material Silt Content, s (%) [b]	Mean Vehicle Weight, W (tons) [c]	Control Equipment / Measure	Unit Control Efficiency (%) [d]	Total Control Efficiency (%) [e]	Particulate Emission Factor (lb/VMT) [f]	VMT/hr [g]	Hourly Emission Rate (lb/hr) [h]	Annual Emission Rate (TPY) [i]
TSP	4.9	0.7	0.45	4.8	22.5				0.0077	4.5	0.035	0.12
PM_{10}	1.5	0.9	0.45	4.8	22.5	Paved & Swept Roads	99	99.9	0.0020	4.5	0.0089	0.031
$PM_{2.5}$	0.15	0.9	0.45	4.8	22.5	Max Speeds ≤ 5 mph	88		0.00020	4.5	0.00089	0.0031

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value)

[c] Based on full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the truck's loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

[f] Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

[g] To No. 1, No. 2, or No. 3 Warehouse: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Maximum Length of Road - one way (feet) =	800
No. of Roundtrips per Hour =	15
Vehicle Miles Traveled (VMT/hr) =	4.5

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (TPY) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

Permitting Administrative Multi-Form

Use for NSR administrative permit revisions (including GCPs), TV administrative amendments, TV responsible official notifications, and other submittals required by a permit condition. Refer to Section 4 for instructions, acronyms, and mailing addresses.

For Department use only:	For Department use only:
Reviewed by: Joseph Kimbrell	Received Date
Permit revision number: 0495M13R4	Received via email on 5/20/2020.
Date: May 21, 2020	
☒ Approved ☐ Completed ☐ Denied	

Section 1: General Information – Required for All Submittals

1	Facility Name: **Mosaic Potash Carlsbad, Inc.**		
2	Preparer/Consultant Name: **Claire Booth**	Title: **Senior Environmental Engineer**	
3	Email: claire@arrayenvironmental.com	Phone: **(720) 316-9935**	
4	Address: **1496 Conestoga Circle, Steamboat Springs, CO 80487**		
5	Air Permit Contact: **Haskins Hobson**	Title: **Senior Environmental Engineer**	
6	Email: **Haskins.Hobson@mosaicco.com**	Phone: **(575) 628-6267**	
7	Address: **P.O. Box 71, Carlsbad, NM 88220**		
8	Check all boxes below for which this submittal applies:	AI #: **196**	Permit #: **495-M13-R3**

X NSR Construction Permit (20.2.72 NMAC)	☐ NOI (20.2.73 NMAC) (Sections 2-B, 2-D)	☐ PSD Permit (20.2.74 NMAC)
☐ TV Operating Permit (20.2.70 NMAC)	☐ Notice of Exemption (20.2.72.202.B NMAC) (Section 2-F)	☐ Nonattainment Permit (20.2.79 NMAC)

Section 2: Details of Submittal

Only print and submit the pages necessary for your submittal. Print double sided head-to-toe, flip on short end (tablet). The Permit Section responds to all TV Administrative amendments and responds only to denials of NSR administrative revisions. Courier proof of delivery is required if you want confirmation that the Department received this submittal. Check the box(es) applicable to this submittal:

☐ 2-A(i) & 2-A(ii): Identical Engine or Turbine Replacements

☐ 2-B: Owner, Operator, and Name Changes to NOIs or Construction Permits

☐ 2-C: Ownership or Operational Control Changes for Title V Permits

☐ 2-D: Closing a Facility or Removing Units from a Permit

☐ 2-E: Correct Typographical Error

☒ 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities

☐ 2-G: Add Minor NSR Exempt Equipment to Construction Permits for PSD or Nonattainment Sources

☐ 2-H: Title V Responsible Official Designations

☐ 2-I: Submittals to the Permit Programs Manager

Section 3: Certification – Required for All Changes

Section 4: Form Instructions

Section 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities

Certain equipment can be added to minor construction permits as exempt equipment under 20.2.72.202.B NMAC as an administrative permit revision. (This exemption does not apply to facilities subject to 20.2.70 NMAC (TV), 20.2.74 NMAC (PSD), or 20.2.79 NMAC Nonattainment Sources. In those cases, use Section 2-G of this form.)

Construction permit Part 72 exemptions are not the same as operating permit TV insignificant activities (20.2.70.7.Q NMAC). If you have a TV permit and want to claim Title V insignificant activities, they may be required to have authorization through a construction permit. Only the insignificant activities that meet the requirements of 20.2.72.202.B NMAC may be added using this form for an administrative permit revision.

The Potential to Emit (PTE) of regulated air contaminants from minor permit exempt equipment count toward the facility's total emissions under the PSD, nonattainment, and TV regulations therefore, the addition of equipment using this form could possibly result in the facility becoming PSD, Nonattainment, or TV major.

Check the box(es) to indicate if your facility has a permit or is a no permit required (NPR) facility, check the box(es) for the equipment being added, and complete the table(s), if applicable. Include attachments as required.

☐ Administrative Revision: This facility has a minor construction permit as designated in Section 1 of this application. This form is being submitted to add a piece(s) of equipment that qualifies as exempt under 20.2.72.202.B NMAC.

or

☐ Notice of Exemption: This facility does not require a 20.2.72 NMAC permit, so it is designated as a no permit required (NPR) facility. This exemption form is being submitted to record that this equipment qualifies as exempt under 20.2.72.202.B NMAC. (This exemption does not apply to (cannot be added to) NOI (20.2.73 NMAC), TV (20.2.70 NMAC), PSD (20.2.74 NMAC), or nonattainment (20.2.79 NMAC) facilities.)

AQB used to require either the Notice of Exemption Form or Exemption Application Form for these facilities. This form replaces both of those forms.

Only fill out the information in this table if your facility is an NPR facility, we already have the information for permitted sites.

Facility Name:	Plant primary SIC Code (4 digits): Plant NAICS code (6 digits):	
Facility Street Address (If no facility street address, provide directions from a prominent landmark):		
Company Name:	Phone:	
Company Mailing Address:		
Air Contact:	Title:	
Email:	Phone:	
The facility is: ☐ (distance) miles ☐ (direction) of ☐(nearest New Mexico town or tribal community).	Zip Code:	County:
Status of land (check one): ☐ Private ☐ Indian/Pueblo ☐ Federal BLM ☐ Federal Forest Service ☐ State Land ☐ Bernalillo County		

Section 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities, continued

Minor Construction Permit (Part 72) or NPR Exempt Equipment

The equipment checked in this section meets the requirements of the exemption in 20.2.72.202 NMAC, will comply with all applicable federal requirements in 40 CFR Part 60 (NSPS) or 40 CFR Part 63 (MACT), and appropriate records will be created and retained for two (2) years (or five (5) years if a TV source):

Standby Generators

☐ Standby generators which are operated only during the unavoidable loss of commercial utility power and less than 500 hours per year. (20.2.72.202.B(3) NMAC). Potentially applicable federal regulations: 40 CFR 63 Subpart ZZZZ and 40 CFR 60 Subparts JJJJ or IIII. Emission rates from emergency standby generators should be calculated assuming operation throughout the year (i.e., 8760 hours per year) to verify that it does not make your facility PSD, Nonattainment, or TV major.

Standby Generator Manufacturer	Serial Number	Date of Manufacture	Date of Installation[1]	Capacity (hp)
Name of commercial power provider[2]:				

[1] Date of installation is the date the engine is placed and secured at the location where it is intended to be operated.
[2] Commercial power is purchased from a utility company, which specifically does not include power generated on-site for the sole purse of the user.

Abrasive Blasting

☐ Enclosed abrasive blasting operations; if no visible emissions from the building. (20.2.72.202.B(7) NMAC). Potentially applicable federal regulations: 40 CFR 63 Subpart XXXXXX - National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories. More information: www.env.nm.gov/air-quality/ind-sector-info/.

Surface Coating

☐ Surface coating of equipment, including spray painting, roll coating, and painting with aerosol spray cans and all coating and clean-up solvent; if VOCs from paints and solvents do not exceed ten (10) pounds per hour and two (2) tons per year. (20.2.72.202.B(6) NMAC). Potentially applicable federal regulations (more information: www.env.nm.gov/air-quality/ind-sector-info/):

40 CFR 63 Subpart HHHHHH - National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources or

40 CFR 63 Subpart XXXXXX - National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories.

Volatile Organic Compound (VOC) Handling and or Storage

☐ VOC emissions resulting from the handling or storing of any VOC emission source; if vapor pressure is less than two tenths (0.2) PSI at the storage and handling temperatures. (20.2.72.202.B(2) NMAC).

Fuel Burning Equipment

☐ Fuel burning equipment used solely for heating buildings for personal comfort or producing hot water for personal use; if gaseous or liquid fuel and rated 5 MMBtu or less, or if distillate oil and 1 MMBtu or less. (20.2.72.202.B(1) NMAC).

Repositioning Sources at Plant

☐ Repositioning or relocating sources of air emissions or emissions points within the plant site, but only when such change in physical configuration does not increase air emissions or the ambient impacts. (20.2.72.B(4) NMAC). Attach an updated plot plan. Permittees must ensure that relocation of any emissions source within the plant site does **not** increase the ambient impact and will not result in an exceedance of any National Ambient Air Quality Standard (NAAQS), New Mexico Ambient Air Quality Standard (NMAAQS), or PSD Increment. If not sure, please contact the Modeling Section Manager (505-476-4300).

Emissions Exempted Based on Quantity

☒ Any emissions unit, operation, or activity that has the potential to emit no more than one-half (1/2) ton per year of any regulated new source review pollutant. Units, operations, or activities of similar function shall be combined when calculating the emission rate. (20.2.72.202.B(5) NMAC).

Unit Description	Serial Number	Capacity (size)	Regulated Pollutants Emitted[3]	PER[4] tpy
Starch Bin	**CS9105**	**25 tph**	**PM_{10}, $PM_{2.5}$**	**<0.5 tpy**

[3] Particulate Matter (PM, PM_{10}, $PM_{2.5}$); Sulfur Dioxide (SO_2); Carbon Monoxide (CO); Nitrogen Dioxide (NO_2); Hydrogen Sulfide (H_2S); Lead (Pb); Total Reduced Sulfur; and Volatile Organic Compounds (VOC).

[4] Potential emission rate, as defined in 20.2.72 NMAC. The PER is the worst-case emission rate of the facility without controls or other limitations (unless the controls or limitations are federally enforceable) and as if the facility were operating continuously 8760 hours per year (24 hour/day, 365 days/year).

Section 3: Certification – Required for All Applications

Company Name: Mosaic Potash Carlsbad

I, Hasking Hobson, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 19th day of May, 2020, upon my oath or affirmation, before a notary of the State of New Mexico.

Haskins Hobson, P.E. — 5/19/20

Signature[1] — Date

Hasking Hobson, P.E. — Senior Env. Engineer

Printed Name — Title

Scribed and sworn before me on this 19 day of May, 2020.

My authorization as a notary of the State of New Mexico expires on the 12 day of October, 2020.

Linda S. Baltzell — May 19, 2020

Notary's Signature — Date

Linda S. Baltzell

Notary's Printed Name

OFFICIAL SEAL
Linda S. Baltzell
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: October 12, 2020

[1] For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC:

TABLE 1: SUMMARY OF MAXIMUM POTENTIAL EMISSIONS FOR THE STARCH STORAGE BIN

Emission Type	PM_{10} Maximum Emissions		$PM_{2.5}$ Maximum Emissions	
	(lb/hr)	(TPY)	(lb/hr)	(TPY)
Material Handling Emissions[(a)]	0.022	0.096	0.0082	0.036
Hauling Emissions[(b)]	0.0023	0.0083	0.00023	0.00083
Total Emissions	**0.024**	**0.10**	**0.0084**	**0.037**

Footnotes:

(a) See Table 2 for the supporting calculations.

(b) See Table 3 for the supporting calculations.

Mosaic

TABLE 2: MATERIAL HANDLING EMISSIONS FOR THE STARCH STORAGE BIN

Material Processed	Process / Source Description[(a)]	Maximum Throughput		Uncontrolled Emission Factors (lb/ton)[(d)]		Control Equipment / Measure[(e)]	Unit Control Efficiency[(f)] (%)	Total Control Efficiency[(g)] (%)	PM_{10} Maximum Emissions		$PM_{2.5}$ Maximum Emissions	
		TPH[(b)]	TPY[(c)]	PM_{10}	$PM_{2.5}$				(lb/hr)[(h)]	(TPY)[(i)]	(lb/hr)[(h)]	(TPY)[(i)]
Starch/Binder	Pneumatic Loading into Starch Storage Bin (CS9105)	25	219,000	0.017	0.0064	Full Equipment Enclosure	95.0	95.0	0.021	0.094	0.0081	0.035
Starch/Binder	Starch Storage Bin (CS9105) to Rotary Feeder (CS9017)	5	43,800	0.0011	0.00031	Full Equipment Enclosure	95.0	95.0	0.00028	0.0012	0.000078	0.00034
Starch/Binder	Rotary Feeder (CS9017) to Wet Mix Tank (CS9016)	5	43,800	0.0011	0.00031	Full Equipment Enclosure	95.0	95.0	0.00028	0.0012	0.000078	0.00034
								Total Emissions =	**0.022**	**0.096**	**0.0082**	**0.036**

Footnotes:

(a) Emissions from the starch bin occur during pneumatic loading operations. The bin is pneumatically loaded by railcar, and on occasion, by truck. Emissions that occur as a result of the haul truck deliveries are provided in Table 3. While the bin is completely enclosed, the tank air pressure snorkel allows for a small amount of material to escape during loading. The rotary feeder is located underneath the starch bin and feeds material from the starch bin to where it is mixed with water, at which point the starch is wetted and no more emissions occur.

(b) The hourly throughput for pneumatic loading is based on the amount of time it takes to unload a railcar or truck. Since one pump is used regardless of transportation type, the same throughput rate is used. The hourly throughput to the rotary feeder and wet mix tank is based on the maximum design capacity of that equipment.

(c) The annual throughput is based on operating 8,760 hours a year, which yields a very conservative annual throughput because the projected maximum material throughput for the bin is no more than 6,000 TPY.

(d) For starch bin loading, the PM emission factor is based on AP-42 Chapter 9.9.7 for Corn Wet Milling (1/95). Table 9.9.7-1 in this AP-42 chapter contains a filterable PM emission factor for a starch storage bin controlled by a fabric filter. The AP-42 emission factor was determined from a single test conducted in 1992, so the emission factor was converted to a uncontrolled emission factor based on a fabric filter control efficiency of 95%. The PM_{10} and $PM_{2.5}$ emission factors were calculated based on AP-42 Appendix B.2 (Generalized Particle Size Distributions) in accordance with Table B.2-1, which shows emission sources in AP-42 Chapter 9.9.7 are subject to the Category 7 particle size distribution. According to Category 7, PM_{10} is 0.61% of total uncontrolled PM and $PM_{2.5}$ is 23% of total uncontrolled PM. For material transfer to the rotary feeder and wet mix tank, the PM_{10} emission factor is based on the material transfer point emission factor in AP-42 Chapter 11.19.2 for Crushed Stone Processing and Pulverized Mineral Processing (8/04). The $PM_{2.5}$ emission factor is calculated by converting the controlled $PM_{2.5}$ emission factor to uncontrolled based on a calculated control efficiency of 95.8%, which is based on the available controlled and uncontrolled PM_{10} data.

(e) Unit controls include only equipment controls, no add-on controls, that are inherent to the design and location of the equipment.

(f) Capture efficiencies are based on best engineering judgment and reflect Table 105.C in the NSR permit.

(g) Total Control Efficiency (%) = 100% - 100% x (1 - Unit Control Efficiency $(\%)_1$ / 100) x (1 - Unit Control Efficiency $(\%)_2$ / 100)

(h) Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

(i) Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) ÷ (2000 lb/ton) x (1 - Total Control Efficiency [%] / 100)

TABLE 3: HAULING EMISSIONS FOR THE STARCH STORAGE BIN

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, S (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (tons/yr)[i]
PM_{10}	1.5	0.9	0.45	4.8	27.5	Paved Roads	99	99.9	0.0021	1.1	0.0023	0.0083
$PM_{2.5}$	0.15	0.9	0.45	4.8	27.5	Max Speeds ≤ 5 mph	88		0.00021	1.1	0.00023	0.00083

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads", Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

[c] Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the haul truck loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Unit Control Efficiency $(\%)_1$ / 100) x (1 - Unit Control Efficiency $(\%)_2$ / 100)

[f] Emission Factor (lb/VMT) = [k x (S/12)^a x (W/3)^b] x [1 - Inherent Control Efficiency (%) / 100

[g] Vehicle miles traveled (VMT/hr) = 2 x Length of haul road - one way (feet) / (5,280 feet/mi) x Maximum no. of round trips per hour (trips/hr).

Maximum length of road - one way (feet) = 2,900

Maximum no. of round trips per hour = 1.0

Vehicle Miles Traveled (VMT/hr) = 1.1

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (ton/yr) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" = 70

Annual Hours of Operation (hrs/yr) = 8,760

Mosaic Potash Carlsbad Inc.
PO Box 71
1361 Potash Mines Road
Carlsbad, NM 88221

(575) 628-6200
Fax (575) 887-0589
www.mosaicco.com

May 19, 2020

Electronic Submittal

New Mexico Environment Department
Air Quality Bureau
Permits Section
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico 87505-1816

RE: Mosaic Potash Carlsbad, Inc.
Starch Bin Exemption Request under 20.2.72.202.B(5) NMAC

Dear Mr. Kimbrell,

Mosaic Potash Carlsbad, Inc. (Mosaic) is submitting this Permitting Administrative Multi-Form to request NMED AQB concurrence that Mosaic's starch bin is exempt from construction permitting requirements in 20.2.72 NMAC as a result of the potential emissions being less than the 0.5 ton per year (tpy) exemption threshold in 20.2.72.202.B(5) NMAC.

Starch is utilized as a binder in the granulation process. Dry starch from railcars or haul trucks is brought on-site and pneumatically loaded into a storage bin. From the storage bin, dry starch is feed into the process via a rotary feeder and into a mix tank at which point it is mixed with liquid. A small amount of particulate matter is emitted during pneumatic loading of the starch bin and during feeding of the starch into the process. Once introduced into the mix tank, the starch is wetted, and no further particulate emissions occur.

Enclosed are the maximum potential emissions resulting from these activities and assuming no controls other than inherent controls provided by the equipment. In addition, 8,760 hours per year (hrs/yr) of operation is used in the calculations, which is a gross overestimation of the hours associated with loading the starch bin. For example, using 8,760 hrs/yr in the emission calculations results in 219,000 tons of starch material loaded into the bin in a year, but Mosaic expects to bring in less than 10,000 tons of starch in a given year.

If you have any questions or need additional information, please don't hesitate to contact me at 575-628-6267 or Haskins.Hobson@mosaicco.com.

Regards,

Haskins Hobson, P.E.

Haskins Hobson, P.E.
Senior Environmental Engineer
MOSAIC POTASH CARLSBAD, INC.

Enclosures:
Emission Calculation Tables 1-3
Permitting Administrative Multi-Form (Sections 1, 2, and 2-F)
Signed Certification Page (Section 3)

TABLE 1: SUMMARY OF MAXIMUM POTENTIAL EMISSIONS FOR THE STARCH STORAGE BIN

Emission Type	TSP Maximum Emissions		PM_{10} Maximum Emissions		$PM_{2.5}$ Maximum Emissions	
	(lb/hr)	(TPY)	(lb/hr)	(TPY)	(lb/hr)	(TPY)
Material Handling Emissions[(a)]	0.049	0.21	0.022	0.096	0.0082	0.036
Hauling Emissions[(b)]	0.0092	0.033	0.0023	0.0083	0.00023	0.00083
Total Emissions	**0.058**	**0.25**	**0.024**	**0.10**	**0.0084**	**0.037**

Footnotes:

[(a)] See Table 2 for the supporting calculations.

[(b)] See Table 3 for the supporting calculations.

TABLE 2: MATERIAL HANDLING EMISSIONS FOR THE STARCH STORAGE BIN

Material Processed	Process / Source Description[a]	Maximum Throughput		Uncontrolled Emission Factors (lb/ton)[d]			Control Equipment / Measure[e]	Unit Control Efficiency[f] (%)	Total Control Efficiency[g] (%)	TSP Maximum Emissions		PM_{10} Maximum Emissions		$PM_{2.5}$ Maximum Emissions	
		TPH[b]	TPY[c]	TSP	PM_{10}	$PM_{2.5}$				(lb/hr)[h]	(TPY)[i]	(lb/hr)[h]	(TPY)[i]	(lb/hr)[h]	(TPY)[i]
Starch/Binder	Pneumatic Loading into Starch Storage Bin (CS9105)	25	219,000	0.028	0.017	0.0064	Full Equipment Enclosure	95.0	95.0	0.035	0.153	0.021	0.094	0.0081	0.035
Starch/Binder	Starch Storage Bin (CS9105) to Rotary Feeder (CS9017)	5	43,800	0.028	0.0011	0.00031	Full Equipment Enclosure	95.0	95.0	0.0070	0.031	0.00028	0.0012	0.000078	0.00034
Starch/Binder	Rotary Feeder (CS9017) to Wet Mix Tank (CS9016)	5	43,800	0.028	0.0011	0.00031	Full Equipment Enclosure	95.0	95.0	0.0070	0.031	0.00028	0.0012	0.000078	0.00034
									Total Emissions =	**0.049**	**0.21**	**0.022**	**0.096**	**0.0082**	**0.036**

Footnotes:

[a] Emissions from the starch bin occur during pneumatic loading operations. The bin is pneumatically loaded by railcar, and on occasion, by truck. Emissions that occur as a result of the haul truck deliveries are provided in Table 3. While the bin is completely enclosed, the tank air pressure snorkel allows for a small amount of material to escape during loading. The rotary feeder is located underneath the starch bin and feeds material from the starch bin to where it is mixed with water, at which point the starch is wetted and no more emissions occur.

[b] The hourly throughput for pneumatic loading is based on the amount of time it takes to unload a railcar or truck. Since one pump is used regardless of transportation type, the same throughput rate is used. The hourly throughput to the rotary feeder and wet mix tank is based on the maximum design capacity of that equipment.

[c] The annual throughput is based on operating 8,760 hours a year, which yields a very conservative annual throughput because the projected maximum material throughput for the bin is no more than 6,000 TPY.

[d] For starch bin loading, the PM emission factor is based on AP-42 Chapter 9.9.7 for Corn Wet Milling (1/95). Table 9.9.7-1 in this AP-42 chapter contains a filterable PM emission factor for a starch storage bin controlled by a fabric filter. The AP-42 emission factor was determined from a single test conducted in 1992, so the emission factor was converted to a uncontrolled emission factor based on a fabric filter control efficiency of 95%. The PM_{10} and $PM_{2.5}$ emission factors were calculated based on AP-42 Appendix B.2 (Generalized Particle Size Distributions) in accordance with Table B.2-1, which shows emission sources in AP-42 Chapter 9.9.7 are subject to the Category 7 particle size distribution. According to Category 7, PM_{10} is 0.61% of total uncontrolled PM and $PM_{2.5}$ is 23% of total uncontrolled PM. For material transfer to the rotary feeder and wet mix tank, the PM_{10} emission factor is based on the material transfer point emission factor in AP-42 Chapter 11.19.2 for Crushed Stone Processing and Pulverized Mineral Processing (8/04). The $PM_{2.5}$ emission factor is calculated by converting the controlled $PM_{2.5}$ emission factor to uncontrolled based on a calculated control efficiency of 95.8%, which is based on the available controlled and uncontrolled PM_{10} data.

[e] Unit controls include only equipment controls, no add-on controls, that are inherent to the design and location of the equipment.

[f] Capture efficiencies are based on best engineering judgment and reflect Table 105.C in the Title V and NSR permits.

[g] Total Control Efficiency (%) = 100% - 100% x (1 - Unit Control Efficiency $(\%)_1$ / 100) x (1 - Unit Control Efficiency $(\%)_2$ / 100)

[h] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[i] Annual Emission Rate (TPY) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) ÷ (2000 lb/ton) x (1 - Total Control Efficiency [%] / 100)

TABLE 3: HAULING EMISSIONS FOR THE STARCH STORAGE BIN

Pollutant	k (lb/VMT)[a]	a[a]	b[a]	Surface Material Silt Content, S (%)[b]	Mean Vehicle Weight, W (tons)[c]	Control Equipment / Measure	Unit Control Efficiency (%)[d]	Total Control Efficiency (%)[e]	Emission Factor (lb/VMT)[f]	VMT/hr[g]	Maximum Hourly Emissions (lb/hr)[h]	Maximum Annual Emissions (tons/yr)[i]
TSP	4.9	0.7	0.45	4.8	27.5				0.0084	1.1	0.0092	0.033
PM_{10}	1.5	0.9	0.45	4.8	27.5	Paved Roads	99	99.9	0.0021	1.1	0.0023	0.0083
$PM_{2.5}$	0.15	0.9	0.45	4.8	27.5	Max Speeds ≤ 5 mph	88		0.00021	1.1	0.00023	0.00083

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads", Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value).

[c] Assumed full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the haul truck loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Unit Control Efficiency (%)$_1$ / 100) x (1 - Unit Control Efficiency (%)$_2$ / 100)

[f] Emission Factor (lb/VMT) = [k x (S/12)^a x (W/3)^b] x [1 - Inherent Control Efficiency (%) / 100]

[g] Vehicle miles traveled (VMT/hr) = 2 x Length of haul road - one way (feet) / (5,280 feet/mi) x Maximum no. of round trips per hour (trips/hr).

Maximum length of road - one way (feet) =	2,900
Maximum no. of round trips per hour =	1.0
Vehicle Miles Traveled (VMT/hr) =	1.1

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (ton/yr) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lbs/ton) x (365-P) / 365

P - no. of days w/precip. > 0.01" =	70
Annual Hours of Operation (hrs/yr) =	8,760

NEW MEXICO
ENVIRONMENT DEPARTMENT

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Santa Fe, New Mexico 87505
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Michelle Lujan Grisham
Governor

Howie C. Morales
Lt. Governor

James C. Kenney
Cabinet Secretary

Jennifer J. Pruett
Deputy Secretary

AIR QUALITY BUREAU

April 16, 2020

Mosaic Potash Carlsbad Inc
Attn: Haskins Hobson
PO Box 71
Carlsbad, NM 88220
Sent by electronic mail to: Haskins.Hobson@mosaicco.com

Subject: Mosaic Potash Carlsbad Inc, Title V Permit P039-R3
Title V 502(b)(10) Change per 20.2.70.302.H(1) NMAC
Minor NSR Exemption Unit Notification NSR 0495-M13R3
Rental portable screener and stacker inside warehouses 2&3

Dear Mr. Hobson,

This letter is in response to your April 15, 2020 502(b)(10) change notification to Title V Permit Number P039-R3 and PSD Administrative Revision to operate a rental portable screener and stacker inside warehouses 2 & 3. The portable screener and stacker are needed to screen the material in Warehouse Nos. 2 and 3 so the correctly sized product can be loaded and shipped offsite. The portable screener is one piece of equipment that is comprised of a hopper, main conveyor, screen, two side conveyors (only one will be used), and a tail conveyor all powered by a diesel engine. One of the conveyors on the screener will transport material to a separate conveyor on the portable stacker that is powered by a smaller diesel engine. The portable stacker consists only of one conveyor. This notification was received by the Air Quality Bureau (AQB) on April 15, 2020.

A. Approved
The request meets the Section 502(b)(10) change requirements at 20.2.70.302.H(1) NMAC and the minor NSR exemption at 20.2.72.202.B(5) NMAC. An ambient impact analysis for the (maximum of 1080 hours of operation per year or 12 hours per day for 90 days) rental portable screener and stacker inside warehouses 2&3 was not required since the units are minor NSR exempt. The request will be attached to Title V permit number P039-R3 and therefore is federally enforceable within the New Mexico state implementation plan as defined at 20.2.70.7.K NMAC.

B. Seven Day Notification
Pursuant to 20.2.70.302.H(1)(b) NMAC, the permittee provided written notification via email on April 15, 2020 to the department [AQB] and the administrator [EPA Region 6] at least seven (7) days in advance of the change and shall include the date on which the change will occur.

The proposed change shall not occur before April 22, 2020.

C. Notification of Date that Change Occurred
The date of the proposed change was not included in the notification and therefore shall be submitted to the Permit Program Manager within five (5) days of commencement of operation of rental portable screener and stacker inside warehouses 2 & 3.

D. Content and Enforceable Requirements
In the 502(b)(10) notification Mosaic Potash Carlsbad Inc is requesting to operate a rental portable screener and stacker inside warehouses 2 & 3. In the request the permittee has certified that the rented equipment will meet the following requirements:

(1) The rental portable screener and stacker operation is limited to 1080 hours of operation per year (equal to 12 hours a day for 90 days) based on a daily rolling 365-day total;
(2) The stacker shall operate inside of Warehouses No. 2 & 3;
(3) The equipment shall be operated as represented in the request for NSR exemption 20.2.72.202.B(5) NMAC; and
(4) ton per year emission rates of NOx, CO, SO2, VOCs, PM10 and PM2.5 less than ½ tpy per minor NSR exemption 20.2.72.202.B(5) NMAC.

E. Records
Pursuant to 20.2.70.7.AF NMAC the permittee shall keep records as required in P039-R3 Conditions A606.A and B, and the hours of operation based on a day rolling total in accordance with B109. Sections B108 of permits P039-R3 and 0495-M13 shall not apply.

F. Permitting Emissions due to Routine or Predictable Maintenance
Adding the rental portable screener and stacker met the minor NSR exemption requirements only due to federally enforceable limits on operating hours and tpy emission rates included in the 502(b)(10) change request. If this activity did not meet the 502(b)(10) criteria, the addition of it would have required a minor source construction permit. Pursuant to 20.2.72.203A(3) and 20.2.7.15 NMAC, the permittee was required to quantify and permit emissions due to routine or predictable startup, shutdown, or maintenance. The permittee should complete an inventory to determine if any other emissions due to routine or predictable maintenance activities that are not permitted or are over existing permit limits need to be approved through a permit per 20.2.72.219.D NMAC.

If there are questions, please contact me at 505 476 4347.

Sincerely,

Joseph Kimbrell
Air Permitting Specialist
Major Source Unit
Air Quality Bureau

cc by email: Erica LeDoux, EPA Region 6 LeDoux.Erica@epa.gov; r6airpermits@epa.gov
Allan Morris, AQB Compliance and Enforcement Section Chief, Allan.Morris@state.nm.us
Claire Booth, Array Environmental, claire@arrayenvironmental.com

Permitting Administrative Multi-Form

Use for NSR administrative permit revisions (including GCPs), TV administrative amendments, TV responsible official notifications, and other submittals required by a permit condition. Refer to Section 4 for instructions, acronyms, and mailing addresses.

For Department use only:		For Department use only:
Reviewed by: Joe Kimbrell	NEW MEXICO ENVIRONMENT DEPARTMENT	Received Date
Permit revision number: 0495M13R3		Received by email on April 15, 2020
Date: April 16, 2020		
☒ Approved ☐ Completed ☐ Denied		

Section 1: General Information – Required for All Submittals

1	Facility Name: **Mosaic Potash Carlsbad, Inc.**		
2	Preparer/Consultant Name: **Claire Booth**	Title: **Senior Environmental Engineer**	
3	Email: claire@arrayenvironmental.com	Phone: **(720) 316-9935**	
4	Address: **1496 Conestoga Circle, Steamboat Springs, CO 80487**		
5	Air Permit Contact: **Haskins Hobson**	Title: **Senior Environmental Engineer**	
6	Email: **Haskins.Hobson@mosaicco.com**	Phone: **(575) 628-6267**	
7	Address: **P.O. Box 71, Carlsbad, NM 88220**		
8	Check all boxes below for which this submittal applies:	AI #: **196**	Permit #: **P039-R3**

☐ NSR Construction Permit (20.2.72 NMAC) X TV Operating Permit (20.2.70 NMAC)	☐ NOI (20.2.73 NMAC) (Sections 2-B, 2-D) ☐ Notice of Exemption (20.2.72.202.B NMAC) (Section 2-F)	☐ PSD Permit (20.2.74 NMAC) ☐ Nonattainment Permit (20.2.79 NMAC)

Section 2: Details of Submittal

Only print and submit the pages necessary for your submittal. Print double sided head-to-toe, flip on short end (tablet). The Permit Section responds to all TV Administrative amendments and responds only to denials of NSR administrative revisions. Courier proof of delivery is required if you want confirmation that the Department received this submittal. Check the box(es) applicable to this submittal:

Section 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities

Certain equipment can be added to minor construction permits as exempt equipment under 20.2.72.202.B NMAC as an administrative permit revision. (This exemption does not apply to facilities subject to 20.2.70 NMAC (TV), 20.2.74 NMAC (PSD), or 20.2.79 NMAC Nonattainment Sources. In those cases, use Section 2-G of this form.)

Construction permit Part 72 exemptions are not the same as operating permit TV insignificant activities (20.2.70.7.Q NMAC). If you have a TV permit and want to claim Title V insignificant activities, they may be required to have authorization through a construction permit. Only the insignificant activities that meet the requirements of 20.2.72.202.B NMAC may be added using this form for an administrative permit revision.

The Potential to Emit (PTE) of regulated air contaminants from minor permit exempt equipment count toward the facility's total emissions under the PSD, nonattainment, and TV regulations therefore, the addition of equipment using this form could possibly result in the facility becoming PSD, Nonattainment, or TV major.

Check the box(es) to indicate if your facility has a permit or is a no permit required (NPR) facility, check the box(es) for the equipment being added, and complete the table(s), if applicable. Include attachments as required.

☐ Administrative Revision: This facility has a minor construction permit as designated in Section 1 of this application. This form is being submitted to add a piece(s) of equipment that qualifies as exempt under 20.2.72.202.B NMAC.

or

☐ Notice of Exemption: This facility does not require a 20.2.72 NMAC permit, so it is designated as a no permit required (NPR) facility. This exemption form is being submitted to record that this equipment qualifies as exempt under 20.2.72.202.B NMAC. (This exemption does not apply to (cannot be added to) NOI (20.2.73 NMAC), TV (20.2.70 NMAC), PSD (20.2.74 NMAC), or nonattainment (20.2.79 NMAC) facilities.)

AQB used to require either the Notice of Exemption Form or Exemption Application Form for these facilities. This form replaces both of those forms.

Only fill out the information in this table if your facility is an NPR facility, we already have the information for permitted sites.

Facility Name:		Plant primary SIC Code (4 digits): Plant NAICS code (6 digits):
Facility Street Address (If no facility street address, provide directions from a prominent landmark):		
Company Name:		Phone:
Company Mailing Address:		
Air Contact:		Title:
Email:		Phone:
The facility is: ☐ (distance) miles ☐ (direction) of ☐ (nearest New Mexico town or tribal community).	Zip Code:	County:
Status of land (check one): ☐ Private ☐ Indian/Pueblo ☐ Federal BLM ☐ Federal Forest Service ☐ State Land ☐ Bernalillo County		

Section 2-F: Reporting Exempt Equipment for Minor Construction Permits or for No Permit Required (NPR) Facilities, continued

Minor Construction Permit (Part 72) or NPR Exempt Equipment

The equipment checked in this section meets the requirements of the exemption in 20.2.72.202 NMAC, will comply with all applicable federal requirements in 40 CFR Part 60 (NSPS) or 40 CFR Part 63 (MACT), and appropriate records will be created and retained for two (2) years (or five (5) years if a TV source):

Standby Generators

☐ Standby generators which are operated only during the unavoidable loss of commercial utility power and less than 500 hours per year. (20.2.72.202.B(3) NMAC). Potentially applicable federal regulations: 40 CFR 63 Subpart ZZZZ and 40 CFR 60 Subparts JJJJ or IIII. Emission rates from emergency standby generators should be calculated assuming operation throughout the year (i.e., 8760 hours per year) to verify that it does not make your facility PSD, Nonattainment, or TV major.

Standby Generator Manufacturer	Serial Number	Date of Manufacture	Date of Installation[1]	Capacity (hp)
Name of commercial power provider[2]:				

[1] Date of installation is the date the engine is placed and secured at the location where it is intended to be operated.
[2] Commercial power is purchased from a utility company, which specifically does not include power generated on-site for the sole purse of the user.

Abrasive Blasting

☐ Enclosed abrasive blasting operations; if no visible emissions from the building. (20.2.72.202.B(7) NMAC). Potentially applicable federal regulations: 40 CFR 63 Subpart XXXXXX - National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories. More information: www.env.nm.gov/air-quality/ind-sector-info/.

Surface Coating

☐ Surface coating of equipment, including spray painting, roll coating, and painting with aerosol spray cans and all coating and clean-up solvent; if VOCs from paints and solvents do not exceed ten (10) pounds per hour and two (2) tons per year. (20.2.72.202.B(6) NMAC). Potentially applicable federal regulations (more information: www.env.nm.gov/air-quality/ind-sector-info/):

40 CFR 63 Subpart HHHHHH - National Emission Standards for Hazardous Air Pollutants: Paint Stripping and Miscellaneous Surface Coating Operations at Area Sources or

40 CFR 63 Subpart XXXXXX - National Emission Standards for Hazardous Air Pollutants Area Source Standards for Nine Metal Fabrication and Finishing Source Categories.

Volatile Organic Compound (VOC) Handling and or Storage

☐ VOC emissions resulting from the handling or storing of any VOC emission source; if vapor pressure is less than two tenths (0.2) PSI at the storage and handling temperatures. (20.2.72.202.B(2) NMAC).

Fuel Burning Equipment

☐ Fuel burning equipment used solely for heating buildings for personal comfort or producing hot water for personal use; if gaseous or liquid fuel and rated 5 MMBtu or less, or if distillate oil and 1 MMBtu or less. (20.2.72.202.B(1) NMAC).

Repositioning Sources at Plant

☐ Repositioning or relocating sources of air emissions or emissions points within the plant site, but only when such change in physical configuration does not increase air emissions or the ambient impacts. (20.2.72.B(4) NMAC). Attach an updated plot plan. Permittees must ensure that relocation of any emissions source within the plant site does **not** increase the ambient impact and will not result in an exceedance of any National Ambient Air Quality Standard (NAAQS), New Mexico Ambient Air Quality Standard (NMAAQS), or PSD Increment. If not sure, please contact the Modeling Section Manager (505-476-4300).

Emissions Exempted Based on Quantity

☒ Any emissions unit, operation, or activity that has the potential to emit no more than one-half (1/2) ton per year of any regulated new source review pollutant. Units, operations, or activities of similar function shall be combined when calculating the emission rate. (20.2.72.202.B(5) NMAC).

Unit Description	Serial Number	Capacity (size)	Regulated Pollutants Emitted[3]	PER[4] tpy
Portable Screener with Diesel Engine	**TBD (rental unit)**	**400 tph**	**PM_{10}, $PM_{2.5}$, NOx, CO, SO_2, VOC**	**Less than 0.5 tpy**
Portable Stacker with Diesel Engine	**TBD (rental unit)**	**400 tph**	**PM_{10}, $PM_{2.5}$, NOx, CO, SO_2, VOC**	

[3] Particulate Matter (PM, PM_{10}, $PM_{2.5}$); Sulfur Dioxide (SO_2); Carbon Monoxide (CO); Nitrogen Dioxide (NO_2); Hydrogen Sulfide (H_2S); Lead (Pb); Total Reduced Sulfur; and Volatile Organic Compounds (VOC).

[4] Potential emission rate, as defined in 20.2.72 NMAC. The PER is the worst-case emission rate of the facility without controls or other limitations (unless the controls or limitations are federally enforceable) and as if the facility were operating continuously 8760 hours per year (24 hour/day, 365 days/year).

Section 3: Certification – Required for All Applications

Company Name: Mosaic Potash Carlsbad

I, Paul Gill, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 15th day of April, 2020, upon my oath or affirmation, before a notary of the State of New Mexico.

P. Gill — 4/15/2020

Signature[1] — Date

Paul Gill — ~~4/15/2020~~ VP of Operations

Printed Name — Title

Scribed and sworn before me on this 15th day of April, 2020.

My authorization as a notary of the State of New Mexico expires on the 21st day of December, 2023.

Jeanette Humphreys — 4-15-20

Notary's Signature — Date

Jeanette Humphreys

Notary's Printed Name

OFFICIAL SEAL
Jeanette Humphreys
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 12-21-2023

[1] For Title V applications, the signature must be of the Responsible Official as defined in 20.2.70.7.AE NMAC:

TABLE 1: SUMMARY OF WAREHOUSE SCREENING EMISSIONS

Source	Activity	PM_{10}		$PM_{2.5}$		NOx		CO		SO2		VOC	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
No. 2 or No. 3 Warehouse	Material Handling [a]	0.086	0.046	0.019	0.010	--	--	--	--	--	--	--	--
	Hauling [b]	0.064	0.035	0.0064	0.0035	--	--	--	--	--	--	--	--
	Diesel Non-Road Engines [c]	0.0051	0.0028	0.0051	0.0028	0.49	0.26	0.51	0.28	0.39	0.21	0.025	0.014
	Total	**0.16**	**0.084**	**0.030**	**0.016**	**0.49**	**0.26**	**0.51**	**0.28**	**0.39**	**0.21**	**0.025**	**0.014**

Footnotes:

[a] See Table 2.

[b] See Table 3.

[c] See Table 4.

TABLE 2: WAREHOUSE SCREENING MATERIAL HANDLING EMISSIONS

Process / Source Description	Maximum Throughput		Emission Factor Category [c]	Control Equipment / Measure	Unit Control Efficiency (%) [d]	Total Control Efficiency (%) [e]	PM_{10} Emission Rate		$PM_{2.5}$ Emission Rate	
	(TPH) [a]	(TPY) [b]					(lb/hr) [f]	(tpy) [g]	(lb/hr) [f]	(tpy) [g]
Loader to Hopper	400	432,000	Transfer Point	Dust Control Agent	90	97.0	0.013	0.0071	0.0037	0.0020
				Partial Building Enclosure	70					
Hopper to Belt Conveyor	400	432,000	Transfer Point	Dust Control Agent	90	97.0	0.013	0.0071	0.0037	0.0020
				Partial Building Enclosure	70					
Belt Conveyor to Screen	400	432,000	Transfer Point	Dust Control Agent	90	99.3	0.0033	0.0018	0.00093	0.00050
				Partial Equipment Enclosure	75					
				Partial Building Enclosure	70					
Screen	400	432,000	Screening	Dust Control Agent	90	99.3	0.026	0.014	0.0018	0.00096
				Partial Equipment Enclosure	75					
				Partial Building Enclosure	70					
Screen to Undersize Belt Conveyor	60	64,800	Transfer Point	Dust Control Agent	90	99.3	0.00049	0.00027	0.00014	0.000076
				Partial Equipment Enclosure	75					
				Partial Building Enclosure	70					
Undersize Belt Conveyor to Undersize Pile	60	64,800	Transfer Point	Dust Control Agent	90	97.0	0.0020	0.0011	0.00056	0.00030
				Partial Building Enclosure	70					
Screen to Midsize Belt Conveyor	340	367,200	Transfer Point	Dust Control Agent	90	99.1	0.0034	0.0018	0.0010	0.00051
				Partial Building Enclosure	70					
				Partial Building Enclosure	70					
Midsize Belt Conveyor to Product Stacker	340	367,200	Transfer Point	Dust Control Agent	90	97.0	0.011	0.0061	0.0032	0.0017
				Partial Building Enclosure	70					
Product Stacker to Product Size Pile	400	432,000	Transfer Point	Dust Control Agent	90	97.0	0.013	0.0071	0.0037	0.0020
				Partial Building Enclosure	70					
						Total =	**0.086**	**0.046**	**0.019**	**0.010**

Footnotes:

[a] Based on the maximum design capacity of the portable screener.

[b] Mosaic will operate the portable screener and stacker for no more than 12 hours a day over 90 days.

[c] Uncontrolled emission factors in lb/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See table below.

Particle Size (µm)	Transfer Point (lb/ton)	Screening (lb/ton)
2.5	0.00031	0.00059
10	0.0011	0.0087

[d] The design of the portable screener provides inherent dust control because of its compact design and transfer point enclosures. In addition, the material stored in the warehouse has already been coated with a dust control agent.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

[f] Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

[g] Annual Emission Rate (tpy) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) / 2000 lb/ton x (1 - Total Control Efficiency [%] / 100)

TABLE 3: WAREHOUSE SCREENING HAULING EMISSIONS

Pollutant	k (lb/VMT) [a]	a [a]	b [a]	Surface Material Silt Content, s (%) [b]	Mean Vehicle Weight, W (tons) [c]	Control Equipment / Measure	Unit Control Efficiency (%) [d]	Total Control Efficiency (%) [e]	Particulate Emission Factor (lb/VMT) [f]	VMT/hr [g]	Hourly Emission Rate (lb/hr) [h]	Annual Emission Rate (tpy) [i]
PM_{10}	1.5	0.9	0.45	4.8	24.0	Partial Building Enclosure	70	99.6	0.0060	10.6	0.064	0.035
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0	Max Speeds ≤ 5 mph	88		0.00060	10.6	0.0064	0.0035

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value)

[c] Based on the loader being full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the loader's loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Because the material in the warehouses has already been coated, the loaders are traveling on coated potash material, which provides additional control.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

[f] Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

[g] In No. 2 or No. 3 Warehouse: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Maximum Length of Road - one way (feet) = 350

No. of Roundtrips per Hour = 80

Vehicle Miles Traveled (VMT/hr) = 10.6

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (tpy) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lb/ton)

Annual Hours of Operation (hr/yr) = 1,080

Mosaic

TABLE 4: WAREHOUSE SCREENING DIESEL NON-ROAD ENGINE EMISSIONS

Emission Factors

Pollutant	Engine	Emission Factor	Units	Source
NOx	Screener	0.00036	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.0073	lb/hp-hr	EPA Tier 4 Standards (95% of NMHC+NOx) [b,c]
CO	Screener	0.00016	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.0082	lb/hp-hr	EPA Tier 4 Standards [b]
PM (assumed equal to PM_{10} and $PM_{2.5}$)	Screener	0.000016	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.000049	lb/hp-hr	EPA Tier 4 Standards [b]
SOx	Screener	0.0021	lb/hp-hr	AP-42, Table 3.3-1
	Stacker	0.0021	lb/hp-hr	AP-42, Table 3.3-1
VOC (as NMHC)	Screener	0.000016	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.00039	lb/hp-hr	EPA Tier 4 Standards (5% of NMHC+NOx) [b,c]

Emission Calculations

Unit Name	Model Number	Serial Number	Size (hp)	Size (kW)	Fuel Type	Maximum Hourly Emissions					Operating Schedule [d] (hr/yr)	Maximum Annual Emissions				
						NOx (lb/hr)	CO (lb/hr)	PM (lb/hr)	SO_x (lb/hr)	VOC (lb/hr)		NOx (tpy)	CO (tpy)	PM (tpy)	SO_2 (tpy)	VOC (tpy)
Diesel Engine on Screener	TBD	TBD	131	98	Diesel	0.047	0.022	0.0022	0.27	0.0022	1,080	0.026	0.012	0.0012	0.15	0.0012
Diesel Engine for Stacker	TBD	TBD	60	45	Diesel	0.44	0.49	0.0030	0.12	0.023	1,080	0.24	0.27	0.0016	0.066	0.013
					Total Emissions =	**0.49**	**0.51**	**0.0051**	**0.39**	**0.025**	--	**0.26**	**0.28**	**0.0028**	**0.21**	**0.014**

Footnotes:

[a] This model is part of EPA Engine Family GPKXL04.4MT1. The emissions data is based on certification level steady-state discrete modal test results in g/kW-hr that have been converted to lb/hp-hr. For CO and NMHC, the emissions data is based on certification level transient test results.

[b] The Tier 4 emission standards are located in Table 1 of 40 CFR 1039.101 for model years later than 2014.

[c] The 95% NMHC and 5% NOx split is based on the June 28, 2004 policy from the California Air Resources Board titled "CARB Emission Factors for CI Diesel Engines - Percent HC in Relation to NMHC + NOx".

[d] Based on operating the rental equipment for 12 hours/day for 90 days.

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Carlsbad, NM 88221

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April 15, 2020

Electronic Submittal

New Mexico Environment Department
Air Quality Bureau
Attn: Mr. Joseph Kimbrell
Air Permit Specialist
525 Camino de los Marquez, Suite 1
Santa Fe, New Mexico 87505-1816

RE: Mosaic Potash Carlsbad, Inc.
Section 502(b)(10) Change for Warehouse Product Screening
Title V Permit No. P039-R3

Dear Mr. Kimbrell,

Mosaic Potash Carlsbad, Inc. (Mosaic) is submitting this Section 502(b)(10) change under 20.2.70.302.H(1) NMAC to request NMED AQB approval to operate a rental portable screener and stacker inside our warehouses. The portable screener and stacker are needed to screen the material in Warehouse Nos. 2 and 3 so the correctly sized product can be loaded and shipped offsite. The portable screener is one piece of equipment that is comprised of a hopper, main conveyor, screen, two side conveyors (only one will be used), and a tail conveyor all powered by a diesel engine. One of the conveyors on the screener will transport material to a separate conveyor on the portable stacker that is powered by a smaller diesel engine. The portable stacker consists only of one conveyor.

The portable screener's maximum design capacity is 400 tons per hour (tph) but it will be operated no higher than 200 tph. Regardless, the design capacity of 400 tph is used in the emission calculations. In addition, the portable stacker's design capacity is 500 tph, but it is limited by the amount screened, so emissions from this source are based on the screener's maximum throughput rate of 400 tpy. Emissions are based on continuous operation for no more than 12 hours a day over 90 days total. Under these assumptions, maximum emissions from the screener and stacker are less than the 0.5 tpy NSR exemption found in 20.2.72.202.B(5) NMAC.

As per our understanding of Section 502(b)(10) requests, once approved, NMED will issue an approval letter that will be attached to our current Title V permit (P039-R3) and become federally enforceable.

If you have any questions or need additional information to process this request, please contact me at 575-628-6267 or Haskins.Hobson@mosaicco.com.

Regards,

Haskins Hobson, P.E.

Haskins Hobson, P.E.
Senior Environmental Engineer
MOSAIC POTASH CARLSBAD, INC.

Enclosures: Permitting Administrative Multi-Form (Sections 1, 2, and 2-F)
Signed Certification Page (Section 3)
Emission Calculation Tables 1-4

CC: Kirby Olson, AQB Major Source Program Manager (Kirby.Olson@state.nm.us)
Melinda Owens, AQB Title V Program Manager (Melinda.Owens@state.nm.us)
Erica LeDoux, US EPA Region 6 (r6airpermits@epa.gov, LeDoux.Erica@epa.gov)

TABLE 1: SUMMARY OF WAREHOUSE SCREENER AND STACKER (RENTAL) EMISSIONS

Source	Activity	TSP		PM_{10}		$PM_{2.5}$		NOx		CO		SO_2		VOC		HAPs	
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
No. 2 or No. 3 Warehouse (FUG8 or FUG11)	Material Handling [a]	0.17	0.094	0.086	0.046	0.019	0.010	--	--	--	--	--	--	--	--	--	--
	Hauling [b]	0.25	0.14	0.064	0.035	0.0064	0.0035	--	--	--	--	--	--	--	--	--	--
	Diesel Non-Road Engines [c]	0.0051	0.0028	0.0051	0.0028	0.0051	0.0028	0.49	0.26	0.51	0.28	0.39	0.21	0.025	0.014	0.0052	0.0028
	Total	**0.43**	**0.23**	**0.16**	**0.084**	**0.030**	**0.016**	**0.49**	**0.26**	**0.51**	**0.28**	**0.39**	**0.21**	**0.025**	**0.014**	**0.0052**	**0.0028**

Footnotes:

[a] See Table 2.

[b] See Table 3.

[c] See Table 4.

TABLE 2: WAREHOUSE SCREENER AND STACKER MATERIAL HANDLING EMISSIONS

Process / Source Description	Maximum Throughput		Emission Factor Category [c]	Control Equipment / Measure	Unit Control Efficiency (%) [d]	Total Control Efficiency (%) [e]	TSP Emission Rate		PM_{10} Emission Rate		$PM_{2.5}$ Emission Rate	
	(TPH) [a]	(TPY) [b]					(lb/hr) [e]	(TPY) [f]	(lb/hr) [f]	(tpy) [g]	(lb/hr) [f]	(tpy) [g]
Loader to Hopper	400	432,000	Transfer Point	Dust Control Agent	90	97.0	0.027	0.015	0.013	0.0071	0.0037	0.0020
				Partial Building Enclosure	70							
Hopper to Belt Conveyor	400	432,000	Transfer Point	Dust Control Agent	90	97.0	0.027	0.015	0.013	0.0071	0.0037	0.0020
				Partial Building Enclosure	70							
Belt Conveyor to Screen	400	432,000	Transfer Point	Dust Control Agent	90	99.3	0.0067	0.0036	0.0033	0.0018	0.00093	0.00050
				Partial Equipment Enclosure	75							
				Partial Building Enclosure	70							
Screen	400	432,000	Screening	Dust Control Agent	90	99.3	0.051	0.028	0.026	0.014	0.0018	0.00096
				Partial Equipment Enclosure	75							
				Partial Building Enclosure	70							
Screen to Undersize Belt Conveyor	60	64,800	Transfer Point	Dust Control Agent	90	99.3	0.0010	0.00055	0.00049	0.00027	0.00014	0.000076
				Partial Equipment Enclosure	75							
				Partial Building Enclosure	70							
Undersize Belt Conveyor to Undersize Pile	60	64,800	Transfer Point	Dust Control Agent	90	97.0	0.0040	0.0022	0.0020	0.0011	0.00056	0.00030
				Partial Building Enclosure	70							
Screen to Midsize Belt Conveyor	340	367,200	Transfer Point	Dust Control Agent	90	99.1	0.0069	0.0037	0.0034	0.0018	0.0010	0.00051
				Partial Building Enclosure	70							
				Partial Building Enclosure	70							
Midsize Belt Conveyor to Product Stacker	340	367,200	Transfer Point	Dust Control Agent	90	97.0	0.023	0.012	0.011	0.0061	0.0032	0.0017
				Partial Building Enclosure	70							
Product Stacker to Product Size Pile	400	432,000	Transfer Point	Dust Control Agent	90	97.0	0.027	0.015	0.013	0.0071	0.0037	0.0020
				Partial Building Enclosure	70							
						Total =	**0.17**	**0.094**	**0.086**	**0.046**	**0.019**	**0.010**

Footnotes:

a Based on the maximum design capacity of the portable screener.

b Mosaic will operate the portable screener and stacker for no more than 12 hours a day over 90 days.

c Uncontrolled emission factors in lb/ton obtained from Section 11.19.2 of AP-42, Compilation of Air Pollutant Emission Factors, Aug, 2004. See table below.

Particle Size (μm)	Transfer Point (lb/ton)	Screening (lb/ton)
2.5	0.00031	0.00059
10	0.0011	0.0087

d The design of the portable screener provides inherent dust control because of its compact design and transfer point enclosures. In addition, the material stored in the warehouse has already been coated with a dust control agent.

e Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

f Hourly Emission Rate (lb/hr) = (Maximum Throughput [TPH]) x (Emission Factor [lb/ton]) x (1 - Total Control Efficiency [%] / 100)

g Annual Emission Rate (tpy) = (Maximum Throughput [TPY]) x (Emission Factor [lb/ton]) / 2000 lb/ton x (1 - Total Control Efficiency [%] / 100)

TABLE 3: WAREHOUSE SCREENER AND STACKER HAULING EMISSIONS

Pollutant	k (lb/VMT) [a]	a [a]	b [a]	Surface Material Silt Content, s (%) [b]	Mean Vehicle Weight, W (tons) [c]	Control Equipment / Measure	Unit Control Efficiency (%) [d]	Total Control Efficiency (%) [e]	Particulate Emission Factor (lb/VMT) [f]	VMT/hr [g]	Hourly Emission Rate (lb/hr) [h]	Annual Emission Rate (tpy) [i]
TSP	4.9	0.7	0.45	4.8	24.0	Dust Control Agent	90		0.024	10.6	0.25	0.14
PM_{10}	1.5	0.9	0.45	4.8	24.0	Partial Building Enclosure	70	99.6	0.0060	10.6	0.064	0.035
$PM_{2.5}$	0.15	0.9	0.45	4.8	24.0	Max Speeds ≤ 5 mph	88		0.00060	10.6	0.0064	0.0035

Footnotes:

[a] From AP-42, Chapter 13.2.2 "Unpaved Roads," Table 13.2.2-2, November, 2006.

[b] AP-42, Table 13.2.2-1 (sand and gravel processing, plant road, mean value)

[c] Based on the loader being full half of the time and empty half of the time, so the mean vehicle weight is based on an average of the loader's loaded and empty weights.

[d] Based on Table 6-6 in the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. The speed limit control efficiency is based on a linear relationship between the speed (x, mph) and the control efficiency (y, %): y = -2.2x + 99. Because the material in the warehouses has already been coated, the loaders are traveling on coated potash material, which provides additional control.

[e] Total Control Efficiency (%) = 100% - 100% x (1 - Control Efficiency $(\%)_1$ / 100) x (1 - Control Efficiency $(\%)_2$ / 100)

[f] Emission Factor (lb/VMT) = [k x (s/12)^a x (W/3)^b] x [1 - Total Control Efficiency (%) / 100]

[g] In No. 2 or No. 3 Warehouse: Vehicle Miles Traveled (VMT/hr) = 2 x Length of Road - one way (feet) / (5,280 feet/mi) x No. of Roundtrips per Hour (trips/hr)

Maximum Length of Road - one way (feet) =	350
No. of Roundtrips per Hour =	80
Vehicle Miles Traveled (VMT/hr) =	10.6

[h] Hourly Emission Rate (lb/hr) = Emission Factor (lb/VMT) x Vehicle Miles Traveled (VMT/hr)

[i] Annual Emission Rate (tpy) = Hourly Emission Rate (lb/hr) x Annual Hours of Operation (hr/yr) / (2,000 lb/ton)

Annual Hours of Operation (hr/yr) =	1,080

Mosaic

TABLE 4: WAREHOUSE SCREENER AND STACKER DIESEL NON-ROAD ENGINE EMISSIONS

Emission Factors

Pollutant	Engine	Emission Factor	Units	Source
NOx	Screener	0.00036	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.0073	lb/hp-hr	EPA Tier 4 Standards (95% of NMHC+NOx) [b,c]
CO	Screener	0.00016	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.0082	lb/hp-hr	EPA Tier 4 Standards [b]
PM (assumed equal to PM_{10} and $PM_{2.5}$)	Screener	0.000016	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.000049	lb/hp-hr	EPA Tier 4 Standards [b]
SOx	Screener	0.0021	lb/hp-hr	AP-42, Table 3.3-1
	Stacker	0.0021	lb/hp-hr	
VOC (as NMHC)	Screener	0.000016	lb/hp-hr	EPA Engine Family Testing [a]
	Stacker	0.00039	lb/hp-hr	EPA Tier 4 Standards (5% of NMHC+NOx) [b,c]
HAPs	Screener	0.000027	lb/hp-hr	AP-42, Table 3.3-2; converted from lb/MMBtu based on 7,000 Btu/hp-hr
	Stacker	0.000027	lb/hp-hr	

Emission Calculations

Unit Name	Model Number	Serial Number	Size (hp)	Size (kW)	Fuel Type	Maximum Hourly Emissions						Operating Schedule [d] (hr/yr)	Maximum Annual Emissions					
						NOx (lb/hr)	CO (lb/hr)	PM (lb/hr)	SO_x (lb/hr)	VOC (lb/hr)	HAPs (lb/hr)		NOx (tpy)	CO (tpy)	PM (tpy)	SO_2 (tpy)	VOC (tpy)	HAPs (tpy)
Diesel Engine on Screener	TBD	TBD	131	98	Diesel	0.047	0.022	0.0022	0.27	0.0022	0.0035	1,080	0.026	0.012	0.0012	0.15	0.0012	0.0019
Diesel Engine for Stacker	TBD	TBD	60	45	Diesel	0.44	0.49	0.0030	0.12	0.023	0.0016	1,080	0.24	0.27	0.0016	0.066	0.013	0.00087
					Total Emissions =	**0.49**	**0.51**	**0.0051**	**0.39**	**0.025**	**0.0052**	--	**0.26**	**0.28**	**0.0028**	**0.21**	**0.014**	**0.0028**

Footnotes:

[a] This model is part of EPA Engine Family GPKXL04.4MT1. The emissions data is based on certification level steady-state discrete modal test results in g/kW-hr that have been converted to lb/hp-hr. For CO and NMHC, the emissions data is based on certification level transient test results.

[b] The Tier 4 emission standards are located in Table 1 of 40 CFR 1039.101 for model years later than 2014.

[c] The 95% NMHC and 5% NOx split is based on the June 28, 2004 policy from the California Air Resources Board titled "CARB Emission Factors for CI Diesel Engines - Percent HC in Relation to NMHC + NOx".

[d] Based on operating the rental equipment for 12 hours/day for 90 days.

Section 7

Information Used To Determine Emissions

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

- If manufacturer data are used, include specifications for emissions units <u>and</u> control equipment, including control efficiencies specifications and sufficient engineering data for verification of control equipment operation, including design drawings, test reports, and design parameters that affect normal operation.
- If test data are used, include a copy of the complete test report. If the test data are for an emissions unit other than the one being permitted, the emission units must be identical. Test data may not be used if any difference in operating conditions of the unit being permitted and the unit represented in the test report significantly effect emission rates.
- **X** If the most current copy of AP-42 is used, reference the section and date located at the bottom of the page. Include a copy of the page containing the emissions factors, and clearly mark the factors used in the calculations.
- If an older version of AP-42 is used, include a complete copy of the section.
- **X** If an EPA document or other material is referenced, include a complete copy.
- Fuel specifications sheet.
- If computer models are used to estimate emissions, include an input summary (if available) and a detailed report, and a disk containing the input file(s) used to run the model. For tank-flashing emissions, include a discussion of the method used to estimate tank-flashing emissions, relative thresholds (i.e., permit or major source (NSPS, PSD or Title V)), accuracy of the model, the input and output from simulation models and software, all calculations, documentation of any assumptions used, descriptions of sampling methods and conditions, copies of any lab sample analysis.

Please see the enclosed information, which serves as the basis for the fugitive emission calculations:

- Emission factors for material transfer points are based on AP-42, Chapter 11.19.2 "Crushed Stone Processing and Pulverized Mineral Processing," August 2004. Copies of the following are included:
  i) Table 11.19.2-2 from AP-42
  ii) Material Handling Emission Factors - Mosaic-created table showing the resulting interpolation of AP-42 data to obtain the PM_{30} (i.e., TSP) emission factors as well as other emission factors where AP-42 has data gaps.
  iii) Figure 1: Controlled Emission Factors for Crushed Stone Processing Operations (Mosaic-created figure that is used in the emission factor interpolation)

- Haul road emissions are based on AP-42, Chapter 13.2.2 "Unpaved Roads," November 2006. Copies of the following are included:
  i) Table 13.2.2-1 from AP-42
  ii) Table 13.2.2-2 from AP-42
  iii) Figure 13.2.2-1 from AP-42

- Control efficiencies used in the hauling calculations are based on the Western Regional Air Partnership's (WRAP) Fugitive Dust Handbook, September 7, 2006. A copy of Chapter 6, Unpaved Roads, is provided.

- Aggregate handling emissions are based on AP-42, Chapter 13.2.4 "Aggregate Handling and Storage Piles," November 2006. Copies of the following are included:
  i) Table 13.2.4-1 from AP-42
  ii) Pages 13.2.4-3 and 13.2.4-4 from AP-42, which contain the emission factor description and equation, particle size multiplier table, and the range of source conditions for the equation.

- Wind erosion emissions are based on AP-42, Chapter 13.2.5 "Industrial Wind Erosion," November 2006. Because a predictive equation is used to estimate emissions, a copy of the entire section is included. The section text includes detailed descriptions of each of the variables and assumptions.

- Abrasive blasting emissions are based on AP-42, Chapter 13.2.6 "Abrasive Blasting," September 1997. A copy of the entire section is provided.

- Starch Bin emissions are based on AP-42, Chapter 9.9.7 "Corn Wet Milling," January 1995. Copies of the following are included:
    - i) Table 9.9.7-1 from AP-42
    - ii) Appendix B, Table B.2-1 from AP-42
    - iii) Appendix B, Table B.2.2 from AP-42

Table 11.19.2-2 (English Units). EMISSION FACTORS FOR CRUSHED STONE PROCESSING OPERATIONS (lb/Ton)[a]

Source [b]	Total Particulate Matter [r,s]	EMISSION FACTOR RATING	Total PM-10	EMISSION FACTOR RATING	Total PM-2.5	EMISSION FACTOR RATING
Primary Crushing (SCC 3-05-020-01)	ND		ND[n]		ND[n]	
Primary Crushing (controlled) (SCC 3-05-020-01)	ND		ND[n]		ND[n]	
Secondary Crushing (SCC 3-05-020-02)	ND		ND[n]		ND[n]	
Secondary Crushing (controlled) (SCC 3-05-020-02)	ND		ND[n]		ND[n]	
Tertiary Crushing (SCC 3-050030-03)	0.0054[d]	E	0.0024[o]	C	ND[n]	
Tertiary Crushing (controlled) (SCC 3-05-020-03)	0.0012[d]	E	0.00054[p]	C	0.00010[q]	E
Fines Crushing (SCC 3-05-020-05)	0.0390[e]	E	0.0150[e]	E	ND	
Fines Crushing (controlled) (SCC 3-05-020-05)	0.0030[f]	E	0.0012[f]	E	0.000070[q]	E
Screening (SCC 3-05-020-02, 03)	0.025[c]	E	0.0087[l]	C	ND	
Screening (controlled) (SCC 3-05-020-02, 03)	0.0022[d]	E	0.00074[m]	C	0.000050[q]	E
Fines Screening (SCC 3-05-020-21)	0.30[g]	E	0.072[g]	E	ND	
Fines Screening (controlled) (SCC 3-05-020-21)	0.0036[g]	E	0.0022[g]	E	ND	
Conveyor Transfer Point (SCC 3-05-020-06)	0.0030[h]	E	0.00110[h]	D	ND	
Conveyor Transfer Point (controlled) (SCC 3-05-020-06)	0.00014[i]	E	4.6×10^{-5}[i]	D	1.3×10^{-5}[q]	E
Wet Drilling - Unfragmented Stone (SCC 3-05-020-10)	ND		8.0×10^{-5}[j]	E	ND	
Truck Unloading -Fragmented Stone (SCC 3-05-020-31)	ND		1.6×10^{-5}[j]	E	ND	
Truck Loading - Conveyor, crushed stone (SCC 3-05-020-32)	ND		0.00010[k]	E	ND	

a. Emission factors represent uncontrolled emissions unless noted. Emission factors in lb/Ton of material of throughput. SCC = Source Classification Code. ND = No data.

b. Controlled sources (with wet suppression) are those that are part of the processing plant that employs current wet suppression technology similar to the study group. The moisture content of the study group without wet suppression systems operating (uncontrolled) ranged from 0.21 to 1.3 percent, and the same facilities operating wet suppression systems (controlled) ranged from 0.55 to 2.88 percent. Due to carry over of the small amount of moisture required, it has been shown that each source, with the exception of crushers, does not need to employ direct water sprays. Although the moisture content was the only variable measured, other process features may have as much influence on emissions from a given source. Visual observations from each source under normal operating conditions are probably the best indicator of which emission factor is most appropriate. Plants that employ substandard control measures as indicated by visual observations should use the uncontrolled factor with an appropriate control efficiency that best reflects the effectiveness of the controls employed.

c. References 1, 3, 7, and 8

d. References 3, 7, and 8

Material Handling Emission Factors
Mosaic Potash Carlsbad, Inc.

	Controlled Emission Factors (lbs/ton)							
Particle Size (µm)	Tertiary Crushing		Screening		Conveyor Transfer Point		Fines Screening	
2.5	0.00010	(1)	0.000050	(1)	0.000013	(1)	0.0014	(2)
10	0.00054	(1)	0.00074	(1)	0.000046	(1)	0.0022	(1)
100	0.0012	(1)	0.0022	(1)	0.00014	(1)	0.0036	(1)
30	0.00086	(3)	0.0015	(3)	0.000094	(3)	0.0029	(2)

PM-10 Control Efficiency	77.5	(5)	91.5	(5)	95.8	(5)	96.9	(5)

	Uncontrolled Emission Factors (lbs/ton)							
Particle Size (µm)	Tertiary Crushing		Screening		Conveyor Transfer Point		Fines Screening	
2.5	0.00044	(4)	0.00059	(4)	0.00031	(4)	0.044	(4)
10	0.0024	(1)	0.0087	(1)	0.0011	(1)	0.072	(1)
100	0.0054	(1)	0.025	(1)	0.0030	(1)	0.30	(1)
30	0.0038	(6)	0.017	(6)	0.0022	(6)	0.094	(6)

Footnotes:

(1) From AP-42, Table 11.19.2-2.

(2) Calculated from PM-10 and PM-100 interpolation: y = m * ln(x) + b, where x is particle size and y is emission factor. See Figure 1.

	Fines Screening
m =	0.00061
b =	0.00080

(3) Calculated from PM-100, PM-10 and PM-2.5 interpolation: y = m * ln(x) + b, where x is particle size and y is emission factor. See Figure 1.

	Tertiary Crushing	Screening	Conveyor Transfer Point
m =	0.00030	0.00059	0.000035
b =	-0.00016	-0.00054	-0.000025

(4) Calculated using the control efficiency for PM-10. This approach is the same as used in AP-42 to calculate PM-100 values from the PM-10 control efficiencies for Tertiary Crushing, Screening, and Conveyor Transfer Points. PM-2.5 uncontrolled = PM-2.5 controlled / (1 - PM-10 Control Efficiency [%] / 100)

(5) PM-10 control efficiency = (PM-10 uncontrolled - PM-10 controlled) / PM-10 uncontrolled x 100

(6) Calculated using the control efficiency for PM-10. This approach is the same as used in AP-42 to calculate PM-100 values from the PM-10 control efficiency. PM-30 uncontrolled = PM-30 controlled / (1 - PM-10 Control Efficiency [%] / 100)

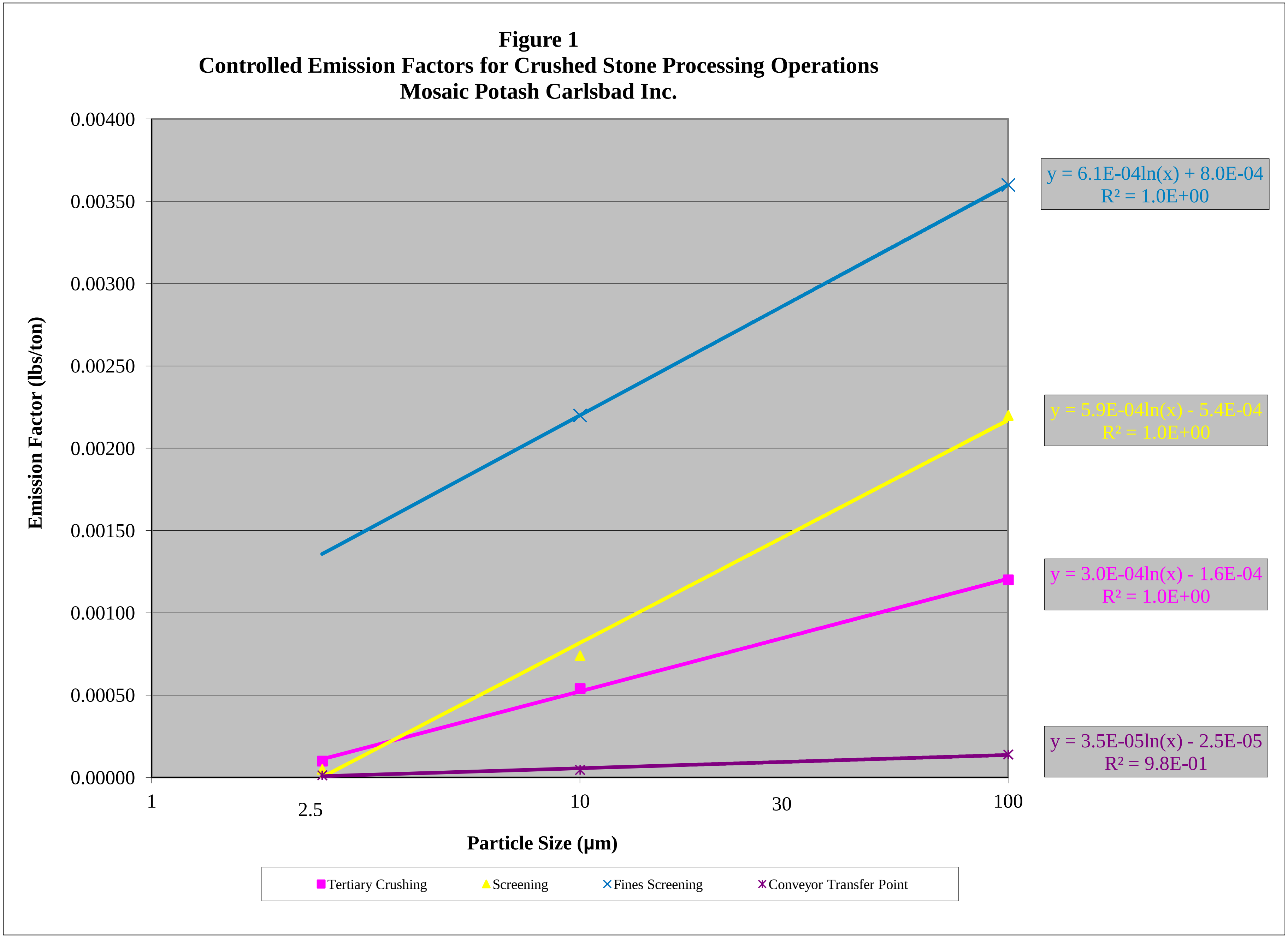
Figure 1
Controlled Emission Factors for Crushed Stone Processing Operations
Mosaic Potash Carlsbad Inc.
0.00400
0.00350
0.00300
0.00250
0.00200
0.00150
0.00100
0.00050
0.00000
Emission Factor (lbs/ton)
1
2.5
10
30
100
Particle Size (µm)
y = 6.1E-04ln(x) + 8.0E-04
R² = 1.0E+00
y = 5.9E-04ln(x) - 5.4E-04
R² = 1.0E+00
y = 3.0E-04ln(x) - 1.6E-04
R² = 1.0E+00
y = 3.5E-05ln(x) - 2.5E-05
R² = 9.8E-01
Tertiary Crushing
Screening
Fines Screening
Conveyor Transfer Point

Table 13.2.2-1. TYPICAL SILT CONTENT VALUES OF SURFACE MATERIAL ON INDUSTRIAL UNPAVED ROADS[a]

Industry	Road Use Or Surface Material	Plant Sites	No. Of Samples	Silt Content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16 - 19	17
Iron and steel production	Plant road	19	135	0.2 - 19	6.0
Sand and gravel processing	Plant road	1	3	4.1 - 6.0	4.8
	Material storage area	1	1	-	7.1
Stone quarrying and processing	Plant road	2	10	2.4 - 16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4 - 7.1	4.3
	Haul road to/from pit	1	12	3.9 - 9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8 - 18	8.4
	Plant road	2	2	4.9 - 5.3	5.1
	Scraper route	3	10	7.2 - 25	17
	Haul road (freshly graded)	2	5	18 - 29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2 - 21	6.4

[a]References 1,5-15.

Table 13.2.2-2. CONSTANTS FOR EQUATIONS 1a AND 1b

Constant	Industrial Roads (Equation 1a)			Public Roads (Equation 1b)		
	PM-2.5	PM-10	PM-30*	PM-2.5	PM-10	PM-30*
k (lb/VMT)	0.15	1.5	4.9	0.18	1.8	6.0
a	0.9	0.9	0.7	1	1	1
b	0.45	0.45	0.45	-	-	-
c	-	-	-	0.2	0.2	0.3
d	-	-	-	0.5	0.5	0.3
Quality Rating	B	B	B	B	B	B

*Assumed equivalent to total suspended particulate matter (TSP)
"-" = not used in the emission factor equation

Table 13.2.2-2 also contains the quality ratings for the various size-specific versions of Equation 1a and 1b. The equation retains the assigned quality rating, if applied within the ranges of source conditions, shown in Table 13.2.2-3, that were tested in developing the equation:

Table 13.2.2-3. RANGE OF SOURCE CONDITIONS USED IN DEVELOPING EQUATION 1a AND 1b

Emission Factor	Surface Silt Content, %	Mean Vehicle Weight		Mean Vehicle Speed		Mean No. of Wheels	Surface Moisture Content, %
		Mg	ton	km/hr	mph		
Industrial Roads (Equation 1a)	1.8-25.2	1.8-260	2-290	8-69	5-43	4-17[a]	0.03-13
Public Roads (Equation 1b)	1.8-35	1.4-2.7	1.5-3	16-88	10-55	4-4.8	0.03-13

[a] See discussion in text.

As noted earlier, the models presented as Equations 1a and 1b were developed from tests of traffic on unpaved surfaces. Unpaved roads have a hard, generally nonporous surface that usually dries quickly after a rainfall or watering, because of traffic-enhanced natural evaporation. (Factors influencing how fast a road dries are discussed in Section 13.2.2.3, below.) The quality ratings given above pertain to the mid-range of the measured source conditions for the equation. A higher mean vehicle weight and a higher than normal traffic rate may be justified when performing a worst-case analysis of emissions from unpaved roads.

The emission factors for the exhaust, brake wear and tire wear of a 1980's vehicle fleet (*C*) was obtained from EPA's MOBILE6.2 model [23]. The emission factor also varies with aerodynamic size range

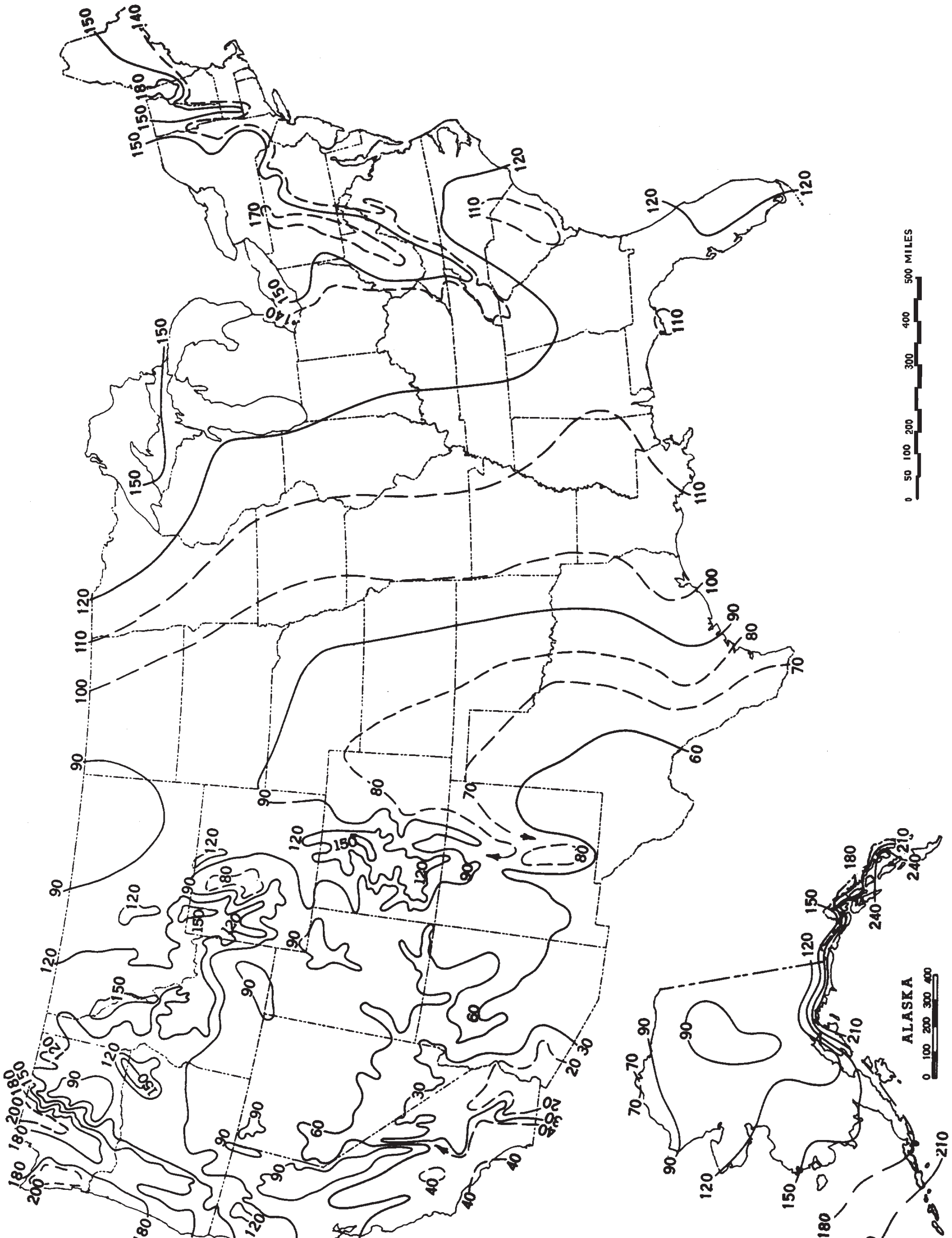

Figure 13.2.2-1. Mean number of days with 0.01 inch or more of precipitation in United States.

WRAP Fugitive Dust Handbook

Prepared for:

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

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(WGA Contract No. 30204-111)

September 7, 2006

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Chapter 6. Unpaved Roads

6.1 Characterization of Source Emissions

When a vehicle travels on an unpaved surface such as an unpaved road or unpaved parking lot, 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 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.

6.2 Emission Estimation: Primary Methodology[1-26]

This section was adapted from Section 13.2.2 of EPA's *Compilation of Air Pollutant Emission Factors (AP-42)*. Section 13.2.2 was last updated in December 2003.

Dust emissions from unpaved roads have been found to vary directly with the fraction of silt (particles smaller than 75 micrometers [μm] in physical diameter) in the road surface materials.[1] The silt fraction is determined by measuring the proportion of loose dry surface dust that passes a 200-mesh screen using the ASTM-C-136 method. A summary of this method is contained in Appendix C of AP-42. Table 6-1 summarizes measured silt values for industrial unpaved roads. Table 6-2 summarizes measured silt values for public unpaved roads. It should be noted that the ranges of silt content for public unpaved roads 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 a hot desert environment and a cool moist location.

Table 6-1. Typical Silt Content Values of Surface Material on Industrial Unpaved Roads[a]

Industry	Road use or surface material	Plant sites	No. of samples	Silt content (%)	
				Range	Mean
Copper smelting	Plant road	1	3	16-19	17
Iron and steel production	Plant road	19	135	0.2-19	6.0
Sand and gravel processing	Plant road	1	3	4.1-6.0	4.8
	Material storage area	1	1	–	7.1
Stone quarry and processing	Plant road	2	10	2.4-16	10
	Haul road to/from pit	4	20	5.0-15	8.3
Taconite mining and processing	Service road	1	8	2.4-7.1	4.3
	Haul road to/from pit	1	12	3.9-9.7	5.8
Western surface coal mining	Haul road to/from pit	3	21	2.8-18	8.4
	Plant road	2	2	4.9-5.3	5.1
	Scraper route	3	10	7.2-25	17
	Haul road (freshly graded)	2	5	18-29	24
Construction sites	Scraper routes	7	20	0.56-23	8.5
Lumber sawmills	Log yards	2	2	4.8-12	8.4
Municipal solid waste landfills	Disposal routes	4	20	2.2-21	6.4

[a] References 1, 5-15.

Table 6-2. Typical Silt Content Values of Surface Material on Public Unpaved Roads[a]

Industry	Road use or surface material	Plant sites	No. of samples	Silt content (%)	
				Range	Mean
Publicly accessible roads	Gravel/crushed limestone	9	46	0.1-15	6.4
	Dirt (i.e., local material compacted, bladed, and crowned)	8	24	0.83-68	11

[a] References 1, 5-16.

6.2.1 Emission Factors

The PM10 emission factors presented below are the outcomes from stepwise linear regressions of field emission test results of vehicles traveling over unpaved surfaces. For vehicles traveling on unpaved surfaces at industrial sites, PM10 emissions are estimated from the following empirical equation:

$$E = 1.5\,(s/12)^{0.9}\,(W/3)^{0.45} \qquad (1a)$$

and, for vehicles traveling on publicly accessible roads, dominated by light duty vehicles, PM10 emissions may be estimated from the following equation:

$$E = \frac{1.8\ (s/12)^{1.8}\ (S/30)^{0.5}}{(M/0.5)^{0.2}} - C \qquad (1b)$$

where

E = PM10 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 1 lb/VMT = 281.9 g/VKT. Equations 1a and 1b have a quality rating of B if applied within the ranges of source conditions that were tested in developing the equations shown in Table 6-3.

Table 6-3. Range of Source Conditions Used in Developing Equations 1a and 1b

Emission factor	Surface silt content, %	Mean vehicle weight		Mean vehicle speed		Mean No. of wheels	Surface moisture content, %
		Mg	ton	km/hr	mph		
Industrial roads (Equation 1a)	1.8-25.2	1.8-260	2-290	8-69	5-43	4-17[a]	0.03-13
Public roads (Equation 1b)	1.8-35	1.4-2.7	1.5-3	16-88	10-55	4-4.8	0.03-13

As noted earlier, the models presented as Equations 1a and 1b were developed from tests of traffic on unpaved surfaces, mostly performed in the 1980s. 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 6.5 below. 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 PM2.5/PM10 ratio for fugitive dust from vehicles traveling on unpaved roads is 0.1.[23] The PM2.5 and PM10 emission factors for the exhaust, brake wear, and tire wear of a 1980's vehicle fleet (*C*) are shown in Table 6-4. They were obtained from EPA's MOBILE6.2 model.[24]

Table 6-4. Emission Factors for 1980's Vehicle Fleet Exhaust, Brake Wear, and Tire Wear

Particle size	*C*, Emission factor for exhaust, brake wear, and tire wear (lb/VMT)
PM2.5	0.00036
PM10	0.00047

A PM10 emission factor for the resuspension of fugitive dust from unpaved shoulders created by the wake of high-profile vehicles such as tractor-trailers traveling on paved roads at high speed has been developed by Desert Research Institute (DRI). A discussion of the emissions estimation methodology for fugitive dust originating from unpaved shoulders is presented in Chapter 14.

6.2.2 Source Extent

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% of the traffic on the road are 2-ton cars and trucks while the remaining 2% 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 Appendices C.1 and C.2 of AP-42. 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 Tables 6-1 and 6-2 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 for their facility.

6.2.3 Natural Mitigation

The effect of routine watering to control emissions from unpaved roads is discussed below in Section 6.5. However, all roads are subject to some natural mitigation because of rainfall and other precipitation. The Equation 1a and 1b emission factors can be extrapolated to annual average uncontrolled conditions (but including natural mitigation) under the simplifying assumption that annual average emissions are inversely proportional to the number of days with measurable (more than 0.254 mm [0.01 inch]) precipitation:

$$E_{ext} = E[(365 - P)/365] \quad (2)$$

where,

E_{ext} = annual size-specific emission factor extrapolated for natural mitigation (lb/VMT)

E = emission factor from Equation 1a or 1b

P = number of days in a year with at least 0.254 mm (0.01 in) of precipitation

Maps showing the geographical distribution of "wet" days on an annual basis for the United States based on meteorological records on a monthly basis are available in the *Climatic Atlas of the United States*.[16] Alternative sources include other Department of Commerce publications such as local climatological data summaries. The National Climatic Data Center (NCDC) offers several products that provide hourly precipitation data. In particular, NCDC offers a *Solar and Meteorological Surface Observation Network 1961-1990* (SAMSON) CD-ROM, which contains 30 years worth of hourly meteorological data for first-order National Weather Service locations. Whatever meteorological data are used, the source of that data and the averaging period should be clearly specified.

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 (www.epa.gov/ttn/chief/ap42/ch13/related/c13s02-2) has a file that contains a spreadsheet program for calculating emission factors that 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.

6.3 Emission Estimation: Alternate Methodology for Non-Farm Roads

This section was adapted from Section 7.10 of CARB's Emission Inventory Methodology. Section 7.10 was last updated in August 1997.

This source category provides estimates of the entrained geologic particulate matter emissions that result from vehicular travel over non-agricultural unpaved roads. The emissions are estimated separately for three major unpaved road categories: city and county roads, U.S. forests and park roads, and Bureau of Land Management (BLM) and Bureau of Indian Affairs (BIA) roads. The emissions result from the mechanical disturbance of the roadway and the vehicle generated air turbulence effects. Agricultural unpaved road estimates are computed in a separate methodology; see Section 6.4.

6.3.1 Emission Factor

The PM10 emission factor used for estimates of geologic dust emissions from vehicular travel on unpaved roads is based on work performed by UC Davis[28] and the Desert Research Institute.[29] The emission factor used for all unpaved roads statewide is 2.27 lbs PM10/VMT.[30] Because the emission measurements were performed in California, this emission factor was used by CARB to replace the previous generic emission factor provided in EPA's AP-42 document.[31] The new emission factor is slightly smaller than the factors derived with the AP-42 methodology. The PM2.5/PM10 ratio for unpaved road dust is 0.1.[23]

6.3.2 Source Extent (Activity Level)

For the purpose of estimating emissions, it is assumed that the unpaved road dust emissions are primarily related to the vehicle miles traveled (VMT) on the roads. State highway data are used to estimate unpaved road miles for each roadway category in each county. It is assumed that 10 daily VMT (DVMT) are traveled on unpaved city and county roads as well as U.S. forest and parks roads and BLM and BIA roads. Road mileage, if needed, can be simply computed by dividing the annual VMT values by 3650 (which is 10 DVMT x 365 days).

Daily activity on unpaved roads occurs primarily during daylight hours. Activity is assumed to be the same each day of the week. Monthly activity varies by county and is based on estimates of monthly rainfall in each county. This is to reflect that during wet months there is less unpaved road traffic, and there are also lower emissions per mile of road when the road soils have a higher moisture content. Unpaved road growth is tied to on-road VMT growth for many counties. For other counties, growth is set to zero and VMT is not used.

6.3.3 Assumptions and Limitations

CARB's methodology is subject to the following assumptions and limitations:

1. This methodology assumes that all unpaved roads emit the same levels of PM10 per VMT during all times of the year for all vehicles and conditions.
2. It is assumed that all unpaved roads receive 10 VMT per day.
3. This methodology assumes that no controls are used on the roads.
4. It is assumed that the emission factors derived in a test county are applicable to the rest of California.

6.4 Emission Estimation: Alternative Methodology for Farm Roads

> This section was adapted from Section 7.11 of CARB's Emission Inventory Methodology. Section 7.11 was last updated in August 1997.

This source category provides estimates of the entrained geologic particulate matter emissions that result from vehicular travel over unpaved roads on agricultural lands. The emissions result from the mechanical disturbance of the roadway and the vehicle generated air turbulence effects. This emission factor used is oriented towards dust emissions from light duty vehicle use, but the activity data implicitly include some larger vehicle use for harvest and other operations.

6.4.1 Emission Factor

The PM10 emission factor used for estimates of geologic dust emissions from vehicular travel on unpaved roads is based on work performed by UC Davis[28] and the Desert Research Institute.[29] The emission factor used for all unpaved roads statewide is 2.27 lbs PM10/VMT.[30] Because the emission measurements were performed in California, this emission factor was used by CARB to replace the previous generic emission factor provided in EPA's AP-42 document.[31] CARB's emission factor is slightly smaller than the factors derived with the AP-42 methodology. The PM2.5/PM10 ratio for unpaved road dust is 0.1.[23]

6.4.2 Source Extent (Activity Level)

For the purpose of estimating emissions, it is assumed that the unpaved road dust emissions are primarily related to the vehicle miles traveled (VMT) on the roads. In 1976 an informal survey was made of several county agricultural commissioners in the San Joaquin Valley, who estimated that each 40 acres of cultivated land receives approximately 175 vehicle passes per year on the unpaved farm roads.[32] This value of 4.28 VMT/acre-year has been used in the past by CARB to calculate emissions from unpaved farm roads. CARB is now proposing the following estimates of source extent for unpaved farm roads for different crops: 0.38 VMT/acre-year for grapes, 0.40 VMT/acre-year for cotton, and 1.23 VMT/acre-year for citrus.[33]

The crop acreage data used to estimate the road dust emissions are from the state agency summary of crop acreage harvested.[34, 35] The acreage estimates do not include pasture lands because it is thought that the quantity of vehicular travel on these lands is minimal. Daily activity on unpaved roads occurs primarily during daylight hours. Activity is assumed to be the same each day of the week. Monthly activity varies by county and is based on estimates of monthly rainfall in each county. This is to reflect that during wet months there is less unpaved road traffic, and there are also lower emissions per mile of road when the road soils have a higher moisture content. Unpaved road growth for farm roads is based on agricultural crop acreage or agricultural production. This value is set to zero for many counties.

6.4.3 Assumptions and Limitations

CARB's methodology is subject to the following assumptions and limitations:

1. This methodology assumes that all unpaved farm roads emit the same levels of PM10 per VMT during all times of the year for all vehicles and conditions.
2. It is assumed that all unpaved farm roads receive 175 VMT per 40 acres per year for all crops and cultivation practices.
3. This methodology assumes that no controls are used on the roads.
4. It is assumed that the emission factors derived in the test area are applicable to the rest of California.
5. This methodology assumes that unpaved road travel associated with pasture lands is negligible.

6.5 Demonstrated Control Techniques

A wide variety of options exist to control emissions from unpaved roads. Options fall into the following three groupings:

1. <u>Vehicle restrictions</u> 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
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.

Vehicle restrictions. These measures seek to limit the amount and type of traffic present on the road, or to lower the mean vehicle speed. For example, many industrial plants have restricted employees from driving on plant property and have instead instituted bussing programs. This eliminates emissions due to employees traveling to/from their worksites. Although the heavier average vehicle weight of the busses increases the base emission factor, the decrease in vehicle-miles-traveled results in a lower overall emission rate.

Surface improvements. Control options in this category alter the road surface. As opposed to "surface treatments" discussed below, improvements are relatively "permanent" and do not require periodic retreatment. The most obvious surface improvement is paving an unpaved road. This option is quite expensive and is probably most applicable to relatively short stretches of unpaved road with at least several hundred vehicle passes per day. Furthermore, if the newly paved road is located near unpaved areas or is used to transport material, it is essential that the control plan address routine cleaning of the newly paved road surface. The control efficiencies achievable by paving can be estimated by comparing emission factors for unpaved and paved road conditions. The predictive emission factor equation for paved roads, given in Chapter 5, requires estimation of the silt loading on the traveled portion of the paved surface, which in turn depends on whether the pavement is periodically cleaned. Unless curbing is to be installed, the effects of vehicle excursion onto unpaved shoulders (berms) also must be taken into account in estimating the control efficiency of paving.

Other surface improvement methods involve covering the road surface with another material that has a lower silt content. Examples include placing gravel or slag on a dirt road. The control efficiency can be estimated by comparing the emission factors obtained using the silt contents before and after improvement. The silt content of the road surface should be determined after 3 to 6 months rather than immediately following placement. Control plans should address regular maintenance practices, such as grading, to retain larger aggregate on the traveled portion of the road.

Surface treatments. These measures refer to control options that require periodic reapplication. Treatments fall into the two main categories of:

(a) wet suppression (i.e., watering, possibly with surfactants or other additives), which keeps the road surface wet to control emissions, and
(b) chemical stabilization that attempts to change the physical characteristics of the surface.

The necessary reapplication frequency varies from minutes or hours for plain water under summertime conditions to several weeks or months for chemical dust suppressants.

Wet Suppression. Watering increases the moisture content, which in turn causes particles to conglomerate and reduces their likelihood of becoming suspended when vehicles pass over the surface. The control efficiency depends on how fast the road dries after water is added. This in turn depends on: (a) the amount (per unit road surface area) of water added during each application; (b) the period of time between applications; (c) the weight, speed and number of vehicles traveling over the watered road during the period between applications; and (d) meteorological conditions (temperature, wind speed, cloud cover, etc.) that affect evaporation during the period. Figure 6-1 presents a simple bilinear relationship between the instantaneous control efficiency due to watering and the resulting increase in surface moisture. The moisture ratio "M" (i.e., the x-axis in Figure 6-1) is found by dividing the surface moisture content of the watered road by the surface moisture content of the uncontrolled road. As the watered road surface dries, both the ratio M and the predicted instantaneous control efficiency (i.e., the y-axis in the figure) decrease. The figure shows that between the uncontrolled moisture content (M = 1) and a value twice as large (M = 2), a small increase in moisture content results in a large increase in control efficiency. Beyond that, control efficiency grows slowly with increased moisture content.

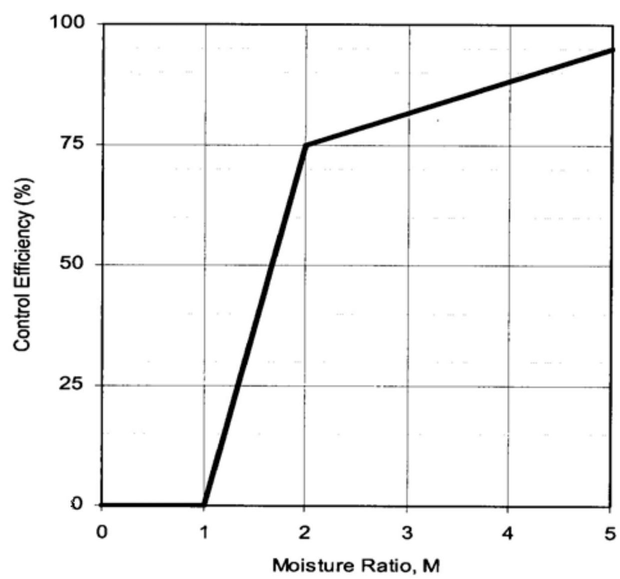

Figure 6-1. Watering Control Effectiveness for Unpaved Travel Surfaces

Given the complicated nature of how the road dries, characterization of emissions from watered roadways is best done by collecting road surface material samples at various times between water truck passes. AP-42 Appendices C.1 and C.2 present the recommended sampling and analysis procedures, respectively, for determining the surface/bulk dust loading. The moisture content measured can then be associated with a control efficiency by use of Figure 6-1. Samples that reflect average conditions during the watering cycle can take the form of either a series of samples between water applications or a single sample at the midpoint. It is essential that samples be collected during periods with active traffic on the road. Finally, because of different evaporation rates, it is recommended that samples be collected at various times during the year. If only one set of samples is to be collected, these must be collected during hot, summertime conditions.

When developing watering control plans for roads that do not yet exist, it is strongly recommended that the moisture cycle be established by sampling similar roads in the same geographic area. If the moisture cycle cannot be established by similar roads using established watering control plans, the more complex methodology used to estimate the mitigation of rainfall and other precipitation can be used to estimate the control provided by routine watering. An estimate of the maximum daytime Class A pan evaporation (based upon daily evaporation data published in the monthly Climatological Data for the state by the National Climatic Data Center) should be used to insure that adequate watering capability is available during periods of highest evaporation. Hourly precipitation values are replaced by the equivalent inches of precipitation resulting fro watering. One inch of precipitation is equivalent to an application of 5.6 gallons of water per square yard of road. Information on the long term average annual evaporation and on the percentage that occurs between May and October is available in the Climatic Atlas.[16] This methodology should be used only for prospective analyses and for designing watering programs for existing roadways. The quality rating of an emission factor for a watered road that is based on this methodology should be downgraded two letters. Periodic road surface samples should be collected and analyzed to verify the efficiency of the watering program.

Chemical Dust Suppressants. As opposed to wet suppression (i.e., watering), chemical dust suppressants have much less frequent reapplication requirements. These materials suppress emissions by changing the physical characteristics of the existing road surface material. Many chemical dust suppressants applied to unpaved roads form a hardened surface that binds particles together. After several applications, a treated unpaved road often resembles a paved road except that the surface is not uniformly flat. Because the improved surface results in more grinding of small particles, the silt content of loose material on a highly controlled surface may be substantially higher than when the surface was uncontrolled. For this reason, the models presented as Equations 1a and 1b cannot be used to estimate emissions from chemically stabilized roads. Should the road be allowed to return to an uncontrolled state with no visible signs of large-scale cementing of material, the Equation 1a and 1b emission factors could then be used to obtain conservatively high emission estimates.

The control effectiveness of chemical dust suppressants appears to depend on: (a) the dilution rate used in the mixture; (b) the application rate (volume of solution per unit road surface area); (c) the time between applications; (d) the size, speed and amount of traffic during the period between applications; and (e) meteorological conditions (rainfall, freeze/thaw cycles, etc.) during the period. Other factors that affect the performance of chemical dust suppressants include other traffic characteristics (e.g., cornering, track-out from unpaved areas) and road characteristics (e.g., bearing strength, grade). The variability in these factors and differences between individual dust control products make the control efficiencies of chemical dust suppressants difficult to estimate. Past field testing of emissions from controlled unpaved roads has shown that chemical dust suppressants provide a PM10 control efficiency of about 80% when applied at regular intervals of 2 weeks to 1 month.

Petroleum resin products historically have been the dust suppressants (besides water) most widely used on industrial unpaved roads. Figure 6-2 presents a method to estimate average control efficiencies associated with petroleum resins applied to unpaved roads.[20] The following items should be noted:

1. The term “ground inventory” represents the total volume (per unit area) of petroleum resin concentrate (not solution) applied since the start of the dust control season.
2. Because petroleum resin products must be periodically reapplied to unpaved roads, the use of a time-averaged control efficiency value is appropriate. Figure 6-2 presents control efficiency values averaged over two common application intervals, 2 weeks and 1 month. Other application intervals will require interpolation.
3. Note that zero efficiency is assigned until the ground inventory reaches 0.05 gallon per square yard (gal/yd^2). Requiring a minimum ground inventory ensures that one must apply a reasonable amount of chemical dust suppressant to a road before claiming credit for emission control. Recall that the ground inventory refers to the amount of petroleum resin concentrate rather than the total solution.

As an example of the application of Figure 6-2, suppose that Equation 1a was used to estimate a PM10 emission factor of 7.1 lb/VMT from a particular road. Also, suppose that, starting on May 1, the road is treated with 0.221 gal/yd^2 of a solution (1 part petroleum resin to 5 parts water) on the first of each month through September. The average controlled PM10 emission factors calculated from Figure 6-2 are shown in Table 6-5.

Besides petroleum resins, other newer dust suppressants have also been successful in controlling emissions from unpaved roads. Specific test results for those chemicals, as well as for petroleum resins and watering, are provided in References 18 through 21.

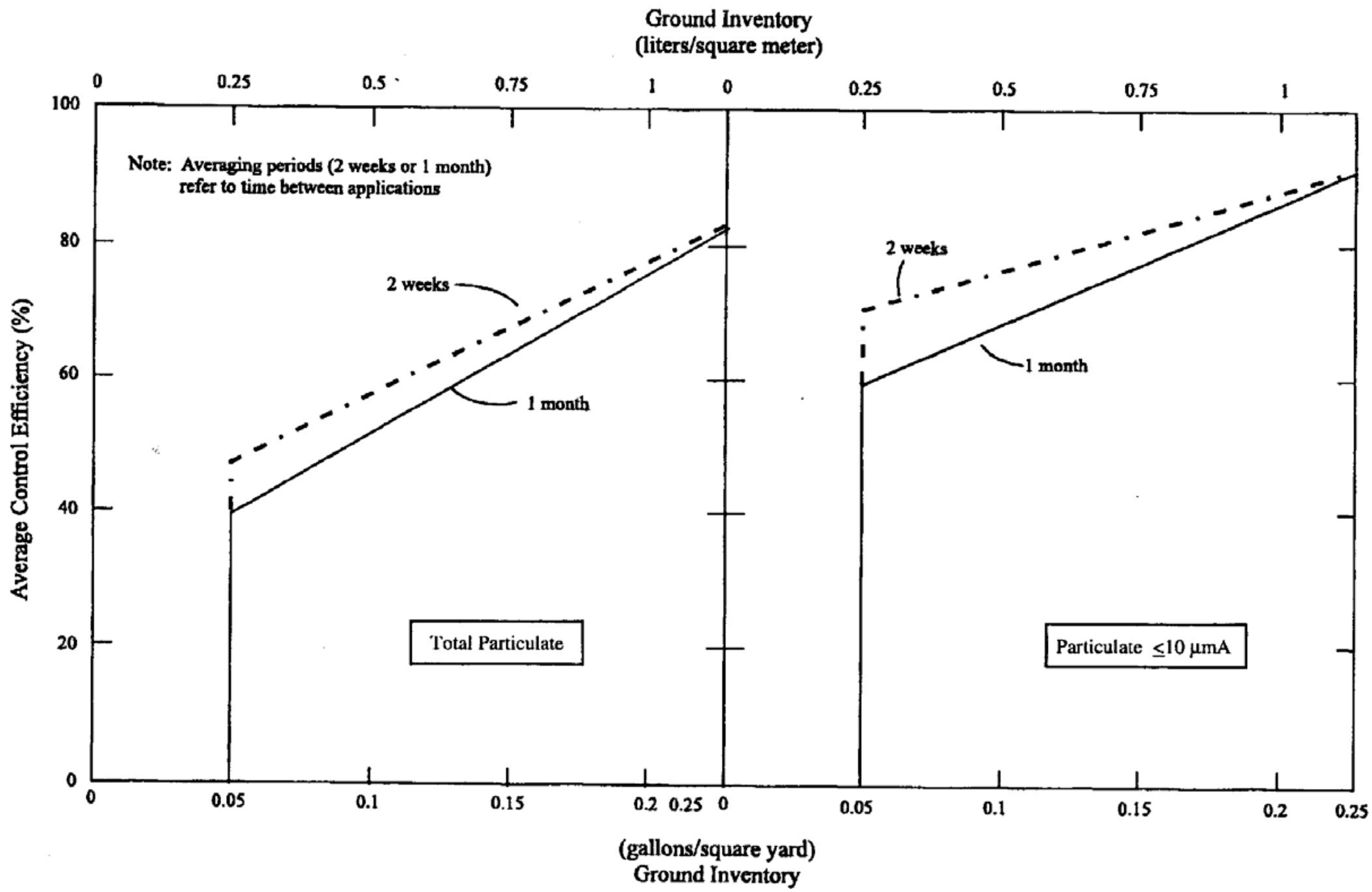

Figure 6-2. Average TSP and PM10 Control Efficiencies for Two Common Application Intervals

Table 6-5. Average Controlled PM10 Emission Factors for Specific Conditions

Period	Ground inventory, gal/yd^2	Average control efficiency, %[a]	Average controlled PM10 emission factor, lb/VMT
May	0.037	0	7.1
June	0.073	62	2.7
July	0.11	68	2.3
August	0.15	74	1.8
September	0.18	80	1.4

[a] From Figure 6-2. Zero efficiency assigned if ground inventory is less than 0.05 gal/yd^2.

1 lb/VMT = 281.9 g/VKT. 1 gal/yd^2 = 4.531 L/m^2.

Table 6-6 summarizes tested control measures and reported control efficiencies for measures that reduce the generation of fugitive dust from unpaved roads.

Table 6-6. Control Efficiencies for Control Measures for Unpaved Roads[36, 37]

Control measure	PM10 control efficiency	References/Comments
Limit maximum speed on unpaved roads to 25 miles per hour	44%	Assumes linear relationship between PM10 emissions and vehicle speed and an uncontrolled speed of 45 mph.
Pave unpaved roads and unpaved parking areas	99%	Based on comparison of paved road and unpaved road PM10 emission factors.
Implement watering twice a day for industrial unpaved road	55%	MRI, April 2001
Apply dust suppressant annually to unpaved parking areas	84%	CARB April 2002

6.6 Regulatory Formats

Fugitive dust control options have been embedded in many regulations for state and local agencies in the WRAP region. Regulatory formats specify the threshold source size that triggers the need for control application. Example regulatory formats downloaded from the Internet for several local air quality agencies in the WRAP region are presented in Table 6-7. The website addresses for obtaining information on fugitive dust regulations for local air quality districts within California, for Clark County, NV, and for Maricopa County, AZ, are as follows:

- Districts within California: www.arb.ca.gov/drdb/drdb.htm
- Clark County, NV: www.co.clark.nv.us/air_quality/regs.htm
- Maricopa County, AZ: www.maricopa.gov/envsvc/air/ruledesc.asp

Table 6-7. Example Regulatory Formats for Unpaved Roads

Control Measure	Goal	Threshold	Agency
Requires annual treatment of unpaved public roads beginning in 1998 and continuing for each of 8 years thereafter by implementing one of the following: paving at least one mile with typical roadway material, applying chemical stabilizers to at least two miles to maintain stabilized surface, implementing at least one of the following on at least three miles of road surface: installing signage at 1/4 mile intervals limiting speed to 15 mph, installing speed control devices every 500 ft, or maintaining roadway to limit speed to 15 mph		Set applicability standard: unpaved road must be more than 50 ft wide at all points or must not be within 25 ft of property line, or have more than 20 vehicle trips per day. All roads with average daily traffic greater than average of all unpaved roads within its jurisdiction must be treated	SCAQMD Rule 1186 9/10/1999
Control measures implemented by June 1, 2003: pave, apply dust palliative, or other	Complies with stabilization standard: limit visible dust emissions to 20% opacity, limit silt loading to 0.33 oz/ft2, and limit silt content to 6%	All unpaved roads with vehicular traffic 150 vehicles or more per day	Clark County Hydrographic Basins 212, 216, 217 Sect. 91 Air Quality Reg. 06/22/2000
Limit vehicle speed </=15mph and </=20 trips/day; BACM: watering, paving, apply/maintain gravel, asphalt, or dust suppressant; Dust control plan for construction site roads	Limit VDE to 20% opacity; limit silt loading to 0.33oz/ft^2, limit silt content to 6%	Construction site roads, inactive/active; limiting vehicle speed and trips is alternative to stabilization requirement and max number of trips each day in control plan (also number of vehicles, earthmoving equip, etc.); for roads with >/=150 vehicles/day implement BACM by 06/10/2004; same for >/=250 vehicles day (existing roads by 06/10/2000)	Maricopa County Rules 310 and 310.01 04/07/2004 and 02/16/2000

6.7 Compliance Tools

Compliance tools assure that the regulatory requirements, including application of dust controls, are being followed. Three major categories of compliance tools are discussed below.

Record keeping: A compliance plan is typically specified in local air quality rules and mandates record keeping of source operation and compliance activities by the source owner/operator. The plan includes a description of how a source proposes to comply with all applicable requirements, log sheets for daily dust control, and schedules for compliance activities and submittal of progress reports to the air quality agency. The purpose of a compliance plan is to provide a consistent reasonable process for documenting air quality violations, notifying alleged violators, and initiating enforcement action to ensure that violations are addressed in a timely and appropriate manner.

Site inspection: This activity includes (1) review of compliance records, (2) proximate inspections (sampling and analysis of source material), and (3) general observations. An inspector can use photography to document compliance with an air quality regulation.

On-site monitoring: EPA has stated that "An enforceable regulation must also contain test procedures in order to determine whether sources are in compliance." Monitoring can include observation of visible plume opacity, surface testing for crust strength and moisture content, and other means for assuring that specified controls are in place.

Table 6-8 summarizes the compliance tools that are applicable for unpaved roads.

Table 6-8. Compliance Tools for Unpaved Roads

Record keeping	Site inspection/monitoring
Road map; traffic volumes, speeds, and patterns; dust suppression equipment and maintenance records; frequencies, amounts, times, and rates for watering and dust suppressants (type); use of water surfactants; calculated control efficiencies; regrading, graveling, or paving of unpaved road segments; control equipment downtime and maintenance records; meteorological log.	Observation of water truck operation and inspection of sources of water; observation of dust plume opacity exceeding a standard; counting of traffic volumes; surface material sampling and analysis for silt and moisture contents; real-time portable monitoring of PM.

6.8 Sample Cost-Effectiveness Calculation

This section is intended to demonstrate how to select a cost-effective control measure for fugitive dust originating from unpaved roads. A sample cost-effectiveness calculation is presented below for a specific control measure (watering) to illustrate the procedure. The sample calculation includes the entire series of steps for estimating uncontrolled emissions (with correction parameters and source extent), controlled emissions, emission reductions, control costs, and control cost-effectiveness values for PM10 and PM2.5. In selecting the most advantageous control measure for unpaved roads, the same procedure is used to evaluate each candidate control measure (utilizing the control measure specific control efficiency and cost data), and the control measure with the most favorable cost-effectiveness and feasibility characteristics is identified.

Sample Calculation for Unpaved Roads at an Industrial Facility

Step 1. Determine source activity and control application parameters.

Road length (mile)	2
Vehicles/day	100
Wet days/year	20
Number of 8-hour workdays/year	260
Number of emission days/yr (workdays without rain)	240
Control Measure	Watering
Control Application/Frequency	Twice daily*
Economic Life of Control System (year)	10
Control Efficiency	55%

* No nighttime traffic.

The number of vehicles per day, wet days per year, workdays per year, and the economic life of the control measure are assumed values for illustrative purposes. Watering has been chosen as the applied control measure. The control application/frequency and control efficiency are default values provided by MRI, 2001.[35]

Step 2. Calculate PM10 Emission Factor. The PM10 emission factor is calculated from the AP-42 equation utilizing the appropriate correction parameters.

$$\mathbf{E\ (lb/VMT) = 1.5\ (s/12)^{0.9}\ (W/3)^{0.45}}$$

s—silt content (%)	15
W—vehicle weight (tons)	15

E = 3.8 lb/VMT

Step 3. Calculate Uncontrolled PM Emissions. The PM10 emission factor (calculated in Step 2) is multiplied by the number of vehicles per day, by the road length and by the number of emission days per year (see activity data) and divided by 2,000 lb/ton to compute the annual PM10 emissions, as follows:

Annual PM10 emissions = (EF x Vehicles/day x Miles x Emission days/yr) / 2,000
Annual PM10 emissions = (3.8 x 100 x 2 x 240) / 2,000 = 91 tons

Annual PM2.5 emissions = 0.1 x PM10 Emissions[23]
Annual PM2.5 emissions = 0.1 x 91 tons = 9.1 tons

Step 4. Calculate Controlled PM Emissions. The controlled PM emissions (i.e., the PM emissions remaining after control) are equal to the uncontrolled emissions (calculated above in Step 3) multiplied by the percentage that uncontrolled emissions are reduced, as follows:

Controlled emissions = Uncontrolled emissions x (1 – Control Efficiency).

For this example, we have selected watering as our control measure. Based on a control efficiency estimate of 55% for the application of water to unpaved roads, the annual controlled emissions estimate are calculated to be:

Annual Controlled PM10 emissions = (91 tons) x (1 – 0.55) = 41 tons
Annual Controlled PM2.5 emissions = (9.1 tons) x (1 – 0.55) = 4.1 tons

Step 5. Determine Annual Cost to Control PM Emissions.

Capital costs ($)	30,000
Annual Operating/Maintenance costs ($)	8,000
Annual Interest Rate	3%
Capital Recovery Factor	0.1172
Annualized Cost ($/yr)	11,517

The capital costs, annual operating and maintenance costs, and annual interest rate (AIR) are assumed values for illustrative purposes. The Capital Recovery Factor (CRF) is calculated from the Annual Interest Rate (AIR) and the Economic Life of the control system, as follows:

$$\text{Capital Recovery Factor} = \text{AIR} \times (1 + \text{AIR})^{\text{Economic life}} / (1 + \text{AIR})^{\text{Economic life}} - 1$$

$$\text{Capital Recovery Factor} = 3\% \times (1 + 3\%)^{10} / (1 + 3\%)^{10} - 1 = 0.1172$$

The Annualized Cost is calculated by adding the product of the Capital Recovery Factor and the Capital costs to the annual Operating/Maintenance costs:

Annualized Cost = (CRF x Capital costs) + Annual Operating/Maintenance costs
Annualized Cost = (0.1172 x 30,000) + 8,000 = $11,517

Step 6. Calculate Cost Effectiveness. Cost effectiveness is calculated by dividing the annualized cost by the emissions reduction. The emissions reduction is determined by subtracting the controlled emissions from the uncontrolled emissions:

Cost effectiveness = Annualized Cost/ (Uncontrolled emissions – Controlled emissions)

Cost effectiveness for PM10 emissions = $11,517 / (91 - 41) = $231/ton
Cost effectiveness for PM2.5 emissions = $11,517 / (9.1 – 4.1) = $2,306/ton

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Table 13.2.4-1. TYPICAL SILT AND MOISTURE CONTENTS OF MATERIALS AT VARIOUS INDUSTRIES[a]

Industry	No. Of Facilities	Material	Silt Content (%)			Moisture Content (%)		
			No. Of Samples	Range	Mean	No. Of Samples	Range	Mean
Iron and steel production	9	Pellet ore	13	1.3 - 13	4.3	11	0.64 - 4.0	2.2
		Lump ore	9	2.8 - 19	9.5	6	1.6 - 8.0	5.4
		Coal	12	2.0 - 7.7	4.6	11	2.8 - 11	4.8
		Slag	3	3.0 - 7.3	5.3	3	0.25 - 2.0	0.92
		Flue dust	3	2.7 - 23	13	1	—	7
		Coke breeze	2	4.4 - 5.4	4.9	2	6.4 - 9.2	7.8
		Blended ore	1	—	15	1	—	6.6
		Sinter	1	—	0.7	0	—	—
		Limestone	3	0.4 - 2.3	1.0	2	ND	0.2
Stone quarrying and processing	2	Crushed limestone	2	1.3 - 1.9	1.6	2	0.3 - 1.1	0.7
		Various limestone products	8	0.8 - 14	3.9	8	0.46 - 5.0	2.1
Taconite mining and processing	1	Pellets	9	2.2 - 5.4	3.4	7	0.05 - 2.0	0.9
		Tailings	2	ND	11	1	—	0.4
Western surface coal mining	4	Coal	15	3.4 - 16	6.2	7	2.8 - 20	6.9
		Overburden	15	3.8 - 15	7.5	0	—	—
		Exposed ground	3	5.1 - 21	15	3	0.8 - 6.4	3.4
Coal-fired power plant	1	Coal (as received)	60	0.6 - 4.8	2.2	59	2.7 - 7.4	4.5
Municipal solid waste landfills	4	Sand	1	—	2.6	1	—	7.4
		Slag	2	3.0 - 4.7	3.8	2	2.3 - 4.9	3.6
		Cover	5	5.0 - 16	9.0	5	8.9 - 16	12
		Clay/dirt mix	1	—	9.2	1	—	14
		Clay	2	4.5 - 7.4	6.0	2	8.9 - 11	10
		Fly ash	4	78 - 81	80	4	26 - 29	27
		Misc. fill materials	1	—	12	1	—	11

[a] References 1-10. ND = no data.

13.2.4.3 Predictive Emission Factor Equations

Total dust emissions from aggregate storage piles result from several distinct source activities within the storage cycle:

1. Loading of aggregate onto storage piles (batch or continuous drop operations).
2. Equipment traffic in storage area.
3. Wind erosion of pile surfaces and ground areas around piles.
4. Loadout of aggregate for shipment or for return to the process stream (batch or continuous drop operations).

Either adding aggregate material to a storage pile or removing it usually involves dropping the material onto a receiving surface. Truck dumping on the pile or loading out from the pile to a truck with a front-end loader are examples of batch drop operations. Adding material to the pile by a conveyor stacker is an example of a continuous drop operation.

The quantity of particulate emissions generated by either type of drop operation, per kilogram (kg) (ton) of material transferred, may be estimated, with a rating of A, using the following empirical expression:[11]

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

$$E = k(0.0032) \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}} \quad \text{(pound [lb]/ton)} \tag{1}$$

where:

E = emission factor
k = particle size multiplier (dimensionless)
U = mean wind speed, meters per second (m/s) (miles per hour [mph])
M = material moisture content (%)

The particle size multiplier in the equation, k, varies with aerodynamic particle size range, as follows:

Aerodynamic Particle Size Multiplier (k) For Equation 1				
< 30 μm	< 15 μm	< 10 μm	< 5 μm	< 2.5 μm
0.74	0.48	0.35	0.20	0.053[a]

[a] Multiplier for < 2.5 μm taken from Reference 14.

The equation retains the assigned quality rating if applied within the ranges of source conditions that were tested in developing the equation, as follows. Note that silt content is included, even though silt content does not appear as a correction parameter in the equation. While it is reasonable to expect that silt content and emission factors are interrelated, no significant correlation between the 2 was found during the derivation of the equation, probably because most tests with high silt contents were conducted under lower winds, and vice versa. It is recommended that estimates from the equation be reduced 1 quality rating level if the silt content used in a particular application falls outside the range given:

Ranges Of Source Conditions For Equation 1			
Silt Content (%)	Moisture Content (%)	Wind Speed	
		m/s	mph
0.44 - 19	0.25 - 4.8	0.6 - 6.7	1.3 - 15

To retain the quality rating of the equation when it is applied to a specific facility, reliable correction parameters must be determined for specific sources of interest. The field and laboratory procedures for aggregate sampling are given in Reference 3. In the event that site-specific values for

13.2.5 Industrial Wind Erosion

13.2.5.1 General[1-3]

Dust emissions may be generated by wind erosion of open aggregate storage piles and exposed areas within an industrial facility. These sources typically are characterized by nonhomogeneous surfaces impregnated with nonerodible elements (particles larger than approximately 1 centimeter [cm] in diameter). Field testing of coal piles and other exposed materials using a portable wind tunnel has shown that (a) threshold wind speeds exceed 5 meters per second (m/s) (11 miles per hour [mph]) at 15 cm above the surface or 10 m/s (22 mph) at 7 m above the surface, and (b) particulate emission rates tend to decay rapidly (half-life of a few minutes) during an erosion event. In other words, these aggregate material surfaces are characterized by finite availability of erodible material (mass/area) referred to as the erosion potential. Any natural crusting of the surface binds the erodible material, thereby reducing the erosion potential.

13.2.5.2 Emissions And Correction Parameters

If typical values for threshold wind speed at 15 cm are corrected to typical wind sensor height (7 - 10 m), the resulting values exceed the upper extremes of hourly mean wind speeds observed in most areas of the country. In other words, mean atmospheric wind speeds are not sufficient to sustain wind erosion from flat surfaces of the type tested. However, wind gusts may quickly deplete a substantial portion of the erosion potential. Because erosion potential has been found to increase rapidly with increasing wind speed, estimated emissions should be related to the gusts of highest magnitude.

The routinely measured meteorological variable that best reflects the magnitude of wind gusts is the fastest mile. This quantity represents the wind speed corresponding to the whole mile of wind movement that has passed by the 1 mile contact anemometer in the least amount of time. Daily measurements of the fastest mile are presented in the monthly Local Climatological Data (LCD) summaries. The duration of the fastest mile, typically about 2 minutes (for a fastest mile of 30 mph), matches well with the half-life of the erosion process, which ranges between 1 and 4 minutes. It should be noted, however, that peak winds can significantly exceed the daily fastest mile.

The wind speed profile in the surface boundary layer is found to follow a logarithmic distribution:

$$u(z) = \frac{u^*}{0.4} \ln \frac{z}{z_o} \qquad (z > z_o) \qquad (1)$$

where:

u = wind speed, cm/s
u^* = friction velocity, cm/s
z = height above test surface, cm
z_o = roughness height, cm
0.4 = von Karman's constant, dimensionless

The friction velocity (u^*) is a measure of wind shear stress on the erodible surface, as determined from the slope of the logarithmic velocity profile. The roughness height (z_o) is a measure of the roughness of the exposed surface as determined from the y intercept of the velocity profile, i. e., the height at which the wind speed is zero. These parameters are illustrated in Figure 13.2.5-1 for a roughness height of 0.1 cm.

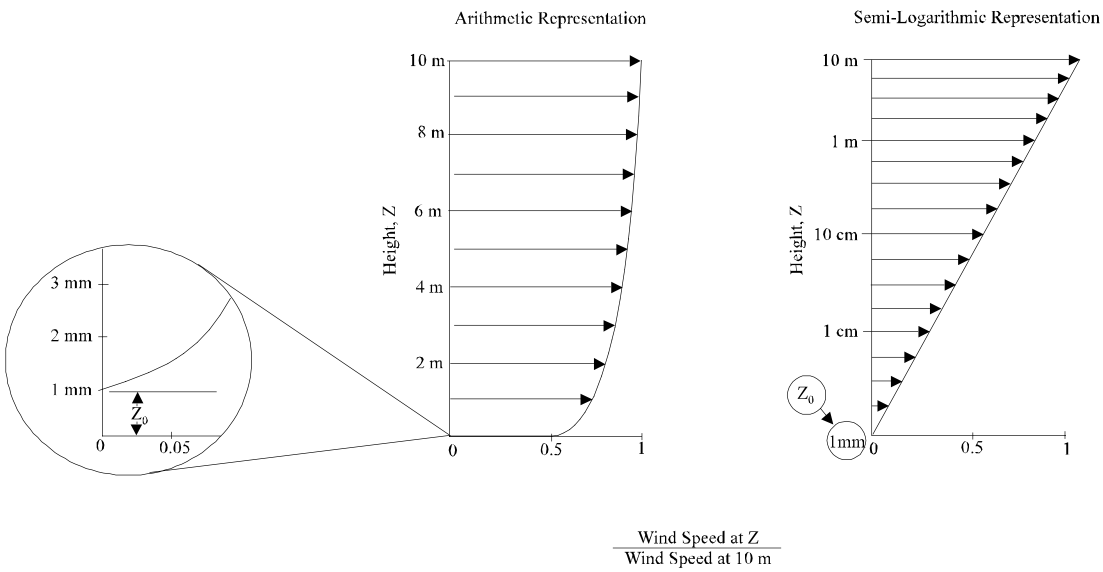


Figure 13.2.5-1. Illustration of logarithmic velocity profile.

Emissions generated by wind erosion are also dependent on the frequency of disturbance of the erodible surface because each time that a surface is disturbed, its erosion potential is restored. A disturbance is defined as an action that results in the exposure of fresh surface material. On a storage pile, this would occur whenever aggregate material is either added to or removed from the old surface. A disturbance of an exposed area may also result from the turning of surface material to a depth exceeding the size of the largest pieces of material present.

13.2.5.3 Predictive Emission Factor Equation[4]

The emission factor for wind-generated particulate emissions from mixtures of erodible and nonerodible surface material subject to disturbance may be expressed in units of grams per square meter (g/m^2) per year as follows:

$$\text{Emission factor} = k \sum_{i=1}^{N} P_i \qquad (2)$$

where:

k = particle size multiplier
N = number of disturbances per year
P_i = erosion potential corresponding to the observed (or probable) fastest mile of wind for the ith period between disturbances, g/m^2

The particle size multiplier (k) for Equation 2 varies with aerodynamic particle size, as follows:

Aerodynamic Particle Size Multipliers For Equation 2			
30 µm	<15 µm	<10 µm	<2.5 µm
1.0	0.6	0.5	0.075[a]

[a] Multiplier for < 2.5 um taken from Reference 11.

This distribution of particle size within the under 30 micrometer (µm) fraction is comparable to the distributions reported for other fugitive dust sources where wind speed is a factor. This is illustrated, for example, in the distributions for batch and continuous drop operations encompassing a number of test aggregate materials (see Section 13.2.4).

In calculating emission factors, each area of an erodible surface that is subject to a different frequency of disturbance should be treated separately. For a surface disturbed daily, N = 365 per year, and for a surface disturbance once every 6 months, N = 2 per year.

The erosion potential function for a dry, exposed surface is:

$$P = 58\ (u^* - u_t^*)^2 + 25\ (u^* - u_t^*)$$
$$P = 0 \text{ for } u^* \leq u_t^* \qquad (3)$$

where:

u^* = friction velocity (m/s)
u_t = threshold friction velocity (m/s)

Because of the nonlinear form of the erosion potential function, each erosion event must be treated separately.

Equations 2 and 3 apply only to dry, exposed materials with limited erosion potential. The resulting calculation is valid only for a time period as long or longer than the period between disturbances. Calculated emissions represent intermittent events and should not be input directly into dispersion models that assume steady-state emission rates.

For uncrusted surfaces, the threshold friction velocity is best estimated from the dry aggregate structure of the soil. A simple hand sieving test of surface soil can be used to determine the mode of the surface aggregate size distribution by inspection of relative sieve catch amounts, following the procedure described below.

FIELD PROCEDURE FOR DETERMINATION OF THRESHOLD FRICTION VELOCITY
(from a 1952 laboratory procedure published by W. S. Chepil):

1. Prepare a nest of sieves with the following openings: 4 mm, 2 mm, 1 mm, 0.5 mm, and 0.25 mm. Place a collector pan below the bottom (0.25 mm) sieve.

2. Collect a sample representing the surface layer of loose particles (approximately 1 cm in depth, for an encrusted surface), removing any rocks larger than about 1 cm in average physical diameter. The area to be sampled should be not less than 30 cm by 30 cm.

3. Pour the sample into the top sieve (4-mm opening), and place a lid on the top.

4. Move the covered sieve/pan unit by hand, using a broad circular arm motion in the horizontal plane. Complete 20 circular movements at a speed just necessary to achieve some relative horizontal motion between the sieve and the particles.

5. Inspect the relative quantities of catch within each sieve, and determine where the mode in the aggregate size distribution lies, i. e., between the opening size of the sieve with the largest catch and the opening size of the next largest sieve.

6. Determine the threshold friction velocity from Table 13.2.5-1.

The results of the sieving can be interpreted using Table 13.2.5-1. Alternatively, the threshold friction velocity for erosion can be determined from the mode of the aggregate size distribution using the graphical relationship described by Gillette.[5-6] If the surface material contains nonerodible elements that are too large to include in the sieving (i. e., greater than about 1 cm in diameter), the effect of the elements must be taken into account by increasing the threshold friction velocity.[10]

Table 13.2.5-1 (Metric Units). FIELD PROCEDURE FOR DETERMINATION OF THRESHOLD FRICTION VELOCITY

Tyler Sieve No.	Opening (mm)	Midpoint (mm)	u_t^* (cm/s)
5	4		
9	2	3	100
16	1	1.5	76
32	0.5	0.75	58
60	0.25	0.375	43

Threshold friction velocities for several surface types have been determined by field measurements with a portable wind tunnel. These values are presented in Table 13.2.5-2.

Table 13.2.5-2 (Metric Units). THRESHOLD FRICTION VELOCITIES

Material	Threshold Friction Velocity (m/s)	Roughness Height (cm)	Threshold Wind Velocity At 10 m (m/s)	
			z_o = Act	z_o = 0.5 cm
Overburden[a]	1.02	0.3	21	19
Scoria (roadbed material)[a]	1.33	0.3	27	25
Ground coal (surrounding coal pile)[a]	0.55	0.01	16	10
Uncrusted coal pile[a]	1.12	0.3	23	21
Scraper tracks on coal pile[a,b]	0.62	0.06	15	12
Fine coal dust on concrete pad[c]	0.54	0.2	11	10

[a] Western surface coal mine. Reference 2.
[b] Lightly crusted.
[c] Eastern power plant. Reference 3.

The fastest mile of wind for the periods between disturbances may be obtained from the monthly LCD summaries for the nearest reporting weather station that is representative of the site in question.[7] These summaries report actual fastest mile values for each day of a given month. Because the erosion potential is a highly nonlinear function of the fastest mile, mean values of the fastest mile are inappropriate. The anemometer heights of reporting weather stations are found in Reference 8, and should be corrected to a 10-m reference height using Equation 1.

To convert the fastest mile of wind (u^+) from a reference anemometer height of 10 m to the equivalent friction velocity (u^*), the logarithmic wind speed profile may be used to yield the following equation:

$$u^* = 0.053\ u_{10}^+ \tag{4}$$

where:

u^* = friction velocity (m/s)

u_{10}^+ = fastest mile of reference anemometer for period between disturbances (m/s)

This assumes a typical roughness height of 0.5 cm for open terrain. Equation 4 is restricted to large relatively flat piles or exposed areas with little penetration into the surface wind layer.

If the pile significantly penetrates the surface wind layer (i. e., with a height-to-base ratio exceeding 0.2), it is necessary to divide the pile area into subareas representing different degrees of exposure to wind. The results of physical modeling show that the frontal face of an elevated pile is exposed to wind speeds of the same order as the approach wind speed at the top of the pile.

For 2 representative pile shapes (conical and oval with flattop, 37-degree side slope), the ratios of surface wind speed (u_s) to approach wind speed (u_r) have been derived from wind tunnel studies.[9] The results are shown in Figure 13.2.5-2 corresponding to an actual pile height of 11 m, a reference (upwind) anemometer height of 10 m, and a pile surface roughness height (z_o) of 0.5 cm. The measured surface winds correspond to a height of 25 cm above the surface. The area fraction within each contour pair is specified in Table 13.2.5-3.

Table 13.2.5-3. SUBAREA DISTRIBUTION FOR REGIMES OF u_s/u_r[a]

Pile Subarea	Percent Of Pile Surface Area			
	Pile A	Pile B1	Pile B2	Pile B3
0.2a	5	5	3	3
0.2b	35	2	28	25
0.2c	NA	29	NA	NA
0.6a	48	26	29	28
0.6b	NA	24	22	26
0.9	12	14	15	14
1.1	NA	NA	3	4

[a] NA = not applicable.

The profiles of u_s/u_r in Figure 13.2.5-2 can be used to estimate the surface friction velocity distribution around similarly shaped piles, using the following procedure:

1. Correct the fastest mile value (u^+) for the period of interest from the anemometer height (z) to a reference height of 10 m u_{10}^+ using a variation of Equation 1:

$$u_{10}^+ = u^+ \frac{\ln (10/0.005)}{\ln (z/0.005)} \tag{5}$$

   where a typical roughness height of 0.5 cm (0.005 m) has been assumed. If a site-specific roughness height is available, it should be used.

2. Use the appropriate part of Figure 13.2.5-2 based on the pile shape and orientation to the fastest mile of wind, to obtain the corresponding surface wind speed distribution (u_s^+)

$$u_s^+ = \frac{(u_s)}{u_r} \quad u_{10}^+ \tag{6}$$

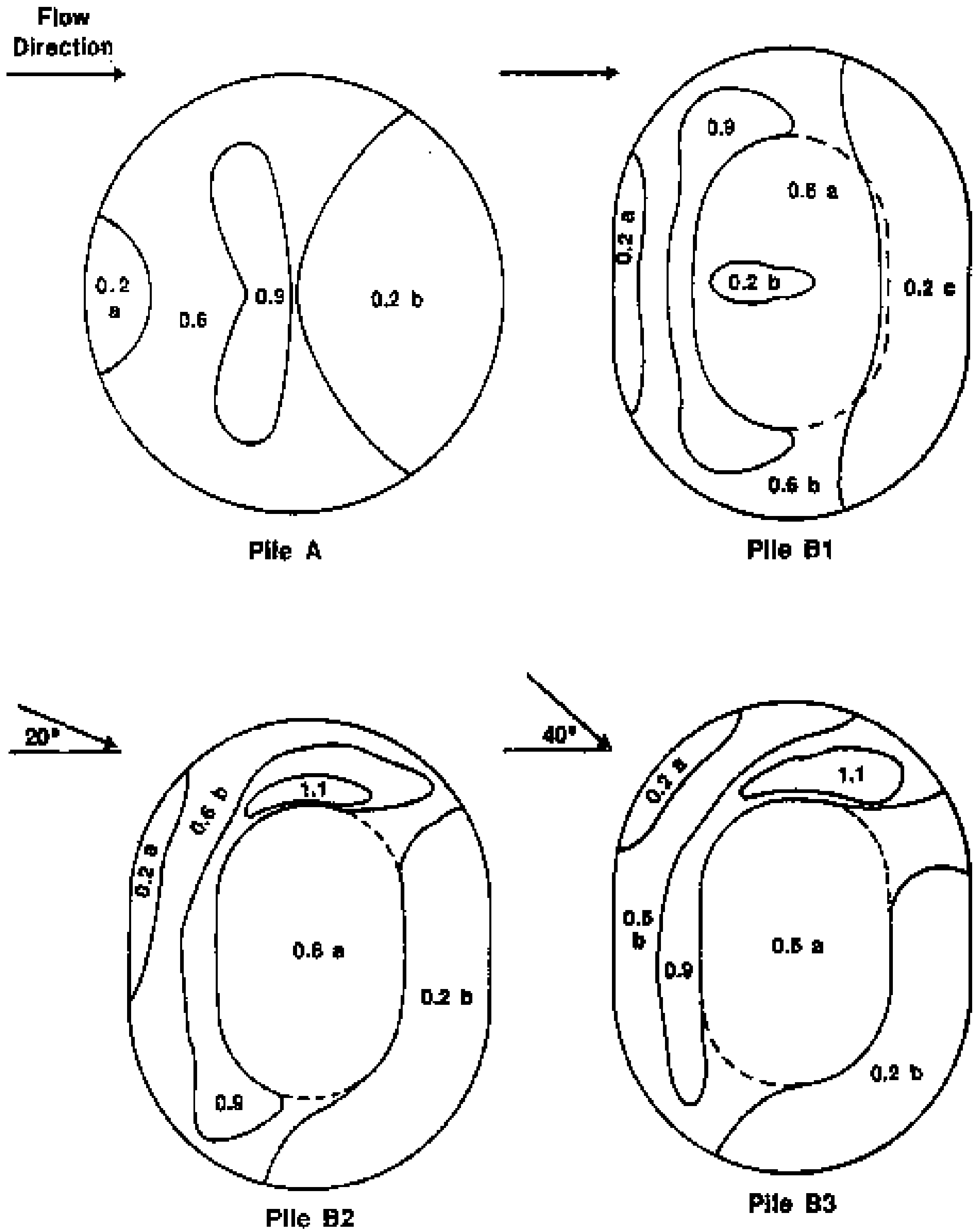


Figure 13.2.5-2. Contours of normalized surface windspeeds, u_s/u_r.

3. For any subarea of the pile surface having a narrow range of surface wind speed, use a variation of Equation 1 to calculate the equivalent friction velocity (u^*):

$$u^* = \frac{0.4\, u_s^+}{\ln \frac{25}{0.5}} = 0.10\, u_s^+ \qquad (7)$$

From this point on, the procedure is identical to that used for a flat pile, as described above.

Implementation of the above procedure is carried out in the following steps:

1. Determine threshold friction velocity for erodible material of interest (see Table 13.2.5-2 or determine from mode of aggregate size distribution).

2. Divide the exposed surface area into subareas of constant frequency of disturbance (N).

3. Tabulate fastest mile values (u^+) for each frequency of disturbance and correct them to 10 m (u^+_{10}) using Equation 5.5

4. Convert fastest mile values (u_{10}) to equivalent friction velocities (u^*), taking into account (a) the uniform wind exposure of nonelevated surfaces, using Equation 4, or (b) the nonuniform wind exposure of elevated surfaces (piles), using Equations 6 and 7.

5. For elevated surfaces (piles), subdivide areas of constant N into subareas of constant u^* (i. e., within the isopleth values of u_s/u_r in Figure 13.2.5-2 and Table 13.2.5-3) and determine the size of each subarea.

6. Treating each subarea (of constant N and u^*) as a separate source, calculate the erosion potential (P_i) for each period between disturbances using Equation 3 and the emission factor using Equation 2.

7. Multiply the resulting emission factor for each subarea by the size of the subarea, and add the emission contributions of all subareas. Note that the highest 24-hour (hr) emissions would be expected to occur on the windiest day of the year. Maximum emissions are calculated assuming a single event with the highest fastest mile value for the annual period.

The recommended emission factor equation presented above assumes that all of the erosion potential corresponding to the fastest mile of wind is lost during the period between disturbances. Because the fastest mile event typically lasts only about 2 minutes, which corresponds roughly to the half-life for the decay of actual erosion potential, it could be argued that the emission factor overestimates particulate emissions. However, there are other aspects of the wind erosion process that offset this apparent conservatism:

1. The fastest mile event contains peak winds that substantially exceed the mean value for the event.

2. Whenever the fastest mile event occurs, there are usually a number of periods of

slightly lower mean wind speed that contain peak gusts of the same order as the fastest mile wind speed.

Of greater concern is the likelihood of overprediction of wind erosion emissions in the case of surfaces disturbed infrequently in comparison to the rate of crust formation.

13.2.5.4 Example 1: Calculation for wind erosion emissions from conically shaped coal pile

A coal burning facility maintains a conically shaped surge pile 11 m in height and 29.2 m in base diameter, containing about 2000 megagrams (Mg) of coal, with a bulk density of 800 kilograms per cubic meter (kg/m^3) (50 pounds per cubic feet [lb/ft^3]). The total exposed surface area of the pile is calculated as follows:

Coal is added to the pile by means of a fixed stacker and reclaimed by front-end loaders operating

$$
\begin{aligned}
S &= \pi r \sqrt{r^2 + h^2} \\
&= 3.14(14.6)\sqrt{(14.6)^2 + (11.0)^2} \\
&= 838\ m^2
\end{aligned}
$$

at the base of the pile on the downwind side. In addition, every 3 days 250 Mg (12.5 percent of the stored capacity of coal) is added back to the pile by a topping off operation, thereby restoring the full capacity of the pile. It is assumed that (a) the reclaiming operation disturbs only a limited portion of the surface area where the daily activity is occurring, such that the remainder of the pile surface remains intact, and (b) the topping off operation creates a fresh surface on the entire pile while restoring its original shape in the area depleted by daily reclaiming activity.

Because of the high frequency of disturbance of the pile, a large number of calculations must be made to determine each contribution to the total annual wind erosion emissions. This illustration will use a single month as an example.

Step 1: In the absence of field data for estimating the threshold friction velocity, a value of 1.12 m/s is obtained from Table 13.2.5-2.

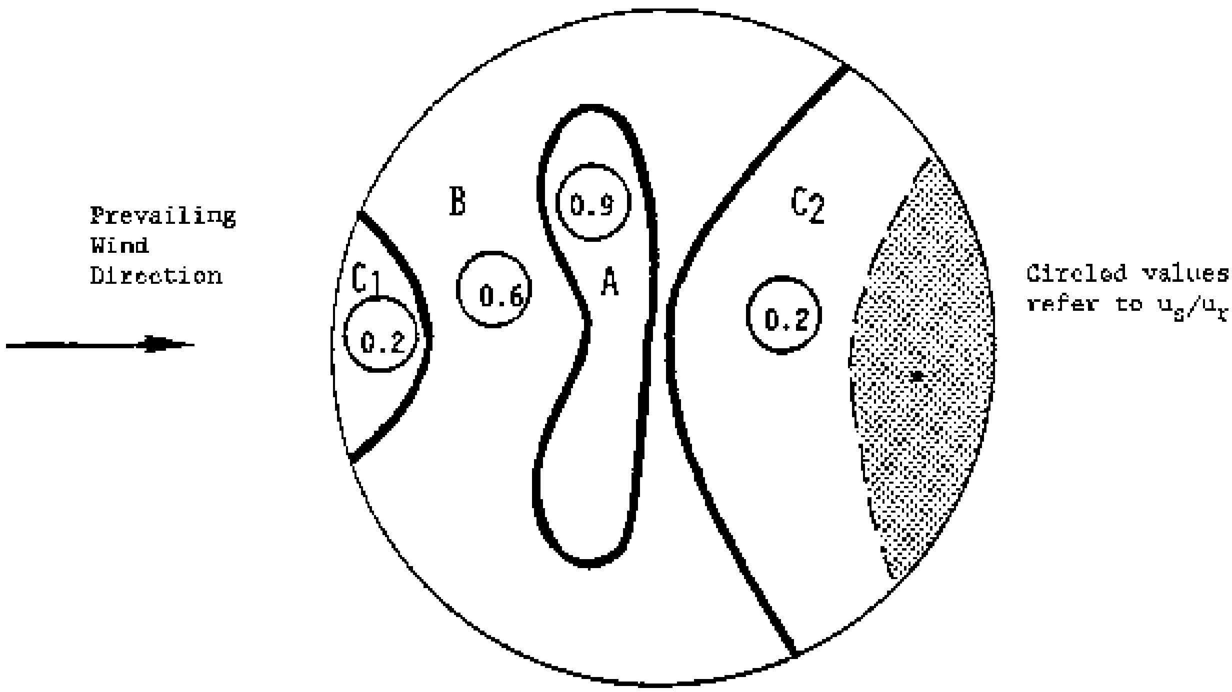
Step 2: Except for a small area near the base of the pile (see Figure 13.2.5-3), the entire pile surface is disturbed every 3 days, corresponding to a value of N = 120 per year. It will be shown that the contribution of the area where daily activity occurs is negligible so that it does not need to be treated separately in the calculations.

Step 3: The calculation procedure involves determination of the fastest mile for each period of disturbance. Figure 13.2.5-4 shows a representative set of values (for a 1-month period) that are assumed to be applicable to the geographic area of the pile location. The values have been separated into 3-day periods, and the highest value in each period is indicated. In this example, the anemometer height is 7 m, so that a height correction to 10 m is needed for the fastest mile values. From Equation 5,

$$u_{10}^{+} = u_{7}^{+} \left(\frac{\ln (10/0.005)}{\ln (7/0.005)} \right)$$

$$u_{10}^{+} = 1.05\ u_{7}^{+}$$

Step 4: The next step is to convert the fastest mile value for each 3-day period into



* A portion of C_2 is disturbed daily by reclaiming activities.

Area ID	$\frac{u_s}{u_r}$	Pile Surface %	Pile Surface Area (m^2)
A	0.9	12	101
B	0.6	48	402
$C_1 + C_2$	0.2	40	335
		Total	838

Figure 13.2.5-3. Example 1: Pile surface areas within each wind speed regime.

Local Climatological Data

Monthly Summary

Wind						
			Fastest Mile			
Resultant Dir.	Resultant Speed M.P.H.	Average Speed M.P.H.	Speed M.P.H.	Direction		Date
13	14	15	16	17		22
30	5.3	6.9	9	36		1
01	10.5	10.6	14	01		2
10	2.4	6.0	10	02		3
13	11.0	11.4	16	13		4
12	11.3	11.9	15	11		5
20	11.1	19.0	29	30		6
29	19.6	19.8	30	30		7
29	10.9	11.2	17	30		8
22	3.0	8.1	15	13		9
14	14.6	15.1	23	12		10
29	22.3	23.3	31	29		11
17	7.9	13.5	23	17		12
21	7.7	15.5	18	18		13
10	4.5	9.6	22	13		14
10	6.7	8.8	13	11		15
01	13.7	13.8	21	36		16
33	11.2	11.5	15	34		17
27	4.3	5.8	12	31		18
32	9.3	10.2	14	35		19
24	7.5	7.8	16	24		20
22	10.3	10.6	16	20		21
32	17.1	17.3	25	32		22
29	2.4	8.5	14	13		23
07	5.9	8.8	15	02		24
34	11.3	11.7	17	32		25
31	12.1	12.2	16	32		26
30	8.3	8.5	16	26		27
30	8.2	8.3	13	32		28
33	5.0	6.6	10	32		29
34	3.1	5.2	9	31		30
29	4.9	5.5	8	25		31
For the Month:						
30	3.3	11.1	31	29		
——	——	——	Date: 11			

Figure 13.2.5-4. Example daily fastest miles wind for periods of interest.

equivalent friction velocities for each surface wind regime (i. e., u_s/u_r ratio) of the pile, using Equations 6 and 7. Figure 13.2.5-3 shows the surface wind speed pattern (expressed as a fraction of the approach wind speed at a height of 10 m). The surface areas lying within each wind speed regime are tabulated below the figure.

The calculated friction velocities are presented in Table 13.2.5-4. As indicated, only 3 of the periods contain a friction velocity which exceeds the threshold value of 1.12 m/s for an uncrusted coal pile. These 3 values all occur within the u_s/u_r = 0.9 regime of the pile surface.

Table 13.2.5-4 (Metric And English Units). EXAMPLE 1:
CALCULATION OF FRICTION VELOCITIES

3-Day Period	u^+_7		u^+_{10}		$u^* = 0.1u^+_s$ (m/s)		
	mph	m/s	mph	m/s	u_s/u_r: 0.2	u_s/u_r: 0.6	u_s/u_r: 0.9
1	14	6.3	15	6.6	0.13	0.40	0.59
2	29	13.0	31	13.7	0.27	0.82	1.23
3	30	13.4	32	14.1	0.28	0.84	1.27
4	31	13.9	33	14.6	0.29	0.88	1.31
5	22	9.8	23	10.3	0.21	0.62	0.93
6	21	9.4	22	9.9	0.20	0.59	0.89
7	16	7.2	17	7.6	0.15	0.46	0.68
8	25	11.2	26	11.8	0.24	0.71	1.06
9	17	7.6	18	8.0	0.16	0.48	0.72
10	13	5.8	14	6.1	0.12	0.37	0.55

Step 5: This step is not necessary because there is only 1 frequency of disturbance used in the calculations. It is clear that the small area of daily disturbance (which lies entirely within the u_s/u_r = 0.2 regime) is never subject to wind speeds exceeding the threshold value.

Steps 6 and 7: The final set of calculations (shown in Table 13.2.5-5) involves the tabulation and summation of emissions for each disturbance period and for the affected subarea. The erosion potential (P) is calculated from Equation 3.

For example, the calculation for the second 3-day period is:

$$P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P_2 = 58(1.23 - 1.12)^2 + 25(1.23 - 1.12)$$

$$= 0.70 + 2.75 = 3.45 \ g/m^2$$

Table 13.2.5-5 (Metric Units). EXAMPLE 1: CALCULATION OF PM-10 EMISSIONS[a]

3-Day Period	u^* (m/s)	$u^* - u_t^*$ (m/s)	P (g/m^2)	ID	Pile Surface Area (m^2)	kPA (g)
2	1.23	0.11	3.45	A	101	170
3	1.27	0.15	5.06	A	101	260
4	1.31	0.19	6.84	A	101	350
TOTAL						780

[a] Where u_t^* = 1.12 m/s for uncrusted coal and k = 0.5 for PM-10.

The emissions of particulate matter greater than 10 µm (PM-10) generated by each event are found as the product of the PM-10 multiplier (k = 0.5), the erosion potential (P), and the affected area of the pile (A).

As shown in Table 13.2.5-5, the results of these calculations indicate a monthly PM-10 emission total of 780 g.

13.2.5.5 Example 2: Calculation for wind erosion from flat area covered with coal dust

A flat circular area 29.2 m in diameter is covered with coal dust left over from the total reclaiming of a conical coal pile described in the example above. The total exposed surface area is calculated as follows:

$$s = \frac{\pi}{4} d^2 = 0.785\ (29.2)^2 = 670\ m^2$$

This area will remain exposed for a period of 1 month when a new pile will be formed.

Step 1: In the absence of field data for estimating the threshold friction velocity, a value of 0.54 m/s is obtained from Table 13.2.5-2.

Step 2: The entire surface area is exposed for a period of 1 month after removal of a pile and N = 1/yr.

Step 3: From Figure 13.2.5-4, the highest value of fastest mile for the 30-day period (31 mph) occurs on the 11th day of the period. In this example, the reference anemometer height is 7 m, so that a height correction is needed for the fastest mile value. From Step 3 of the previous example, $u^+_{10} = 1.05\ u^+_7$, so that u^+_{10} = 33 mph.

Step 4: Equation 4 is used to convert the fastest mile value of 14.6 m/s (33 mph) to an equivalent friction velocity of 0.77 m/s. This value exceeds the threshold friction velocity from Step 1 so that erosion does occur.

Step 5: This step is not necessary, because there is only 1 frequency of disturbance for the entire source area.

Steps 6 and 7: The PM-10 emissions generated by the erosion event are calculated as the product of the PM-10 multiplier (k = 0.5), the erosion potential (P) and the source area (A). The erosion potential is calculated from Equation 3 as follows:

$$P = 58(u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 58(0.77 - 0.54)^2 + 25(0.77 - 0.54)$$

$$= 3.07 + 5.75$$

$$= 8.82 \text{ g/m}^2$$

Thus the PM-10 emissions for the 1-month period are found to be:

$$E = (0.5)(8.82 \text{ g/m}^2)(670 \text{ m}^2)$$

$$= 3.0 \text{ kg}$$

References For Section 13.2.5

1. C. Cowherd, Jr., "A New Approach To Estimating Wind Generated Emissions From Coal Storage Piles", Presented at the APCA Specialty Conference on Fugitive Dust Issues in the Coal Use Cycle, Pittsburgh, PA, April 1983.

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3. G. E Muleski, "Coal Yard Wind Erosion Measurement", Midwest Research Institute, Kansas City, MO, March 1985.

4. *Update Of Fugitive Dust Emissions Factors In AP-42 Section 11.2 — Wind Erosion*, MRI No. 8985-K, Midwest Research Institute, Kansas City, MO, 1988.

5. W. S. Chepil, "Improved Rotary Sieve For Measuring State And Stability Of Dry Soil Structure", *Soil Science Society Of America Proceedings*, *16*:113-117, 1952.

6. D. A. Gillette, *et al.*, "Threshold Velocities For Input Of Soil Particles Into The Air By Desert Soils", *Journal Of Geophysical Research*, *85*(C10):5621-5630.

7. Local Climatological Data, National Climatic Center, Asheville, NC.

8. M. J. Changery, *National Wind Data Index Final Report*, HCO/T1041-01 UC-60, National Climatic Center, Asheville, NC, December 1978.

9. B. J. B. Stunder and S. P. S. Arya, "Windbreak Effectiveness For Storage Pile Fugitive Dust Control: A Wind Tunnel Study", *Journal Of The Air Pollution Control Association*, *38*:135-143, 1988.

10. 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.

11. C. Cowherd, *Background Document for Revisions to Fine Fraction Ratios Used 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.

13.2.6 Abrasive Blasting

13.2.6.1 General[1-2]

Abrasive blasting is the use of abrasive material to clean or texturize a material such as metal or masonry. Sand is the most widely used blasting abrasive. Other abrasive materials include coal slag, smelter slags, mineral abrasives, metallic abrasives, and synthetic abrasives. Industries that use abrasive blasting include the shipbuilding industry, automotive industry, and other industries that involve surface preparation and painting. The majority of shipyards no longer use sand for abrasive blasting because of concerns about silicosis, a condition caused by respiratory exposure to crystalline silica. In 1991, about 4.5 million tons of abrasives, including 2.5 million tons of sand, 1 million tons of coal slag, 500 thousand tons of smelter slag, and 500 thousand tons of other abrasives were used for domestic abrasive blasting operations.

13.2.6.2 Process Description[1-9]

Abrasive blasting systems typically include three essential components: an abrasive container (i. e., blasting pot); a propelling device; and a blasting nozzle or nozzles. The exact equipment used depends to a large extent on the specific application and type(s) of abrasive.

Three basic methods can be used to project the abrasive towards the surface being cleaned: air pressure; centrifugal wheels; or water pressure. Air blast (or dry) systems use compressed air to propel the abrasive using either a suction-type or pressure-type process. Centrifugal wheel systems use a rotating impeller to mechanically propel the abrasive by a combination of centrifugal and inertial forces. Finally, the water (or wet) blast method uses either air pressure or water pressure to propel an abrasive slurry towards the cleaned surface.

Abrasive materials used in blasting can generally be classified as sand, slag, metallic shot or grit, synthetic, or other. The cost and properties associated with the abrasive material dictate its application. The following discusses the general classes of commonly used abrasives.

Silica sand is commonly used for abrasive blasting where reclaiming is not feasible, such as in unconfined abrasive blasting operations. Sand has a rather high breakdown rate, which can result in substantial dust generation. Worker exposure to free crystalline silica is of concern when silica sand is used for abrasive blasting.

Coal and smelter slags are commonly used for abrasive blasting at shipyards. Black Beauty™, which consists of crushed slag from coal-fired utility boilers, is a commonly used slag. Slags have the advantage of low silica content, but have been documented to release other contaminants, including hazardous air pollutants (HAP), into the air.

Metallic abrasives include cast iron shot, cast iron grit, and steel shot. Cast iron shot is hard and brittle and is produced by spraying molten cast iron into a water bath. Cast iron grit is produced by crushing oversized and irregular particles formed during the manufacture of cast iron shot. Steel shot is produced by blowing molten steel. Steel shot is not as hard as cast iron shot, but is much more durable. These materials typically are reclaimed and reused.

Synthetic abrasives, such as silicon carbide and aluminum oxide, are becoming popular substitutes for sand. These abrasives are more durable and create less dust than sand. These materials typically are reclaimed and reused.

Other abrasives include mineral abrasives (such as garnet, olivine, and staurolite), cut plastic, glass beads, crushed glass, and nutshells. As with metallic and synthetic abrasives, these other abrasives are generally used in operations where the material is reclaimed. Mineral abrasives are reported to create significantly less dust than sand and slag abrasives.

The type of abrasive used in a particular application is usually specific to the blasting method. Dry blasting is usually done with sand, metallic grit or shot, aluminum oxide (alumina), or silicon carbide. Wet blasters are operated with either sand, glass beads, or other materials that remain suspended in water.

13.2.6.3 Emissions And Controls[1,3,5-11]

Emissions —

Particulate matter (PM) and particulate HAP are the major concerns relative to abrasive blasting. Table 13.2.6-1 presents total PM emission factors for abrasive blasting as a function of wind speed. Higher wind speeds increase emissions by enhanced ventilation of the process and by retardation of coarse particle deposition.

Table 13.2.6-1 also presents fine particulate emission factors for abrasive blasting. Emission factors are presented for PM-10 and PM-2.5, which denote particles equal to or smaller than 10 and 2.5 microns in aerodynamic diameter, respectively. Emissions of PM of these size fractions are not significantly wind-speed dependent. Table 13.2.6-1 also presents an emission factor for controlled emissions from an enclosed abrasive blasting operation controlled by a fabric filter; the blasting media was 30/40 mesh garnet.

Limited data from Reference 3 give a comparison of total PM emissions from abrasive blasting using various media. The study indicates that, on the basis of tons of abrasive used, total PM emissions from abrasive blasting using grit are about 24 percent of total PM emissions from abrasive blasting with sand. The study also indicates that total PM emissions from abrasive blasting using shot are about 10 percent of total PM emissions from abrasive blasting with sand.

Hazardous air pollutants, typically particulate metals, are emitted from some abrasive blasting operations. These emissions are dependent on both the abrasive material and the targeted surface.

Controls —

A number of different methods have been used to control the emissions from abrasive blasting. Theses methods include: blast enclosures; vacuum blasters; drapes; water curtains; wet blasting; and reclaim systems. Wet blasting controls include not only traditional wet blasting processes but also high pressure water blasting, high pressure water and abrasive blasting, and air and water abrasive blasting. For wet blasting, control efficiencies between 50 and 93 percent have been reported. Fabric filters are used to control emissions from enclosed abrasive blasting operations.

Table 13.2.6-1. PARTICULATE EMISSION FACTORS FOR ABRASIVE BLASTING[a]

EMISSION FACTOR RATING: E

Source	Particle size	Emission factor, lb/1,000 lb abrasive
Sand blasting of mild steel panels[b] (SCC 3-09-002-02)	Total PM	
	5 mph wind speed	27
	10 mph wind speed	55
	15 mph wind speed	91
	PM-10[c]	13
	PM-2.5[c]	1.3
Abrasive blasting of unspecified metal parts, controlled with a fabric filter[d] (SCC 3-09-002-04)	Total PM	0.69

a One lb/1,000 lb is equal to 1 kg/Mg. Factors represent uncontrolled emissions, unless noted. SCC = Source Classification Code.

b Reference 10.

c Emissions of PM-10 and PM-2.5 are not significantly wind-speed dependent.

d Reference 11. Abrasive blasting with garnet blast media.

References For Section 13.2.6

1. C. Cowherd and J. Kinsey, *Development Of Particulate And Hazardous Emission Factors For Outdoor Abrasive Blasting*, EPA Contract No. 68-D2-0159, Midwest Research Institute, Kansas City, MO, June 1995.

2. Written communication from J. D. Hansink, Barton Mines Corporation, Golden, CO, to Attendees of the American Waterways Shipyard Conference, Pedido Beach, AL, October 28, 1991.

3. South Coast Air Quality Management District, *Section 2: Unconfined Abrasive Blasting*, Draft Document, El Monte, CA, September 8, 1988.

4. A. W. Mallory, "Guidelines For Centrifugal Blast Cleaning", *J. Protective Coatings And Linings, 1(1)*, June 1984.

5. B. Baldwin, "Methods Of Dust-Free Abrasive Blast Clearing", *Plant Engineering, 32(4)*, February 16, 1978.

6. B. R Appleman and J. A. Bruno, Jr., "Evaluation Of Wet Blast Cleaning Units", *J. Protective Coatings And Linings*, *2(8)*, August 1985.

7. M. K. Snyder and D. Bendersky, *Removal Of Lead-Based Bridge Paints*, NCHRP Report 265, Transportation Research Board, Washington, DC, December 1983.

8. J. A. Bruno, "Evaluation Of Wet Abrasive Blasting Equipment", *Proceedings Of The 2nd Annual International Bridge Conference*, Pittsburgh, PA, June 17-19, 1985.

9. J. S. Kinsey, *Assessment Of Outdoor Abrasive Blasting*, Interim Report, EPA Contract No. 68-02 4395, Work Assignment No. 29, U. S. Environmental Protection Agency, Research Triangle Park, NC, September 11, 1989.

10. J. S. Kinsey, S. Schliesser, P. Murowchick, and C. Cowherd, *Development Of Particulate Emission Factors For Uncontrolled Abrasive Blasting Operations*, EPA Contract No. 68-D2-0159, Midwest Research Institute, Kansas City, MO, February 1995.

11. *Summary Of Source Test Results, Poly Engineering, Richmond, CA*, Bay Area Air Quality Management District, San Francisco, CA, November 19, 1990.

12. *Emission Factor Documentation For AP-42 Section 13.2.6, Abrasive Blasting, Final Report*, Midwest Research Institute, Cary, NC, September 1997.

Starch Storage Bin
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Table 9.9.7-1 (Metric And English Units). PARTICULATE MATTER EMISSION FACTORS FOR CORN WET MILLING OPERATIONS[a]

EMISSION FACTOR RATING: E

Emission Source	Type Of Control	Filterable PM[b]	
		kg/Mg	lb/ton
Grain receiving[c] (trucks) (SCC 3-02-007-51)	Fabric filter	0.016	0.033
Grain handling[c] (legs, belts, etc.) (SCC 3-02-007-52)	None	0.43	0.87
Grain cleaning[d] (SCC 3-02-007-53)	None	0.82	1.6
Grain cleaning[d] (SCC 3-02-007-53)	Cyclone	0.086	0.17
Starch storage bin[e] (SCC 3-02-014-07)	Fabric filter	0.0007	0.0014
Starch bulk loadout[f] (SCC 3-02-014-08)	Fabric filter	0.00025	0.00049
Gluten feed drying			
Direct-fired rotary dryers[g] (SCC 3-02-007-63)	Product recovery cyclone	0.13	0.27
Indirect-fired rotary dryers[g] (SCC 3-02-007-64)	Product recovery cyclone[h]	0.25	0.49
Starch drying			
Flash dryers[j] (SCC 3-02-014-10, -12)	Wet scrubber	0.29	0.59
Spray dryers[k] (SCC 3-02-014-11, -13)	Fabric filter	0.080	0.16
Gluten drying			
Direct-fired rotary dryers[g] (SCC 3-02-007-68)	Product recovery cyclone	0.13	0.27
Indirect-fired rotary dryers[g] (SCC 3-02-007-69)	Product recovery cyclone	0.25	0.49
Fiber drying (SCC 3-02-007-67)	ND	ND	ND
Germ drying (SCC 3-02-007-66)	ND	ND	ND
Dextrose drying (SCC 3-02-007-70)	ND	ND	ND
Degerminating mills (SCC 3-02-007-65)	ND	ND	ND
Milling (SCC 3-02-007-56)	ND	ND	ND

Table 9.9.7-1 (cont.).

[a] For grain transfer and handling operations, factors are for an aspirated collection system of 1 or more capture hoods ducted to a particulate collection device. Because of natural removal processes, uncontrolled emissions may be overestimated. ND = no data. SCC = Source Classification Code.
[b] Emission factors based on weight of PM, regardless of size, per unit weight of corn throughput unless noted.
[c] Assumed to be similar to country grain elevators (see Section 9.9.1).
[d] Assumed to be similar to country grain elevators (see Section 9.9.1). If 2 cleaning stages are used, emission factor should be doubled.
[e] Reference 9.
[f] Reference 9. Emission factor based on weight of PM per unit weight of starch loaded.
[g] Reference 10. Type of material dried not specified, but expected to be gluten meal or gluten feed. Emission factor based on weight of PM, regardless of size, per unit weight of gluten meal or gluten feed produced.
[h] Includes data for 4 (out of 9) dryers known to be vented through product recovery cyclones, and other systems are expected to have such cyclones. Emission factor based on weight of PM, regardless of size, per unit weight of gluten meal or gluten feed produced.
[j] References 11-13. EMISSION FACTOR RATING: D. Type of material dried is starch, but whether the starch is modified or unmodified is not known. Emission factor based on weight of PM, regardless of size, per unit weight of starch produced.
[k] Reference 14. Type of material dried is starch, but whether the starch is modified or unmodified is not known. Emission factor based on weight of PM, regardless of size, per unit weight of starch produced.

Table 9.9.7-2 (Metric And English Units). EMISSION FACTORS FOR CORN WET MILLING OPERATIONS

Emission Source	Type Of Control	VOC		SO_2	
		kg/Mg	lb/ton	kg/Mg	lb/ton
Steeping (SCC 3-02-007-61)	ND	ND	ND	ND	ND
Evaporators (SCC 3-02-007-62)	ND	ND	ND	ND	ND
Gluten feed drying (SCC 3-02-007-63, -64)	ND	ND	ND	ND	ND
Germ drying (SCC 3-02-007-66)	ND	ND	ND	ND	ND
Fiber drying (SCC 3-02-007-67)	ND	ND	ND	ND	ND
Gluten drying (SCC 3-02-007-68, -69)	ND	ND	ND	ND	ND
Starch drying (SCC 3-02-014-10, -11, -12, -13)	ND	ND	ND	ND	ND
Dextrose drying (SCC 3-02-007-70)	ND	ND	ND	ND	ND
Oil expelling/extraction (SCC 3-02-019-16)	ND	ND	ND	ND	ND

ND = no data. SCC = Source Classification Code.

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Table B.2-1. PARTICLE SIZE CATEGORY BY AP-42 SECTION

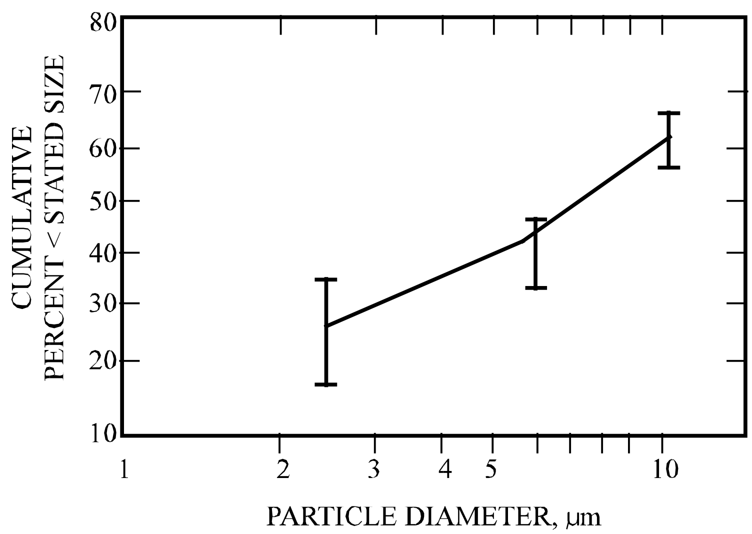
AP-42 Section	Source Category	Category Number*
	External combustion	
1.1	Bituminous and subbituminous coal combustion	a
1.2	Anthracite coal combustion	a
1.3	Fuel oil combustion	
	Residual oil	
	Utility	a
	Commercial	a
	Distillate oil	
	Utility	a
	Commercial	a
	Residential	a
1.4	Natural gas combustion	a
1.5	Liquefied petroleum gas	a
1.6	Wood waste combustion in boilers	a
1.7	Lignite combustion	a
1.8	Bagasse combustion	b
1.9	Residential fireplaces	a
1.10	Residential wood stoves	a
1.11	Waste oil combustion	a
	Solid waste disposal	
2.1	Refuse combustion	a
2.2	Sewage sludge incineration	a
2.7	Conical burners (wood waste)	2
	Internal combustion engines	
	Highway vehicles	c
3.2	Off highway vehicles	1
	Organic chemical processes	
6.4	Paint and varnish	4
6.5	Phthalic anhydride	9
6.8	Soap and detergents	a
	Inorganic chemical processes	
8.2	Urea	a
8.3	Ammonium nitrate fertilizers	a
8.4	Ammonium sulfate	
	Rotary dryer	b
	Fluidized bed dryer	b
8.5	Phosphate fertilizers	3
8.5.3	Ammonium phosphates	
	Reactor/ammoniator-granulator	4
	Dryer/cooler	4
8.7	Hydrofluoric acid	
	Spar drying	3
	Spar handling	3
	Transfer	3
8.9	Phosphoric acid (thermal process)	a
8.10	Sulfuric acid	b
8.12	Sodium carbonate	a
	Food and agricultural	
9.3.1	Defoliation and harvesting of cotton	
	Trailer loading	6
	Transport	6
9.3.2	Harvesting of grain	
	Harvesting machine	6
	Truck loading	6
	Field transport	6
9.5.2	Meat smokehouses	9
9.7	Cotton ginning	b
9.9.1	Grain elevators and processing plants	a
9.9.4	Alfalfa dehydrating	
	Primary cyclone	b
	Meal collector cyclone	7
	Pellet cooler cyclone	7
	Pellet regrind cyclone	7
9.9.7	Starch manufacturing	7
9.12	Fermentation	6,7
9.13.2	Coffee roasting	6
	Wood products	
10.2	Chemical wood pulping	a
10.7	Charcoal	9
	Mineral products	
11.1	Hot mix asphalt plants	a
11.3	Bricks and related clay products	
	Raw materials handling	
	Dryers, grinders, etc.	b

Table B.2.2 (cont.).

Category: 7
Process: Grain Processing
Material: Grain

Category 7 covers grain processing operations such as drying, screening, grinding, and milling. The particulate emissions are generated during forced air flow, separation, or size reduction.

REFERENCES: 1-2



Particle Size, µm	Cumulative % ≤ Stated Size (Uncontrolled)	Minimum Value	Maximum Value	Standard Deviation
1.0[a]	8			
2.0[a]	18			
2.5	23	17	34	9
3.0[a]	27			
4.0[a]	34			
5.0[a]	40			
6.0	43	35	48	7
10.0	61	56	65	5

[a] Value calculated from data reported at 2.5, 6.0, and 10.0 µm. No statistical parameters are given for the calculated value.

Section 8

Map(s)

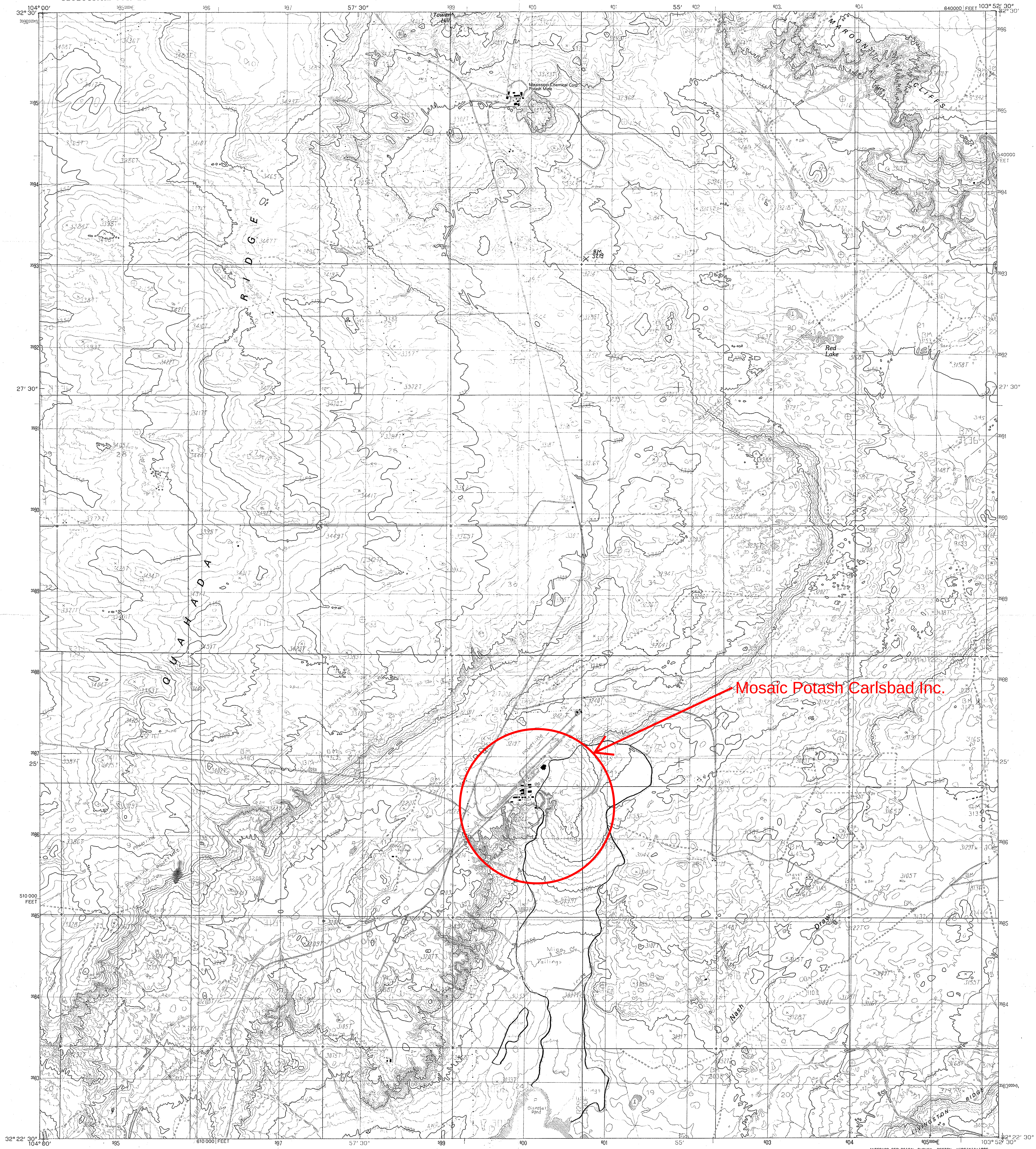
A map such as a 7.5 minute topographic quadrangle showing the exact location of the source. The map shall also include the following:

The UTM or Longitudinal coordinate system on both axes	An indicator showing which direction is north
A minimum radius around the plant of 0.8km (0.5 miles)	Access and haul roads
Topographic features of the area	Facility property boundaries
The name of the map	The area which will be restricted to public access
A graphical scale	

Please see the enclosed quad map.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

TOWER HILL SOUTH QUADRANGLE
NEW MEXICO-EDDY CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY
CONTROL BY . . . . USGS, NOS/NOAA
COMPILED FROM AERIAL PHOTOGRAPHS TAKEN 1977
FIELD CHECKED . . . . . . 1978 MAP EDITED 1985
PROJECTION . . . . . . TRANSVERSE MERCATOR
GRID: 1000-METER UNIVERSAL TRANSVERSE MERCATOR . . . . . . ZONE 13
10,000-FOOT STATE GRID TICKS . . . . . . NEW MEXICO, EAST ZONE
UTM GRID DECLINATION . . . . . . 0°43' EAST
1985 MAGNETIC NORTH DECLINATION . . . . . . 9°30' EAST
VERTICAL DATUM . . . . . . NATIONAL GEODETIC VERTICAL DATUM OF 1929
HORIZONTAL DATUM . . . . . . 1927 NORTH AMERICAN DATUM

To place on the predicted North American Datum of 1983, move the projection lines as shown by dashed corner ticks (9 meters south and 46 meters east)

There may be private inholdings within the boundaries of any Federal and State Reservations shown on this map

All marginal data and lettering generated and positioned by automated type placement procedures

Land lines have not been established in area

NORTH

PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of field check. 3

SCALE 1:24 000

CONTOUR INTERVAL 10 FEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225
OR RESTON, VIRGINIA 22092

QUADRANGLE LOCATION

1	2	3
4		5
6	7	8

1 Illinois Camp SE
2 Tower Hill North
3 Williams Sink
4 Indian Flats
5 Livingston Ridge
6 Loving
7 Remuda Basin
8 Los Medanos

ADJOINING 7.5' QUADRANGLE NAMES

INTERIOR-GEOLOGICAL SURVEY, RESTON, VIRGINIA-1986

ROAD LEGEND

Improved Road
Unimproved Road
Trail
Interstate Route U.S. Route State Route

TOWER HILL SOUTH, NEW MEXICO
PROVISIONAL EDITION 1985

32103-D8-TF-024

NOTE: *These complimentary copies are sent for your review and comment. Mark any corrections or comments on one copy and return using the enclosed envelope. If no comments, both copies may be retained for your use. Information you provide will aid in future updating or revision of this map.*

*Signature*________ *Address*________

*Title*________

*Date*________

Section 9

Not Required for Title V Applications

Proof of Public Notice

(for NSR applications submitting under 20.2.72 or 20.2.74 NMAC)
(This proof is required by: 20.2.72.203.A.14 NMAC "Documentary Proof of applicant's public notice")

☐ **I have read the AQB "Guidelines for Public Notification for Air Quality Permit Applications"**
This document provides detailed instructions about public notice requirements for various permitting actions. It also provides public notice examples and certification forms. Material mistakes in the public notice will require a re-notice before issuance of the permit.

Unless otherwise allowed elsewhere in this document, the following items document proof of the applicant's Public Notification. Please include this page in your proof of public notice submittal with checkmarks indicating which documents are being submitted with the application.

New Permit and **Significant Permit Revision** public notices must include all items in this list.

Technical Revision public notices require only items 1, 5, 9, and 10.

Per the Guidelines for Public Notification document mentioned above, include:

1. ☐ A copy of the certified letter receipts with post marks (20.2.72.203.B NMAC)
2. ☐ A list of the places where the public notice has been posted in at least four publicly accessible and conspicuous places, including the proposed or existing facility entrance. (e.g: post office, library, grocery, etc.)
3. ☐ A copy of the property tax record (20.2.72.203.B NMAC).
4. ☐ A sample of the letters sent to the owners of record.
5. ☐ A sample of the letters sent to counties, municipalities, and Indian tribes.
6. ☐ A sample of the public notice posted and a verification of the local postings.
7. ☐ A table of the noticed citizens, counties, municipalities and tribes and to whom the notices were sent in each group.
8. ☐ A copy of the public service announcement (PSA) sent to a local radio station and documentary proof of submittal.
9. ☐ A copy of the classified or legal ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
10. ☐ A copy of the display ad including the page header (date and newspaper title) or its affidavit of publication stating the ad date, and a copy of the ad. When appropriate, this ad shall be printed in both English and Spanish.
11. ☐ A map with a graphic scale showing the facility boundary and the surrounding area in which owners of record were notified by mail. This is necessary for verification that the correct facility boundary was used in determining distance for notifying land owners of record.

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.

The Mosaic Potash facility is a potash mine and mill that produces fertilizer products from langbeinite ore. The major processes associated with the facility are mining, crushing, screening, granulation, leaching, drying, storing, and loading. The facility consists of an underground mine and surface mill capable of processing 17,500 tpd of langbeinite ore and 9,600 tpd of cuttings. The plant operates 24 hours per day, 365 days per year. Additional process details are provided in the following paragraphs.

Langbeinite Process – Langbeinite (LANG, aka K-Mag) ore is hoisted 900 feet from the underground mine to the surface at a maximum rate of 17,500 tpd and emptied into a bin. The bin discharges raw ore onto a belt conveyor that transports the ore one-half mile to a crushing circuit. In the crushing circuit, raw ore is screened and the undersized material goes to a fine ore bin while the oversized material is sent to an impact crusher and then rescreened. The fine ore bin discharges material onto a fine ore belt for transport to the wet processing circuit where impurities are removed from the ore. Reagents are used to separate the desired langbeinite from the impurities. The dry reagent is hauled to the plant where it is slurried and added to the wet process stream. After the wet circuit, the langbeinite material is dewatered over a belt filter and then dried in a rotary dryer. The dried langbeinite is sized by several screens in a screening tower, and the various size grades are dispatched to warehouses and sold as either granular, standard, or special standard K-Mag.

Langbeinite Granulation Process – Approximately 30-50% of the langbeinite product is transferred to a granulation circuit for further processing. This material is finely ground in two Raymond Mills and injected into a rotating drum granulator with binder material to form uniform, BB-sized granules that are then dried in a rotary dryer. The dried product is sized by screening, and the optimal sized product is dispatched to a warehouse. Over and undersized product is recycled through the granulation circuit.

Cuttings Circuit – Cuttings are hoisted from the underground mine to the surface at a maximum rate of 9,600 tpd and processed in one of the old Muriate circuits, which is also referred to as the "Nash Plant". The cuttings are emptied into a bin that discharges onto a belt, which transports the ore to a screening circuit. The material is screened and all the oversized material gets crushed and recycled back to the belt that feeds the screen, while the appropriately-sized material gets slurried and pumped to the tailings pile.

Storage and Loading – Langbeinite product is stored in two main warehouses (Warehouse Nos. 2 and 3). Approximately 95% of the products are shipped by rail from two loadouts (S&L Loadout Nos. 4 and 5) and the remaining ~5% is loaded into trucks at one truck loadout (S&L Truck Loadout). Warehouse No. 1 remains in use as surplus storage.

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)**:**

- Nash Plant Hoist and Screening (FUG1,2)
- LANG Hoist (STK4-CON4/FUG3,25,26)
- LANG Crusher (STK5a-CON5a/FUG27,28)
- LANG Fine Ore Bin (STK5b-CON5b/FUG29)
- LANG Dryer (STK6-CON6/FUG30)
- LANG Screens (STK7-CON7/FUG30)
- GRAN Dryer 10a (STK10ab-CON10a/FUG33)
- GRAN Process Ventilation 10b (STK10ab-CON10b/FUG33)
- GRAN Process Ventilation 10c (STK14-CON14/FUG24)
- Dispatch Transfer Tower (STK11-CON11/FUG32)
- S&L Boiler (STK20)
- S&L Warehouse 1 (FUG6)
- S&L Warehouse 2 (FUG8)
- S&L Warehouse 3 (FUG11)
- S&L Loadout 4 (FUG9)
- S&L Loadout 5 (FUG10)
- S&L Truck Loadout (FUG12)
- S&L Dispatch (FUG31,32)
- Railcar Offloading (FUG43)
- GRAN Reclaim (FUG44)
- K-Mag Rehandling (FUG50)
- Brine Circuit (FUG52)
- Reagent (FUG60,61)
- Potash Hauling (FUG64,65)
- TMA (FUG66)
- Permanent Abrasive Blasting (FUG20)
- Portable Abrasive Blasting (FUG40)
- Paved Roads (FUG22,47,48,49,51,57,58,59,62,63,64,65,67)
- LRAD Diesel-Fired Gensets (LRAD1,2,3,4,5,6)
- Gasoline Dispensing Facilities (AS1 and LC1) (GDF1,2)

B. Apply the 3 criteria for determining a single source:

SIC Code: Surrounding or associated sources belong to the same 2-digit industrial grouping (2-digit SIC code) as this facility, OR surrounding or associated sources that belong to different 2-digit SIC codes are support facilities for this source.

X Yes ☐ **No**

Common Ownership or Control: Surrounding or associated sources are under common ownership or control as this source.

X Yes ☐ **No**

Contiguous or Adjacent: Surrounding or associated sources are contiguous or adjacent with this source.

X Yes ☐ **No**

C. Make a determination:

X 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):

Section 12

Section 12.A

PSD Applicability Determination for All Sources

Not Required for Title V Applications

(Submitting under 20.2.72, 20.2.74 NMAC)

A PSD applicability determination for all sources. For sources applying for a significant permit revision, apply the applicable requirements of 20.2.74.AG and 20.2.74.200 NMAC and to determine whether this facility is a major or minor PSD source, and whether this modification is a major or a minor PSD modification. It may be helpful to refer to the procedures for Determining the Net Emissions Change at a Source as specified by Table A-5 (Page A.45) of the EPA New Source Review Workshop Manual to determine if the revision is subject to PSD review.

A. This facility is:

- ☐ **a minor PSD source before and after this modification (if so, delete C and D below).**
- ☐ **a major PSD source before this modification. This modification will make this a PSD minor source.**
- ☐ **an existing PSD Major Source that has never had a major modification requiring a BACT analysis.**
- ☐ **an existing PSD Major Source that has had a major modification requiring a BACT analysis**
- ☐ **a new PSD Major Source after this modification.**

B. **This facility [is or is not] one of the listed 20.2.74.501 Table I – PSD Source Categories. The "project" emissions** for this modification are **[significant or not significant]. [Discuss why.] The "project" emissions listed below [do or do not] only result from changes described in this permit application, thus no emissions from other [revisions or modifications, past or future] to this facility. Also, specifically discuss whether this project results in "de-bottlenecking", or other associated emissions resulting in higher emissions. The project emissions (before netting) for this project are as follows [see Table 2 in 20.2.74.502 NMAC for a complete list of significance levels]:**

a. **NOx: XX.X TPY**
b. **CO: XX.X TPY**
c. **VOC: XX.X TPY**
d. **SOx: XX.X TPY**
e. **TSP (PM): XX.X TPY**
f. **PM10: XX.X TPY**
g. **PM2.5: XX.X TPY**
h. **Fluorides: XX.X TPY**
i. **Lead: XX.X TPY**
j. **Sulfur compounds (listed in Table 2): XX.X TPY**
k. **GHG: XX.X TPY**

C. **Netting [is required, and analysis is attached to this document.] OR [is not required (project is not significant)] OR [Applicant is submitting a PSD Major Modification and chooses not to net.]**

D. **BACT** is **[not required for this modification, as this application is a minor modification.] OR [required, as this application is a major modification. List pollutants subject to BACT review and provide a full top down BACT determination.]**

E. If this is an existing PSD major source, or any facility with emissions greater than 250 TPY (or 100 TPY for 20.2.74.501 Table 1 – PSD Source Categories), determine whether any permit modifications are related, or could be considered a single project with this action, and provide an explanation for your determination whether a PSD modification is triggered.

Section 13

Determination of State & Federal Air Quality Regulations

This section lists each state and federal air quality regulation that may apply to your facility and/or equipment that are stationary sources of regulated air pollutants.

Not all state and federal air quality regulations are included in this list. Go to the Code of Federal Regulations (CFR) or to the Air Quality Bureau's regulation page to see the full set of air quality regulations.

Required Information for Specific Equipment:
For regulations that apply to specific source types, in the 'Justification' column **provide any information needed to determine if the regulation does or does not apply**. **For example**, to determine if emissions standards at 40 CFR 60, Subpart IIII apply to your three identical stationary engines, we need to know the construction date as defined in that regulation; the manufacturer date; the date of reconstruction or modification, if any; if they are or are not fire pump engines; if they are or are not emergency engines as defined in that regulation; their site ratings; and the cylinder displacement.

Required Information for Regulations that Apply to the Entire Facility:
See instructions in the 'Justification' column for the information that is needed to determine if an 'Entire Facility' type of regulation applies (e.g. 20.2.70 or 20.2.73 NMAC).

Regulatory Citations for Regulations That Do Not, but Could Apply:
If there is a state or federal air quality regulation that does not apply, but you have a piece of equipment in a source category for which a regulation has been promulgated, you must **provide the low level regulatory citation showing why your piece of equipment is not subject to or exempt from the regulation. For example** if you have a stationary internal combustion engine that is not subject to 40 CFR 63, Subpart ZZZZ because it is an existing 2 stroke lean burn stationary RICE with a site rating of more than 500 brake HP located at a major source of HAP emissions, your citation would be 40 CFR 63.6590(b)(3)(i). **We don't want a discussion of every non-applicable regulation, but if it is possible a regulation could apply, explain why it does not. For example,** if your facility is a power plant, you do not need to include a citation to show that 40 CFR 60, Subpart OOO does not apply to your non-existent rock crusher.

Regulatory Citations for Emission Standards:
For each unit that is subject to an emission standard in a source specific regulation, such as 40 CFR 60, Subpart OOO or 40 CFR 63, Subpart HH, include the low level regulatory citation of that emission standard. Emission standards can be numerical emission limits, work practice standards, or other requirements such as maintenance. **Here are examples:** a glycol dehydrator is subject to the general standards at 63.764C(1)(i) through (iii); an engine is subject to 63.6601, Tables 2a and 2b; a crusher is subject to 60.672(b), Table 3 and all transfer points are subject to 60.672(e)(1)

Federally Enforceable Conditions:
All federal regulations are federally enforceable. All Air Quality Bureau State regulations are federally enforceable except for the following: affirmative defense portions at 20.2.7.6.B, 20.2.7.110(B)(15), 20.2.7.11 through 20.2.7.113, 20.2.7.115, and 20.2.7.116; 20.2.37; 20.2.42; 20.2.43; 20.2.62; 20.2.63; 20.2.86; 20.2.89; and 20.2.90 NMAC. Federally enforceable means that EPA can enforce the regulation as well as the Air Quality Bureau and federally enforceable regulations can count toward determining a facility's potential to emit (PTE) for the Title V, PSD, and nonattainment permit regulations.

INCLUDE ANY OTHER INFORMATION NEEDED TO COMPLETE AN APPLICABILITY DETERMINATION OR THAT IS RELEVENT TO YOUR FACILITY'S NOTICE OF INTENT OR PERMIT.

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

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 for NSR; No for Title V**	**Facility**	See Section 16 of this application; however, this does not apply to Title V Permit Modifications.
20.2.7 NMAC	Excess Emissions	**Yes**	**Facility**	This applies since the facility and individual pieces of equipment are subject to emissions limits in the current permit.
20.2.19 NMAC	Potash, Salt or Sodium Sulfate Processing Equipment	**Yes**	**Entire Facility except Haul Roads, S&L Boiler, Abrasive Blasting, LRAD1-6, GEN1, GDF1-2**	The objective of this Part is to establish particulate matter emission standards for potash, salt or sodium sulfate processing equipment.
20.2.23 NMAC	Fugitive Dust Control	No		This does not apply because the facility is a permitted facility and is not located in an area subject to a mitigation plan pursuant to 40 CFR 51.930.
20.2.33 NMAC	Gas Burning Equipment - Nitrogen Dioxide	No		This facility does not have new or existing gas burning equipment with a heat input of greater than 1,000,000 million British Thermal Units per year per unit. Note: "New gas burning equipment" means gas burning equipment, the construction or modification of which is commenced after February 17, 1972.
20.2.34 NMAC	Oil Burning Equipment: NO_2	No		The facility does not have any oil burning equipment with a heat input of greater than 1,000,000 million British Thermal Units.
20.2.35 NMAC	Natural Gas Processing Plant – Sulfur	No		This facility is not a natural gas processing plant.
20.2.37 and 20.2.36 NMAC	Petroleum Processing Facilities and Petroleum Refineries	N/A		These regulations were repealed by the Environmental Improvement Board. If you had equipment subject to 20.2.37 NMAC before the repeal, your combustion emission sources are now subject to 20.2.61 NMAC.
20.2.38 NMAC	Hydrocarbon Storage Facility	No		This facility is not a petroleum production or processing facility or hydrocarbon storage facility.
20.2.39 NMAC	Sulfur Recovery Plant - Sulfur	No		This facility is not a sulfur recovery plant.
20.2.61.109 NMAC	Smoke & Visible Emissions	**Yes**	**S&L Boiler; LRAD1-6; GEN1**	This regulation, which limits opacity to 20%, applies to the S&L Boiler, the LRADs, and GEN1 since these equipment are not subject to another state regulation that limits particulate matter such as 20.2.19 NMAC (see 20.2.61.109 NMAC).
20.2.70 NMAC	Operating Permits	**Yes**	**Facility**	This regulation applies since the facility's potential to emit (PTE) of CO, TSP, PM_{10}, and $PM_{2.5}$ is greater than 100 tpy. Mosaic's HAPs are less than 10 tpy for a single HAP and less than 25 tpy for combined HAPs, so Mosaic is an area source of HAPs. Note that this facility is not one of those listed at 20.2.70.7(2)(a) through (aa), so only stack emissions are used to determine PTE.
20.2.71 NMAC	Operating Permit Fees	**Yes**	**Facility**	This facility is subject to 20.2.70 NMAC and is in turn subject to 20.2.71 NMAC.

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.)
20.2.72 NMAC	Construction Permits	**Yes**	**Facility**	This facility is subject to 20.2.72 NMAC and the current NSR Permit number is 495-M14.
20.2.73 NMAC	NOI & Emissions Inventory Requirements	**Yes**	**Facility**	This facility is required to submit Emissions Inventory Reporting per 20.2.73.300 NMAC because it is a Title V Major Source as defined at 20.2.70.7.R NMAC.
20.2.74 NMAC	Permits – Prevention of Significant Deterioration (PSD)	No		This facility does not have emissions in excess of the PSD 250 tpy threshold and this modification does not trigger PSD. In addition, the source is not one of the listed sources.
20.2.75 NMAC	Construction Permit Fees	No		This applies if you are submitting an application pursuant to 20.2.72, 20.2.73, 20.2.74, and/or 20.2.79 NMAC, so since this is a Title V modification that is being submitted under 20.2.70 NMAC, the Construction Permit Fees do not apply.
20.2.77 NMAC	New Source Performance	**Yes**	**LRAD1-6**	The LRAD engines are subject to 40 CFR 60, Subpart IIII (see below for more information).
20.2.78 NMAC	Emission Standards for HAPS	No		This facility does not emit hazardous air pollutants that are subject to the requirements of 40 CFR Part 61.
20.2.79 NMAC	Permits – Nonattainment Areas	No		This facility is not located in a non-attainment area, nor does it currently affect an adjacent non-attainment area.
20.2.80 NMAC	Stack Heights	**Yes**	**STK4, STK5a, STK5b, STK6, STK7, STK10, STK11, STK14**	The stacks at Mosaic do not exceed good engineering practice or employ dispersion techniques.
20.2.82 NMAC	MACT Standards for source categories of HAPS	**Yes**	**GDF1-2, LRAD1-6**	This regulation applies since the Gasoline Dispensing Operations at Mosaic are subject to 40 CFR Part 63, Subpart CCCCCC, and the LRAD engines are subject to 40 CFR Part 63, Subpart ZZZZ (see below for more information).

Example of a Table for Applicable FEDERAL REGULATIONS (Note: This is not an exhaustive list):

FEDERAL REGU-LATIONS CITATION	Title	Applies ? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
40 CFR 50	NAAQS	**Yes**	**Facility**	This applies to the Mosaic facility since the facility is subject to 20.2.70 and 20.2.72 NMAC.
NSPS 40 CFR 60, Subpart A	General Provisions	**Yes**	**LRAD1-6**	This applies because the LRAD engines at Mosaic are subject to 40 CFR 60, Subpart IIII.

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		This facility does not have any electric utility steam generating units.
NSPS 40 CFR60.40b Subpart Db	**Electric Utility Steam Generating Units**	No		This facility does not have any industrial, commercial, or institutional steam generating units.
40 CFR 60.40c, Subpart Dc	Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units	No		This facility does not have any small industrial, commercial, or institutional steam generating units.
NSPS 40 CFR 60, Subpart Ka	Standards of Performance for **Storage Vessels for Petroleum Liquids** for which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and **Prior** to July 23, 1984	No		This subpart does not apply because the only tank over 40,000 gallons at the facility contains a glycerin dedusting product for K-Mag. All of the petroleum liquid storage tanks on-site are under 40,000 gallons, including the storage and loading dedusting tanks that use petroleum products.
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		Tanks WLT1, WLT2, and LLT1 have capacities greater than 75 cubic meters and were constructed after July 23, 1984, but these tanks are exempt from these requirements because the true vapor pressures are less than 3.5 kPa.
NSPS 40 CFR 60.330 Subpart GG	**Stationary Gas Turbines**	No		This facility does not have any stationary gas turbines.
NSPS 40 CFR 60, Subpart KKK	Leaks of VOC from **Onshore Gas Plants**	No		This facility is not an onshore natural gas processing plant.
NSPS 40 CFR Part 60 Subpart LLL	Standards of Performance for **Onshore Natural Gas Processing**: SO_2 Emissions	No		This facility is not an onshore natural gas processing facility.

FEDERAL REGU-LATIONS CITATION	Title	Applies ? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR Part 60, Subpart OOO	Standards of Performance for **Nonmetallic Mineral Processing Plants**	No		This subpart applies to non-metallic mineral processing plants. Except for sodium compounds (NaCl) this facility does not process any of the "nonmetallic minerals" defined in 60.671, definitions. EPA intentionally left out potash facilities from being subject to NSPS OOO or UUU. On October 6, 1998, EPA made the determination that Mosaic Potash (formerly IMC Kalium) is not subject to either NSPS UUU or OOO.
NSPS 40 CFR Part 60, Subpart UUU	Standards of Performance for **Calciners and Dryers in Mineral Industries**	No		Mosaic does not process any of the minerals listed in the definition of "Mineral Processing Plant" in 40 CFR 60.731. On October 6, 1998, EPA made the determination that Mosaic Potash (formerly IMC Kalium) is not subject to either NSPS UUU or OOO.
NSPS 40 CFR Part 60, Subpart IIII	Standards of Performance for **Stationary Compression Ignition Internal Combustion Engines**	**Yes**	**LRAD1-LRAD6**	Diesel generator engines LRAD1, LRAD2, LRAD3, LRAD4, LRAD5, and LRAD6 are subject to §60.4200(a)(2)(i) of this subpart since the engines were manufactured in 2009 and 2015, have a displacement of less than 30 L/cylinder, are not fire pumps, and are not considered emergency engines. The owner/operator must follow the requirements in §60.4211(a) since the LRADs are not subject to any other emission standards in the regulation other than ensuring that the engines are certified by the manufacturer to the correct standards.
NSPS 40 CFR Part 60, Subpart JJJJ	Standards of Performance for **Stationary Spark Ignition Internal Combustion Engines**	No		This facility does not have any stationary spark ignition internal combustion engines.
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		This facility is not a crude oil or natural gas production, transmission, or distribution facility.
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		This facility is not a crude oil or natural gas facility.

FEDERAL REGU-LATIONS CITATION	Title	Applies? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NSPS 40 CFR 60 Subpart TTTT	Standards of Performance for Greenhouse Gas Emissions for Electric Generating Units	No		This facility does not have any electric generating units.
NSPS 40 CFR 60 Subpart UUUU	Emissions Guidelines for Greenhouse Gas Emissions and Compliance Times for Electric Utility Generating Units	No		This facility does not have any electric utility generating units.
NSPS 40 CFR 60, Subparts WWW, XXX, Cc, and Cf	Standards of performance for Municipal Solid Waste (MSW) Landfills	No		This facility is not a municipal solid waste landfill.
NESHAP 40 CFR 61 Subpart A	General Provisions	No		No units at the facility are subject to 40 CFR 61.
NESHAP 40 CFR 61 Subpart E	National Emission Standards for **Mercury**	No		This facility does not process mercury ore to recover mercury, use mercury chlor-alkali cells to produce chlorine gas and alkali metal hydroxide, or incinerate or dry wastewater treatment plant sludge.
NESHAP 40 CFR 61, Subpart M	National Emission Standard for **Asbestos**	**Yes**	**Entire Facility**	There is regulated asbestos-containing material (RACM) at this facility and Mosaic is following the Asbestos NESHAP accordingly.
NESHAP 40 CFR 61 Subpart V	National Emission Standards for **Equipment Leaks** (Fugitive Emission Sources)	No		This facility does not have the following sources 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.
MACT 40 CFR 63, Subpart A	General Provisions	**Yes**	**GDF1-2, LRAD1-6**	Applies since 40 CFR 63, Subparts ZZZZ and CCCCCC apply (see below for more information).
MACT 40 CFR 63.760 Subpart HH	**Oil and Natural Gas Production Facilities**	No		This facility is not an oil and natural gas production facility.
MACT 40 CFR 63 Subpart HHH		No		This facility is not an owner or operator of a natural gas transmission and storage facility.

FEDERAL REGU-LATIONS CITATION	Title	Applies ? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
NESHAP 40 CFR 63, Subpart ZZZZ	National Emission Standards for Hazardous Air Pollutants for **Stationary Reciprocating Internal Combustion Engines**	**Yes**	**LRAD1-LRAD6**	Diesel generator engines LRAD1, LRAD2, LRAD3, LRAD4, LRAD5, and LRAD6 are subject. As per §63.6590(c), to meet the requirements of NESHAP ZZZZ, one must meet the requirements of NSPS IIII. No other requirements under Subpart ZZZZ apply.
MACT 40 CFR 63 Subpart DDDDD	National Emission Standards for Hazardous Air Pollutants for Major Industrial, Commercial, and Institutional Boilers & Process Heaters	No		This facility is not subject because it is not a major source of HAP.
MACT 40 CFR 63 Subpart UUUUU	National Emission Standards for Hazardous Air Pollutants Coal & Oil Fire Electric Utility Steam Generating Unit	No		This facility is not subject because it does not own or operate a coal-fired electric utility generating unit (EGU) or an oil-fired EGU.
NESHAP 40 CFR 63, Subpart CCCCCC	National Emission Standards for Hazardous Air Pollutants for Source Category: **Gasoline Dispensing Facilities**	**Yes**	**GDF1 (AS1)** **GDF2 (LC1)**	The unleaded gasoline dispensing operations at the Auto Shop (AS1; GDF1) and Lake Compound (LC1; GDF2) are subject to §63.11111(b) on account of their monthly throughputs being less than 10,000 gallons of gasoline. As such, Mosaic only has to comply with the following GDF requirements in §63.1116: a. Minimize gasoline spills; b. Clean up spills as expeditiously as practicable; c. Cover all open gasoline containers and all gasoline storage tank fill-pipes with a gasketed seal when not in use; and, d. Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices, such as oil/water separators. Note that there are no notification or reports required.
40 CFR 64	**Compliance Assurance Monitoring**	**Yes**	**CON4** **CON5a** **CON5b** **CON6** **CON7** **CON10a** **CON10b** **CON11** **CON14**	Per 64.2(a)(1)(2)&(3), all emission units controlled with a baghouse or scrubber are subject to CAM and include: LANG Hoist (STK4/CON4), LANG Crusher (STK5a/CON5a), LANG Fine Ore Bin (STK5b/CON5b), LANG Dryer (STK6/CON6), LANG Screens (STK7/CON7), GRAN Dryer 10a (STK10ab/CON10a), GRAN Process Ventilation 10b (STK10ab/CON10b), Dispatch Transfer Tower (STK11/CON11), and GRAN Process Ventilation 10c (STK14/CON14). None of the units are large pollutant-specific emissions units (PSEUs) because they do not have controlled emissions greater than 100 tpy.
40 CFR 68	**Chemical Accident Prevention**	No		Mosaic does not have more than a threshold quantity of a regulated substance under §68.115, so this does not apply.

FEDERAL REGU-LATIONS CITATION	Title	Applies ? Enter Yes or No	Unit(s) or Facility	JUSTIFICATION:
Title IV – Acid Rain 40 CFR 72	**Acid Rain**	No		This facility is not a listed source under the Acid Rain Program.
Title IV – Acid Rain 40 CFR 73	**Sulfur Dioxide** Allowance Emissions	No		This facility is not a listed source under the Acid Rain Program.
Title IV-Acid Rain 40 CFR 75	**Continuous Emissions Monitoring**	No		This facility is not a listed source under the Acid Rain Program.
Title IV – Acid Rain 40 CFR 76	**Acid Rain** Nitrogen Oxides **Emission Reduction Program**	No		This facility is not a listed source under the Acid Rain Program.
Title VI – 40 CFR 82	Protection of **Stratospheric Ozone**	**Yes**	**Auto Shop**	The facility is subject to 40 CFR 82, Subparts B and F.

Section 14

Operational Plan to Mitigate Emissions

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

X Title V Sources (20.2.70 NMAC)**:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Emissions During Startups, Shutdowns, and Emergencies** defining the measures to be taken to mitigate source emissions during startups, shutdowns, and emergencies as required by 20.2.70.300.D.5(f) and (g) NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☐ **NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has developed an **Operational Plan to Mitigate Source Emissions During Malfunction, Startup, or Shutdown** defining the measures to be taken to mitigate source emissions during malfunction, startup, or shutdown as required by 20.2.72.203.A.5 NMAC. This plan shall be kept on site to be made available to the Department upon request. This plan should not be submitted with this application.

☐ **Title V** (20.2.70 NMAC)**, NSR** (20.2.72 NMAC)**, PSD** (20.2.74 NMAC) **& Nonattainment** (20.2.79 NMAC) **Sources:** By checking this box and certifying this application the permittee certifies that it has established and implemented a Plan to Minimize Emissions During Routine or Predictable Startup, Shutdown, and Scheduled Maintenance through work practice standards and good air pollution control practices as required by 20.2.7.14.A and B NMAC. This plan shall be kept on site or at the nearest field office to be made available to the Department upon request. This plan should not be submitted with this application.

The above-listed operational plan required for 20.2.70 NMAC sources has been developed and is available upon request.

Section 15

Alternative Operating Scenarios

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

Alternative Operating Scenarios: Provide all information required by the department to define alternative operating scenarios. This includes process, material and product changes; facility emissions information; air pollution control equipment requirements; any applicable requirements; monitoring, recordkeeping, and reporting requirements; and compliance certification requirements. Please ensure applicable Tables in this application are clearly marked to show alternative operating scenario.

Construction Scenarios: When a permit is modified authorizing new construction to an existing facility, NMED includes a condition to clearly address which permit condition(s) (from the previous permit and the new permit) govern during the interval between the date of issuance of the modification permit and the completion of construction of the modification(s). There are many possible variables that need to be addressed such as: Is simultaneous operation of the old and new units permitted and, if so for example, for how long and under what restraints? In general, these types of requirements will be addressed in Section A100 of the permit, but additional requirements may be added elsewhere. Look in A100 of our NSR and/or TV permit template for sample language dealing with these requirements. Find these permit templates at: https://www.env.nm.gov/aqb/permit/aqb_pol.html. Compliance with standards must be maintained during construction, which should not usually be a problem unless simultaneous operation of old and new equipment is requested.

In this section, under the bolded title "Construction Scenarios", specify any information necessary to write these conditions, such as: conservative-realistic estimated time for completion of construction of the various units, whether simultaneous operation of old and new units is being requested (and, if so, modeled), whether the old units will be removed or decommissioned, any PSD ramifications, any temporary limits requested during phased construction, whether any increase in emissions is being requested as SSM emissions or will instead be handled as a separate Construction Scenario (with corresponding emission limits and conditions, etc.

This facility is authorized to operate continuously 8,760 hours per year, and units controlled with baghouses are each allowed to operate without baghouse control for up to 175 hours per year. Note that operating without baghouse control for 175 hours per year is not a requirement but an option to prevent the baghouse bags from breaking during wet or high humidity conditions. The facility could operate the entire year controlling emissions with the baghouses. Note that the facility is also allowed to operate 175 hours per year without the coating system operating and is not required to coat Special Standard (animal feed) product or Granulation feed.

Section 16

Air Dispersion Modeling

Not Required for Title V Applications

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1) Minor Source Construction (20.2.72 NMAC) and Prevention of Significant Deterioration (PSD) (20.2.74 NMAC) ambient impact analysis (modeling): Provide an ambient impact analysis as required at 20.2.72.203.A(4) and/or 20.2.74.303 NMAC and as outlined in the Air Quality Bureau's Dispersion Modeling Guidelines found on the Planning Section's modeling website. If air dispersion modeling has been waived for one or more pollutants, attach the AQB Modeling Section modeling waiver approval documentation.
2) SSM Modeling: Applicants must conduct dispersion modeling for the total short term emissions during routine or predictable startup, shutdown, or maintenance (SSM) using realistic worst case scenarios following guidance from the Air Quality Bureau's dispersion modeling section. Refer to "Guidance for Submittal of Startup, Shutdown, Maintenance Emissions in Permit Applications (http://www.env.nm.gov/aqb/permit/app_form.html) for more detailed instructions on SSM emissions modeling requirements.
3) Title V (20.2.70 NMAC) ambient impact analysis: Title V applications must specify the construction permit and/or Title V Permit number(s) for which air quality dispersion modeling was last approved. Facilities that have only a Title V permit, such as landfills and air curtain incinerators, are subject to the same modeling required for preconstruction permits required by 20.2.72 and 20.2.74 NMAC.

What is the purpose of this application?	Enter an X for each purpose that applies
New PSD major source or PSD major modification (20.2.74 NMAC). See #1 above.	
New Minor Source or significant permit revision under 20.2.72 NMAC (20.2.72.219.D NMAC). See #1 above. **Note:** Neither modeling nor a modeling waiver is required for VOC emissions.	
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.	**X**
Relocation (20.2.72.202.B.4 or 72.202.D.3.c NMAC)	
Minor Source Technical Permit Revision 20.2.72.219.B.1.d.vi NMAC for like-kind unit replacements.	
Other: i.e. SSM modeling. See #2 above.	
This application does not require modeling since this is a No Permit Required (NPR) application.	
This application does not require modeling since this is a Notice of Intent (NOI) application (20.2.73 NMAC).	
This application does not require modeling according to 20.2.70.7.E(11), 20.2.72.203.A(4), 20.2.74.303, 20.2.79.109.D NMAC and in accordance with the Air Quality Bureau's Modeling Guidelines.	

Check each box that applies:

☐ See attached, approved modeling **waiver for all** pollutants from the facility.
☐ See attached, approved modeling **waiver for some** pollutants from the facility.
☐ Attached in Universal Application Form 4 (UA4) is a **modeling report for all** pollutants from the facility.
☐ Attached in UA4 is a **modeling report for some** pollutants from the facility.
X No modeling is required.

An air quality dispersion modeling waiver request was approved for NSR Permit No. 495-M14.

Section 17

Compliance Test History

(Submitting under 20.2.70, 20.2.72, 20.2.74 NMAC)

To show compliance with existing NSR permits conditions, you must submit a compliance test history. The table below provides an example.

The last 5 years of testing (i.e., 2015 to 2020) is shown in the table below. Additional test history is available upon request.

Compliance Test History Table

Unit No.	Test Description	Test Date
STK4-CON4	Biennial testing in accordance with EPA test methods for PM (TSP).	10/23/2019
	Annual testing in accordance with EPA test methods for PM (TSP).	8/31/2017
	Annual testing in accordance with EPA test methods for PM (TSP).	6/19/2016
	Annual testing in accordance with EPA test methods for PM (TSP).	3/4-5/2015
STK5a-CON5a	Biennial testing in accordance with EPA test methods for PM (TSP).	7/31/2019
	Annual testing in accordance with EPA test methods for PM (TSP).	8/22-23/2017
	Annual testing in accordance with EPA test methods for PM (TSP).	6/17-18/2016
	Annual testing in accordance with EPA test methods for PM (TSP).	3/13/2015
STK5b-CON5b	Biennial testing in accordance with EPA test methods for PM (TSP).	8/1/2019
	Annual testing in accordance with EPA test methods for PM (TSP).	8/3/2017
	Annual testing in accordance with EPA test methods for PM (TSP).	9/24/2016
	Annual testing in accordance with EPA test methods for PM (TSP).	3/18/2015
STK6-CON6	Biennial testing in accordance with EPA test methods for PM (TSP).	8/15/2019
	Annual testing in accordance with EPA test methods for PM (TSP).	6/26/2017
	Tested in accordance with EPA test methods for NOx, CO, and PM (TSP).	12/7/2016
	Annual testing in accordance with EPA test methods for PM (TSP).	8/7/2015
STK7-CON7	Biennial testing in accordance with EPA test methods for PM (TSP).	8/15/2019
	Annual testing in accordance with EPA test methods for PM (TSP).	7/24-25/2017
	Annual testing in accordance with EPA test methods for PM (TSP).	7/23/2016
	Annual testing in accordance with EPA test methods for PM (TSP).	3/24/2015

STK10ab-CON10ab	Biennial testing in accordance with EPA test methods for PM (TSP).	5/6/2020
	Supplemental testing to increase alarms.	4/4/2018
	Annual testing in accordance with EPA test methods for PM (TSP).	5/23/2017
	Tested in accordance with EPA test methods for NOx, CO, and PM (TSP).	9/29/2016
	Annual testing in accordance with EPA test methods for PM (TSP).	10/29/2015
STK11-CON11	Biennial testing in accordance with EPA test methods for PM (TSP).	10/24/2019
	Annual testing in accordance with EPA test methods for PM (TSP).	8/24/2017
	Annual testing in accordance with EPA test methods for PM (TSP).	7/21/2016
	Annual testing in accordance with EPA test methods for PM (TSP).	10/28/2015
STK14-CON14	Testing in accordance with EPA test methods for PM (TSP).	8/19/2020
	Not tested in 2019. Monitoring exemption since operated <10% of the monitoring period.	
	Not tested in 2018. Monitoring exemption since operated <10% of the monitoring period.	
	Not tested in 2017. Monitoring exemption since operated <10% of the monitoring period.	
	Not tested in 2016. Monitoring exemption since operated <10% of the monitoring period.	
	Annual testing in accordance with EPA test methods for PM (TSP).	12/9/2015

Section 18

This is not a Streamline Application

Addendum for Streamline Applications

Do not print this section unless this is a streamline application.

Streamline Applications do not require a complete application. Submit Sections 1-A, 1-B, 1-D, 1-F, 1-G, 2-A, 2-C thru L, Sections 3 thru 8, Section 13, Section 18, Section 22, and Section 23 (Certification). Other sections may be required at the discretion of the Department. 20.2.72.202 NMAC Exemptions do not apply to Streamline sources. 20.2.72.219 NMAC revisions and modifications do not apply to Streamline sources, thus 20.2.72.219 type actions require a complete new application submittal. Please do not print sections of a streamline application that are not required.

18-A: Streamline Category	
1	**Indicate under which part of 20.2.72.301.D this facility is applying. Refer to the forth column of Table 18-D below, to assist in this determination:** ☐ 20.2.72.301.D(1) NMAC ☐ 20.2.72.301.D(2) NMAC ☐ 20.2.72.301.D(3) NMAC

18-B: Streamline Applicability Criteria		Answer (yes/no)
1	Does the source category for this facility meet one of those listed in the following table? (20.2.72.301.A NMAC) **20.2.72.501 Table 2 – Permit Streamlining Source Class Categories** 1. Reciprocating internal combustion engines including portable or temporary engines 2. Turbines	☐ Yes ☐ No
2	If this facility is a compressor station, does it meet the definition of a "Compressor station" below? (20.2.72.301.D NMAC) **"Compressor station"** means a facility whose primary function is the extraction of crude oil, natural gas, or water from the earth with compressors, or movement of any fluid, including crude oil or natural gas, or products refined from these substances through pipelines or the injection of natural gas or CO2 back into the earth using compressors. A compressor station may include engines to generate power in conjunction with the other functions of extraction, injection or transmission and may contain emergency flares. A compressor station may have auxiliary equipment which emits small quantities of regulated air contaminants, including but not limited to, separators, de-hydration units, heaters, treaters and storage tanks, provided the equipment is located within the same property boundaries as the compressor engine (underline added). (20.2.72.301.A NMAC)	☐ Yes ☐ No
3	Will the source operate in compliance with all applicable state and federal regulations, including federal new source performance standards incorporated by 20.2.77 NMAC and permit conditions? (20.2.72.305.B NMAC)	☐Yes ☐No
4	Will the fuel combusted at this facility be produced natural gas, sweet natural gas, liquid petroleum gas, or fuel gas containing 0.1 grain of total sulfur or less per dry standard cubic foot; or refinery grade diesel or No. 2 fuel oil that is not a blend containing waste oils or solvents and contains less than 0.3% by weight sulfur? (20.2.72.306 NMAC)	☐Yes ☐No

5	Will all spark ignited gas-fired or any compression ignited dual fuel-fired engine which operates with a non-selective catalytic converter be equipped and operated with an automatic air-fuel ratio (AFR) controller which maintains AFR in the range required to minimize NOx emissions, as recommended by the manufacturer? (20.2.72.306 NMAC)	☐Yes ☐No
6	Has payment of all fees that are specified in 20.2.75 NMAC (Construction Permit Fees), as payable at the time the application is submitted, been included with the application package? (20.2.72.302.15 NMAC)	☐Yes ☐No
7	Is the answer to each of the above questions, #1 through #6, '**Yes**'? If the answer to **this** question is "**No**", this facility does **not** qualify for a streamline permit.	☐Yes ☐No
8	Will the facility, either before or after construction or modification, have a total potential to emit of any regulated air contaminant[2] greater than 200 tons per year (tpy) of any one regulated air pollutant (CO, NOx, SO2, or VOC)? (20.2.72.301.B.2 NMAC); **"Potential to emit"** or **"potential emissions"** means the maximum capacity of a stationary source to emit a regulated air contaminant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a regulated air contaminant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitations or the effect it would have on emissions is federally enforceable. Secondary emissions do not count in determining the potential to emit of a stationary source.	☐ Yes ☐ No
9	Is the facility a "major stationary source" as defined in 20 NMAC 2.74? (20.2.72.301.B.1 NMAC)	☐ Yes ☐ No
10	Is this source subject 20.2.78 NMAC, other than 40CFR61 Subpart M National Emission Standard for Asbestos? (20.2.72.301.B.3 NMAC)	☐ Yes ☐ No
11	Is this a source of potential air toxic emissions (20 NMAC 2.72. 400-499)? (20.2.72.301.B.3 NMAC)	☐ Yes ☐ No
12	Will the reciprocating internal combustion (IC) engines and/or turbines be located at a petroleum refinery, chemical manufacturing plant, bulk gasoline terminal, natural gas processing plant, or at any facility containing sources in addition to IC engines and/or turbines for which an air quality permit is required through state or federal air quality regulations in the absence of the (IC) engines and/or turbines? (20.2.72.301.B.4 NMAC)	☐ Yes ☐ No
13	Will the proposed facility be located within any of the 20.2.72.301.B.5 exclusion areas specified in the Air Dispersion Modeling Guidelines[1], Table: Areas Where Streamline Permits Are Prohibited? (20.2.72.301.B.5 NMAC) http://www.env.nm.gov/aqb/modeling	☐ Yes ☐ No
14	Will the proposed facility's impact area intersect any of the areas specified in the Air Dispersion Modeling Guidelines[1], Table: Areas Where Streamline Permits Are Prohibited? (20.2.72.301.B.5 NMAC) http://www.env.nm.gov/aqb/modeling	☐Yes ☐No ☐N/A
15	Is the answer to each of the above questions, #8 through #14, '**No**'? If the answer to **this** question is "**No**", this facility does **not** qualify for a streamline permit.	☐Yes ☐No

[1] The Air Dispersion Modeling Guidelines contain a section on streamline permitting. The table mentioned above can be found within those guidelines at http://www.env.nm.gov/aqb/modeling

[2] The potential to emit for nitrogen dioxide shall be based on total oxides of nitrogen

18-C: Streamline Location Restrictions		Answer (yes/no)	Identify: Name and Distance (km)
1	Will the distance from the nearest property boundary to the nearest school, residence, office building or occupied structure, excluding the immediate facility complex be greater than one (1.0) km? (20.2.72.301.B.6.a NMAC)	☐Yes ☐No	
2	Will the distance from the nearest property boundary to the nearest state park, Class II wilderness or wildlife refuge, historic park, state recreation area be greater than three (3.0) km? (20.2.72.301.B.6.b NMAC) The Air Dispersion Modeling Guidelines[1], Table: List Of State Parks, Class II Wilderness Areas, Class II National Wildlife Refuge, National Historic Parks, State Recreation Areas, and Class I Areas contains a list of most of these areas in New Mexico, but may not include new areas designated since the modeling guidelines were published.	☐Yes ☐No	
3	Will the distance from the nearest property boundary to the nearest community with a population of more than 20,000 people be greater than three (3.0) km? (20.2.72.301.B.6 NMAC).b	☐Yes ☐No	
4	Will the distance from the nearest property boundary to the nearest community with a population of more than 40,000 people be greater than 10 km? (20.2.72.301.B.6.c NMAC)	☐Yes ☐No	
5	Will the distance from the nearest property boundary to the nearest Class I area be greater than 30 km? (20.2.72.301.B.6.d NMAC) The Air Dispersion Modeling Guidelines[1], Table: List Of State Parks, Class II Wilderness Areas, Class II National Wildlife Refuge, National Historic Parks, State Recreation Areas, and Class I Areas contains a list of most of these areas in New Mexico, but may not include new areas designated since the modeling guidelines were published.	☐Yes ☐No	
6	Will the distance from the nearest property boundary to Bernalillo County be greater than 15 km? (20.2.72.301.B.7 NMAC)	☐Yes ☐No	-NA-
7	Is the answer to all of the above question yes or N/A? If the answer to **this** question is "**No**", this facility does not qualify for a streamline permit.	☐Yes ☐No	-NA-

[1] The Air Dispersion Modeling Guidelines contain a section on streamline permitting. The table mentioned above can be found within those guidelines at http://www.env.nm.gov/aqb/modeling.

18-D: Source Category Determination			
1	Is the total potential to emit of each regulated contaminant from all sources at the facility less than 40 tpy?	☐ Yes ☐ No	• If the answers to this question is "Yes", the facility qualifies for a 20.2.72.301.D.1 NMAC streamline permit. • Public notice is not required, 20.2.72.303.A NMAC. • Modeling is **not** required, 20.2.72.301.D NMAC. • If "Yes", leave the remainder of this table blank.
2	Is the total potential to emit of each regulated contaminant from all emission sources at the facility less than 100 tons per year (tpy) **AND** the impact on ambient air from all sources at the facility less than the ambient significance levels in 20.2.72.500 NMAC?	☐ Yes ☐ No	• If the answer to this question is "Yes", the facility qualifies for a 20.2.72.301.D.2 NMAC streamline permit. • Public notice is not required, 20.2.72.303.A NMAC. • **Modeling is required** in accordance with 20.2.72.301.D.2 NMAC • If "Yes", leave the remainder of this table blank.

<table>
<tr><td>3.a</td><td>Is the total potential to emit of each regulated contaminant from all emission sources at the facility less than 200 tons per year (tpy) AND the maximum modeled ambient impact from the total potential emissions at the facility less than 50 percent of each applicable PSD increment, state and federal ambient air quality standards?</td><td>☐ Yes
☐ No</td><td rowspan="4">• If the answers to these questions (3.a, 3.b, 3.c, and 3.d) are all “Yes”, the facility qualifies for a 20.2.72.301.D.3 NMAC streamline permit.
• Public notice is required in accordance with NMAC 20.2.72.303 NMAC.
• <u>Modeling</u> <u>is</u> <u>required</u> in accordance with 20.2.72.301.D.3 NMAC
• If the answers to questions 1, 2, and any of questions in question 3 (3.a, 3.b, 3.c, or 3.d) are “No”, this facility does not qualify for a streamline permit.</td></tr>
<tr><td>3.b</td><td>Are there no adjacent sources emitting the same regulated air contaminant(s) as the source within 2.5 km of the modeled nitrogen dioxide (NO2) impact area?</td><td>☐ Yes
☐ No</td></tr>
<tr><td>3.c</td><td>Is the "sum of the potential emissions for oxides of nitrogen from all adjacent sources" (SUM) within 15 km of the NO2 impact area (SUM15) less than 740 tpy?</td><td>☐ Yes
☐ No</td></tr>
<tr><td>3.d</td><td>Is the "sum of the potential emissions for oxides of nitrogen from all adjacent sources" (SUM) within 25 km of the NO2 impact area (SUM25) less than 1540 tpy?</td><td>☐ Yes
☐ No</td></tr>
</table>

Note: All modeling demonstrations have the option of demonstrating compliance with 20.2.72.301.D.3 NMAC. All public notices are required to comply with the public notice requirements of a NMAC20.2.72.301.D.3 facility.

18-E: Submittals

<table>
<tr><td>1</td><td>If a facility is required to submit a modeling analysis to demonstrate compliance with NMAC 20.2.72.300-399, use the Department’s most current version of the Departments Air Dispersion Modeling Guidelines, and include a copy of the modeling in the application. A copy of the most current version of the guidelines can be obtained at the following web address: http://www.env.nm.gov/aqb/modeling.</td></tr>
<tr><td>2</td><td>Public Notice: Per 20.2.72.303.A NMAC, public notice is only required for sources subject to NMAC 20.2.72.301.D.3. Public notice submittals shall consist of the following:

1. Proof of Public Notice
2. Include a copy of the certified letter receipts (Field office & Federal Land Managers) (20.2.72.206.A.7, 302.A & 302.12)
3. A copy of the letters sent to the appropriate federal land manager if the source will locate within 50 km of a boundary of a Class I area (302.A.2)
4. A statement stating a complete copy of the application and public notice has been provided to the Departments field or district office nearest the source (302.A.1)
5. The location where the public notice has been posted on the site (303.B.2)
6. A copy of the classified or legal ad and its affidavit of publication (303.B.1)</td></tr>
</table>

Section 19

Requirements for Title V Program

Do not print this section unless this is a Title V application.

Who Must Use this Attachment:

* Any major source as defined in 20.2.70 NMAC.
* Any source, including an area source, subject to a standard or other requirement promulgated under Section 111 - Standards of Performance for New Stationary Sources, or Section 112 Hazardous Air Pollutants, of the 1990 federal Clean Air Act ("federal Act"). Non-major sources subject to Sections 111 or 112 of the federal Act are exempt from the obligation to obtain an 20.2.70 NMAC operating permit until such time that the EPA Administrator completes rulemakings that require such sources to obtain operating permits. In addition, sources that would be required to obtain an operating permit solely because they are subject to regulations or requirements under Section 112(r) of the federal Act are exempt from the requirement to obtain an Operating Permit.
* Any Acid Rain source as defined under title IV of the federal Act. The Acid Rain program has additional forms. See http://www.env.nm.gov/aqb/index.html. Sources that are subject to both the Title V and Acid Rain regulations are encouraged to submit both applications simultaneously.
* Any source in a source category designated by the EPA Administrator ("Administrator"), in whole or in part, by regulation, after notice and comment.

19.1 - 40 CFR 64, Compliance Assurance Monitoring (CAM) (20.2.70.300.D.10.e NMAC)

Any source subject to 40CFR, Part 64 (Compliance Assurance Monitoring) must submit all the information required by section 64.7 with the operating permit application. The applicant must prepare a separate section of the application package for this purpose; if the information is already listed elsewhere in the application package, make reference to that location. Facilities not subject to Part 64 are invited to submit periodic monitoring protocols with the application to help the AQB to comply with 20.2.70 NMAC. Sources subject to 40 CFR Part 64, must submit a statement indicating your source's compliance status with any enhanced monitoring and compliance certification requirements of the federal Act.

Mosaic currently has two CAM Plans in place - one for particulate matter control of the baghouses and one for particulate matter control of the scrubbers. Compliance with both CAM Plans is provided for in the Semi-Annual Reports. Both CAM Plans are included in this Title V permit application.

19.2 - Compliance Status (20.2.70.300.D.10.a & 10.b NMAC)

Describe the facility's compliance status with each applicable requirement at the time this permit application is submitted. This statement should include descriptions of or references to all methods used for determining compliance. This statement should include descriptions of monitoring, recordkeeping and reporting requirements and test methods used to determine compliance with all applicable requirements. Refer to Section 2, Tables 2-N and 2-O of the Application Form as necessary. (20.2.70.300.D.11 NMAC) For facilities with existing Title V permits, refer to most recent Compliance Certification for existing requirements. Address new requirements such as CAM, here, including steps being taken to achieve compliance.

The compliance status of this facility is assessed, documented, and reported on a semi-annual through the Semi-Annual Reports and on an annual basis through the Annual Compliance Certification (ACC). No new requirements are being implemented as part of this Title V permit application.

19.3 - Continued Compliance (20.2.70.300.D.10.c NMAC)

Provide a statement that your facility will continue to be in compliance with requirements for which it is in compliance at the time of permit application. This statement must also include a commitment to comply with other applicable requirements as they come into effect during the permit term. This compliance must occur in a timely manner or be consistent with such schedule expressly required by the applicable requirement.

Mosaic is presently in compliance with all Federal and State requirements as well as permit conditions. The required reports were submitted on time and any non-compliance issues were reported. Based on review of the known requirements, Mosaic believes that they will be in compliance with all future requirements. Mosaic will implement any necessary actions for compliance with any applicable requirements that come into effect during the permit term.

19.4 - Schedule for Submission of Compliance (20.2.70.300.D.10.d NMAC)

You must provide a proposed schedule for submission to the department of compliance certifications during the permit term. This certification must be submitted annually unless the applicable requirement or the department specifies a more frequent period. A sample form for these certifications will be attached to the permit.

Mosaic submits their ACC within 30 days of the end of every 12-month reporting period, which starts on January 1st of each year. Mosaic also submits the Semi-Annual Reports within 45 days of the end of every 6-month reporting period, which starts on January 1st and July 1st of each year. Mosaic is not requesting any changes to these compliance schedules.

19.5 - Stratospheric Ozone and Climate Protection

In addition to completing the four (4) questions below, you must submit a statement indicating your source's compliance status with requirements of Title VI, Section 608 (National Recycling and Emissions Reduction Program) and Section 609 (Servicing of Motor Vehicle Air Conditioners).

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1. Does your facility have any air conditioners or refrigeration equipment that uses CFCs, HCFCs or other ozone-depleting substances? **X Yes** ☐ **No**
2. Does any air conditioner(s) or any piece(s) of refrigeration equipment contain a refrigeration charge greater than 50 lbs? ☐ **Yes** **X No**

   (If the answer is yes, describe the type of equipment and how many units are at the facility.)
3. Do your facility personnel maintain, service, repair, or dispose of any motor vehicle air conditioners (MVACs) or appliances ("appliance" and "MVAC" as defined at 82. 152)? **X Yes** ☐ **No**
4. Cite and describe which Title VI requirements are applicable to your facility (i.e. 40 CFR Part 82, Subpart A through G.) **40 CFR 82, Subparts B and F**

Mosaic personnel remove refrigerant from MVACs and MVAC-like appliances using equipment that is compliant with 40 CFR Part 82 and have the proper training and certification. See the enclosed training certificates. Note that AC units are serviced by outside contractors.

19.6 - Compliance Plan and Schedule

Applications for sources, which are not in compliance with all applicable requirements at the time the permit application is submitted to the department, must include a proposed compliance plan as part of the permit application package. This plan shall include the information requested below:

A. Description of Compliance Status: (20.2.70.300.D.11.a NMAC)
A narrative description of your facility's compliance status with respect to all applicable requirements (as defined in 20.2.70 NMAC) at the time this permit application is submitted to the department.

B. Compliance plan: (20.2.70.300.D.11.B NMAC)
A narrative description of the means by which your facility will achieve compliance with applicable requirements with which it is not in compliance at the time you submit your permit application package.

C. Compliance schedule: (20.2.70.300D.11.c NMAC)
A schedule of remedial measures that you plan to take, including an enforceable sequence of actions with milestones, which will lead to compliance with all applicable requirements for your source. This schedule of compliance must be at least as stringent as that contained in any consent decree or administrative order to which your source is subject. The obligations of any consent decree or administrative order are not in any way diminished by the schedule of compliance.

D. Schedule of Certified Progress Reports: (20.2.70.300.D.11.d NMAC)
A proposed schedule for submission to the department of certified progress reports must also be included in the compliance schedule. The proposed schedule must call for these reports to be submitted at least every six (6) months.

E. Acid Rain Sources: (20.2.70.300.D.11.e NMAC)
If your source is an acid rain source as defined by EPA, the following applies to you. For the portion of your acid rain source subject to the acid rain provisions of title IV of the federal Act, the compliance plan must also include any additional requirements under the acid rain provisions of title IV of the federal Act. Some requirements of title IV regarding the schedule and methods the source will use to achieve compliance with the acid rain emissions limitations may supersede the requirements of title V and 20.2.70 NMAC. You will need to consult with the Air Quality Bureau permitting staff concerning how to properly meet this requirement.

NOTE: The Acid Rain program has additional forms. See http://www.env.nm.gov/aqb/index.html. Sources that are subject to both the Title V and Acid Rain regulations are **encouraged** to submit both applications **simultaneously**.

There are currently no compliance issues that require a compliance plan and schedule.

19.7 - 112(r) Risk Management Plan (RMP)

Any major sources subject to section 112(r) of the Clean Air Act must list all substances that cause the source to be subject to section 112(r) in the application. The permittee must state when the RMP was submitted to and approved by EPA.

Mosaic is not subject to the 112(r) Risk Management Plan (RMP) rule.

19.8 - Distance to Other States, Bernalillo, Indian Tribes and Pueblos

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 NMAC)?

(If the answer is yes, state which apply and provide the distances.)

Yes, the facility is approximately 45 km (28 miles) north of Texas.

19.9 - Responsible Official

Provide the Responsible Official as defined in 20.2.70.7.AD NMAC:

The Responsible Official is Paul Gill, General Manager.

The alternate Responsible Official is Jim Johnson, Senior Mill Manager.

Baghouse and Scrubber Compliance Assurance Monitoring (CAM) Plans

Baghouse CAM Plan for Particulate Matter (PM_{10} & $PM_{2.5}$) Control
Mosaic Potash Carlsbad, Inc.
Revision Date: September 2020

Baghouse Operations

Baghouses were selected to control particulate matter from the potash processing circuits. They are designed for use in areas of the plant where moisture from the potash processing operations is not present. Potash is a highly hygroscopic material, and it can become sticky and cake easily in the presence of moisture from ambient air, which can cause baghouse operational difficulties and bag life issues that negatively effect the baghouses. To protect the baghouses and ensure adequate collection of particulate matter, the following three indicators are provided in this Baghouse CAM Plan for compliance assurance monitoring: 1) pressure drop, 2) cleaning arm/chains functionality, and 3) visible emissions observations.

The baghouses are inspected periodically per the indicators described in Table 1 of this Plan to maintain proper operating efficiency. If any of the three indicators do not pass their procedure and corrective actions are needed that cannot be completed without shutting down the control equipment, a Work Order is initiated to coordinate the needed evaluation or repair with the process equipment down. Each process has a scheduled downtime; and when practicable, the control equipment repair coincides with these downtimes. Note that emergency shut down requires sequenced process equipment shutdown that can take one or more hours before the control equipment can be shut down.

Since the potash material that enters the baghouse is highly hygroscopic, large rain events can be detrimental to proper operation of the baghouse because the accumulated dust can absorb moisture and become sticky. Further, dust entering the baghouse can mix with atmospheric moisture and cake on the bags in a similar manner. Sticky material that cakes on the bags may not be dislodged by the puff of air from the cleaning arm/chains; and over time, may cause the pressure drop to increase, which increases the potential for bags to tear.

To prevent any of the baghouse from requiring a major bag change out after large rain events, all baghouses may be taken offline as soon as it starts to rain and brought back online as soon as the rain has passed. During these offline periods, the process equipment may continue to operate unless the baghouse downtime is approaching or projected to exceed 175 hours per rolling 12 months for each baghouse. To prevent fugitive emissions from entering the atmosphere while the baghouses are offline, static control devices (e.g., hoods and enclosures) will remain in place.

Baghouse Monitoring Plan

The compliance assurance monitoring plan for the baghouses, including the indicators monitored, indicator ranges, and performance criteria, are shown in Table 1 of this CAM Plan.

For continued assurance that the baghouses are repaired as quickly as possible, replacement parts are maintained in the on-site warehouse for baghouse components subject to normal wear and tear.

Table 1. Baghouse Monitoring Indicators

	Indicator 1	**Indicator 2**	**Indicator 3**
Indicator	Pressure Drop	Cleaning Arm/Chains Functionality	Visible Emissions Observations
Measurement Approach	Visually observe and record the pressure drop value from the magnehelic/ photohelic gauges while the process equipment and baghouses are operational.	Verify that the cleaning arm/chains are functional while the process equipment and baghouses are operational through visual observation or mechanical PM inspections. Since the cleaning arm/chains are not visible for **CON4**, a whisker switch will alarm if it is not tripped by the cleaning arm/chains movement, signaling that the cleaning arm/chains is not operating. **CON14** does not have a cleaning arm/chains and relies on air jets to clean the bags. Verification that there is viable air pressure signifies that the air jets are working.	30 second daily visible emission observations of each stack equipped with a baghouse while the process equipment and baghouses are operational.

	Indicator 1	Indicator 2	Indicator 3
Indicator Range	For **CON7**, the operating pressure drop range is from **1 to 5 inches of H_2O** and an excursion is defined as a daily average pressure drop below 1 inch of H_2O or greater than 5 inches of H_2O. For **CON4, CON5a, CON5b,** and **CON11**, the pressure drop operating range is from **0.2 to 3 inches of H_2O** and an excursion is defined as a daily average pressure drop below 0.2 inches of H_2O or greater than 3 inches of H_2O. For **CON14,** the pressure drop operating range is from **0.5 to 7 inches of H_2O** and an excursion is defined as a daily average pressure drop below 0.5 inches of H_2O or greater than 7 inches of H_2O. Excursions trigger further inspection and operational adjustment.	An observed lack of cleaning arm/chains, whisker switch, or air jet functionality initiates a work order for a mechanical evaluation and repair or replacement.	The presence of visible emissions emanating from the stack outlet when the process equipment and baghouse is in operation triggers further inspection and operational adjustments and/or repairs. If the visible emissions are due to mechanical issues, a work order is prepared. If the visible emissions are due to broken, torn, or otherwise non-functional bags, the bags are repaired or replaced. For all other issues, engineering support is requested. All work is performed on an expedited schedule.
Data Representativeness	The monitoring system consists of magnehelic or photohelic gauges that measure the pressure drop and produce an analog or digital readout.	Regular checks of the cleaning arm/chains, whisker switch, or air jets are made to verify that the equipment is operating properly.	Observations of each stack are made from a vantage point in accordance with the position requirements found in EPA Reference Method 9, 40 CFR 60, Appendix A. The process equipment must be in operation during the visible emissions observation.

	Indicator 1	Indicator 2	Indicator 3
Verification of Operational Status	Operators determine if the process equipment and baghouses are operational by observing if the electronic display in the control room shows the process equipment and baghouses as powered ON.	Operators determine if the process equipment and baghouses are operational by observing if the electronic display in the control room shows the process equipment and baghouses as powered ON.	Operators determine if the process equipment and baghouses are operational by observing if the electronic display in the control room shows the process equipment and baghouses as powered ON.
Quality Assurance and Quality Control Practices and Criteria	The gauges are maintained in accordance with the manufacturer's recommendations. The zero and span of the gauges are calibrated monthly. Operators are trained on how to properly read the gauges.	Training familiarizes the operators with the cleaning arm/chains, whisker switch, and air jets.	At least once every two years, observers are trained on EPA Reference Methods 22 and 9, 40 CFR 60, Appendix A. No EPA Reference Method 9 certification is required. The training records are maintained on-site and include the names of each individual that received the training.
Monitoring Frequency	Pressure drop is recorded a minimum of twice a day (i.e., during each 12-hour shift) while the process equipment and baghouses are operational.	Functionality of the cleaning arm/chains, whisker switch, and air jets is recorded once per day while the process equipment and baghouses are operational.	Once per daylight shift while the process equipment and baghouses are operational.
Data Collection Procedures	Operators visually read the instrument and record the readings in a log.	If the baghouse cleaning arm/chains, whisker switch, or air jets are not working properly, they are either fixed immediately or noted in a work order.	Records are kept of each observation and include the baghouse unit number, the date and time of each observation, and if any visible emissions are observed. The name of the person making the observations is also included to verify that they have received the required training.
Averaging Period	Daily average of at least two pressure drop readings.	Daily verification.	30 second visible emission observation.

	Indicator 1	Indicator 2	Indicator 3
Records and Reporting	Records include applicable training records, the baghouse unit number, the pressure drop readings, the date of the pressure drop readings, magnehelic/photohelic gauge maintenance and calibrations, including the manufacturers' instructions.	Records include the training records; baghouse unit number; date of cleaning arm/chains, whisker switch, and air jet inspections; the functionality of the cleaning arm/chains, whisker switch, and air jets; any work orders initiated; the repairs or replacements made; and the date that all repairs or replacements are completed.	Records include the training records; the records required by the Data Collection Procedures above; if visible emissions are due to mechanical failure and/or due to broken, torn, or nonfunctional bags; the baghouse inspection records; any work orders; the operational repairs made; and the date that repairs are completed.

Scrubber CAM Plan for Particulate Matter (PM_{10} & $PM_{2.5}$) Control
Mosaic Potash Carlsbad, Inc.
Revision Date: September 2020

Scrubber Operations

Scrubbers were selected to control particulate matter from the potash processing circuits and natural gas-fired rotary kilns used to dry potash material. Exhaust gas from the dryers is vented to dry dust cyclones, which are vented to venturi scrubbers. Venturi scrubbers are the generally accepted best control technology for hot, water soluble particulate emissions such as potash dust. The scrubbers do not have by-pass stacks, and if a scrubber failure occurs, the process circuit is shut down. To protect the scrubbers and cyclones and ensure adequate collection of particulate matter, the following three indicators are provided in this Scrubber CAM Plan for compliance assurance monitoring: 1) pressure drop, 2) dust cyclone valve operation, and 3) scrubber water salt concentration.

Pressure drop is an indicator of scrubber performance and is an indirect measure of the energy available to cause particulate matter to impinge and be captured by water droplets. Pressure drop is monitored continuously and recorded two times a day to coincide with the 12-hour work shift. Because pressure drop varies with water flow, venturi opening, gas volume, and temperature, minimum operational pressure drop limits are established based on previous passing particulate matter stack test results. The pressure drop limits account for the normal variability of scrubber systems.

Dust cyclones are passive devices that use centrifugal force to separate suspended particles from the gas stream. Dust falls through a deep cone hopper and is removed through cyclone valves. Visual inspection of the cyclone valves assures that there is no obstruction due to plugging in the cyclone that would cause a particulate overload to the scrubber.

Scrubber water salt concentration is an operational parameter that informs the operator when there is an overload of particulates/salt to the scrubber, which requires freshwater make-up. This indicator ensures that the scrubbers are being operated properly.

Scrubber Monitoring Plan

The compliance assurance monitoring plan for the scrubbers, including the indicators monitored, indicator ranges, and performance criteria, are shown in Table 2 of this CAM Plan.

For continued assurance that the scrubbers are repaired as quickly as possible, replacement parts are maintained in the on-site warehouse for scrubber components subject to normal wear and tear. A partial list of these replacement parts includes wet scrubber pumps, electric motors, spray nozzles, and manometers.

Table 2. Scrubber Monitoring Indicators

	Indicator 1	Indicator 2	Indicator 3
Indicator	Pressure Drop	Dust Cyclone Valve Operation	Scrubber Water Salt Concentration
Measurement Approach	Visually observe and record the pressure drop from the magnehelic/ photohelic gauges while the process equipment and scrubber are operational.	Visual inspection of the dust cyclone valves for free operation (i.e., no choke ups) while the process equipment and cyclone are operational.	Scrubber water salt concentration is measured daily while the process equipment and scrubber are operational to reflect the freshness of the scrubber makeup water.
Indicator Range	Minimum average pressure drop is established by stack testing. An excursion is defined as when the daily average of at least two readings is one inch or more below the minimum pressure drop established from stack tests. Excursions trigger further inspection and operational adjustment.	An excursion is defined as a valve not operating freely. A choked valve is cleared immediately upon discovery.	Maximum scrubber water salt concentration is maintained at 3% or less.
Data Representativeness	Pressure drop, which is the primary measure of scrubber performance, is measured across the venturi. The minimum pressure drop is reset only if a passing stack test results in a lower pressure drop. Pressure drop is consistent, but slight variations are compensated by averaging two daily readings.	If the valves are operating freely, cyclone performance is assured.	Scrubber water salt concentration is measured via lab analyses of water exiting the scrubber recycle tank. Note that scrubbers CON10a and CON10b share the same recycle tank. Both scrubbers discharge to and pull from the same tank, which is where fresh water is added when needed.

	Indicator 1	Indicator 2	Indicator 3
Verification of Operational Status	Operators determine if the process equipment and scrubber are operational by observing if the electronic display in the control room shows the process equipment and scrubber as being ON.	Operators determine if the process equipment and scrubber are operational by observing if the electronic display in the control room shows the process equipment and scrubber as being ON.	Operators determine if the process equipment and scrubber are operational by observing if the electronic display in the control room shows the process equipment and scrubber as being ON.
Quality Assurance and Quality Control Practices and Criteria	Manometer zero and span are calibrated monthly.	N/A	Lab QA/QC procedures for determining salt concentration are followed and are available upon request.
Monitoring Frequency	Pressure drop is recorded twice a day (once during each 12-hour shift) while the process equipment and scrubber are operational.	Cyclone valves are visually inspected daily while the process equipment and cyclone are operational.	Scrubber water salt concentration is recorded daily while the process equipment and scrubber are operational.
Data Collection Procedures	Pressure drop is monitored visually.	Operator visually inspects the cyclone valves.	Scrubber water salt concentration is logged based on the lab analyses results.
Averaging Period	The twice-daily visual readings are averaged daily.	Daily inspections.	Daily logs.
Records and Reporting	Records include the twice daily pressure drops, the minimum pressure drop determined through stack testing, the scrubber unit number, the date and time of each pressure drop reading, and manometer calibrations that correspond to the manufacturers' recommendations.	Records include the date and time of each dust cyclone valve inspection, the scrubber unit number, if the valve is not operating freely, and if the valve was unblocked.	Records include the date and time of each water sample, the scrubber unit number, the percent salt concentration, lab analyses and QA/QC procedures (available upon request), and the date that adjustments to the make-up water flow rate is made.

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.

None.

Section 21

This is not a Landfill Application

Addendum for Landfill Applications

Do not print this section unless this is a landfill application.

Landfill Applications are not required to complete Sections 1-C Input Capacity and Production Rate, 1-E Operating Schedule, 17 Compliance Test History, and 18 Streamline Applications. Section 12 – PSD Applicability is required only for Landfills with Gas Collection and Control Systems and/or landfills with other non-fugitive stationary sources of air emissions such as engines, turbines, boilers, heaters. All other Sections of the Universal Application Form are required.

EPA Background Information for MSW Landfill Air Quality Regulations:
https://www3.epa.gov/airtoxics/landfill/landflpg.html

NM Solid Waste Bureau Website: https://www.env.nm.gov/swb/

21-A: Municipal Solid Waste Landfill Information

1	How long will the landfill be operated?			
2	Maximum operational hours per year:			
3	Landfill Operating hours (open to the public) M-F:		Sat.	Sun.
4	To determine to what NSPS and emissions guidelines the landfill is subject, what is the date that the landfill was constructed, modified, or reconstructed as defined at 40 CFR 60, Subparts A, WWW, XXX, Cc, and Cf.			
5	Landfill Design Capacity. Enter all 3	Tons:	Megagrams (Mg):	Cubic meters:
6	Landfill NMOC Emission Rate (NSPS XXX)	☐ Less than 34 Mg/year using Tiers 1 to 3	☐ Equal to or Greater than 34 Mg/year using Tiers 1 to 3	
	Landfill NMOC Emission Rate (NSPS XXX)	☐ Less than 500 ppm using Tier 4	☐ Equal to or Greater than 500 ppm using Tier 4	
	Landfill NMOC Emission Rate (NSPS WWW)	☐ Less than 50 Mg/yr	☐ Equal to or Greater than 50 Mg/yr	
7	Annual Waste Acceptance Rate:			
8	Is Petroleum Contaminated Soil Accepted?		If so, what is the annual acceptance rate?	
9	NM Solid Waste Bureau (SWB) Permit No.:		SWB Permit Date:	
10	Describe the NM Solid Waste Bureau Permit, Status, and Type of waste deposited at the landfill.			
11	Describe briefly any process(es) or any other operations conducted at the landfill.			

21-B: NMOC Emissions Determined Pursuant to 40 CFR 60, Subparts WWW or XXX	
	Enter the regulatory citation of all Tier 1, 2, 3, and/or 4 procedures used to determine NMOC emission rates and the date(s) that each Tier procedure was conducted. In Section 7 of the application, include the input data and results.
1	Tier 1 equations (e.g. LandGEM):
2	Tier 2 Sampling:
3	Tier 3 Rate Constant:
4	Tier 4 Surface Emissions Monitoring:
5	Attach all Tier Procedure calculations, procedures, and results used to determine the Gas Collection and Control System (GCCS) requirements.

Facilities that have a landfill GCCS must complete Section 21-C.

21-C: Landfill Gas Collection and Control System (GCCS) Design Plan	
1	Was the GCCS design certified by a Professional Engineer?
2	Attach a copy of the GCCS Design Plan and enter the submittal date of the Plan pursuant to the deadlines in either NSPS WWW or NSPS XXX. The NMOC applicability threshold requiring a GCCS plan is 50Mg/yr for NSPS WWW and 34 Mg/yr or 500 ppm for NSPS XXX.
3	Is/Was the GCCS planned to be operational within 30 months of reporting NMOC emission rates equal to or greater than 50 Mg/yr, 34 Mg/yr, or 500 ppm pursuant to the deadlines specified in NSPS WWW or NSPS XXX?
4	Does the GCCS comply with the design and operational requirements found at 60.752, 60.753, and 69.759 (NSPS WWW) or at 60.762, 60.763, and 60.769 (NSPS XXX)?
5	Enter the control device(s) to which the landfill gas will be/is routed such as an open flare, enclosed combustion device, boiler, process heater, or other.
6	Do the control device(s) meet the operational requirements at 60.752 and 60.756 (NSPS WWW) or 60.762, 60.763, 60.766 (NSPS XXX)?

Section 22: Certification

Company Name: Mosaic Potash Carlsbad, Inc.

I, JASPAL PAUL S. GILL, hereby certify that the information and data submitted in this application are true and as accurate as possible, to the best of my knowledge and professional expertise and experience.

Signed this 15 day of SEPTEMBER, 2020, upon my oath or affirmation, before a notary of the State of

NEW MEXICO.

P. Gill
*Signature

9/15/2020
Date

JASPAL PAUL S. GILL
Printed Name

GENERAL MANAGER & VP OPERATIONS
Title

Scribed and sworn before me on this 15th day of September, 2020.

My authorization as a notary of the State of New Mexico expires on the

21st day of December, 2023.

Jeanette Humphreys
Notary's Signature

9-15-20
Date

Jeanette Humphreys
Notary's Printed Name

OFFICIAL SEAL
Jeanette Humphreys
NOTARY PUBLIC
STATE OF NEW MEXICO
My Commission Expires: 12-21-23

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