

Missouri Department of dnr.mo.gov
NATURAL RESOURCES
Michael L. Parson, Governor Carol S. Comer, Director

APR 22 2019

Ms. Stephanie Hirner
Manager, Air Permitting and Compliance
Kansas City Power & Light Company - Iatan Generating Station
PO Box 889
Topeka, KS 66601

RE: New Source Review Permit - Project Number: 2019-01-030

Dear Ms. Hirner:

Enclosed with this letter is your permit to construct. Please study it carefully and refer to Appendix A for a list of common abbreviations and acronyms used in the permit. Also, note the special conditions on the accompanying pages. The document entitled, "Review of Application for Authority to Construct," is part of the permit and should be kept with this permit in your files. Operation in accordance with these conditions, your new source review permit application and with your amended operating permit is necessary for continued compliance. The reverse side of your permit certificate has important information concerning standard permit conditions and your rights and obligations under the laws and regulations of the State of Missouri.

This permit may include requirements with which you may not be familiar. If you would like the department to meet with you to discuss how to understand and satisfy the requirements contained in this permit, an appointment referred to as a Compliance Assistance Visit (CAV) can be set up with you. To request a CAV, please contact your local regional office or fill out an online request. The regional office contact information can be found at the following website: <http://dnr.mo.gov/regions/>. The online CAV request can be found at <http://dnr.mo.gov/cav/compliance.htm>.

If you were adversely affected by this permit decision, you may be entitled to pursue an appeal before the administrative hearing commission pursuant to Sections 621.250 and 643.075.6 RSMo. To appeal, you must file a petition with the administrative hearing commission within thirty days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the administrative hearing commission, whose contact information is: Administrative Hearing Commission, United States Post Office Building, 131 West High Street, Third Floor, P.O. Box 1557, Jefferson City, Missouri 65102, phone: 573-751-2422, fax: 573-751-5018, website: www.oha.mo.gov/ahc.



Ms. Stephanie Hirner
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If you have any questions regarding this permit, please do not hesitate to contact Chad Stephenson, at the Department of Natural Resources' Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102 or at (573) 751-4817. Thank you for your attention to this matter.

Sincerely,

AIR POLLUTION CONTROL PROGRAM



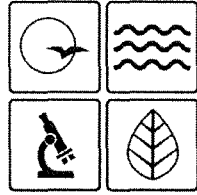
Susan Heckenkamp
New Source Review Unit Chief

SH:csj

Enclosures

c: Kansas City Regional Office
PAMS File: 2019-01-030

Permit Number: 042019 - 012



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the air contaminant source(s) described below, in accordance with the laws, rules and conditions as set forth herein.

Permit Number: 042019 - 012

Project Number: 2019-01-030
Installation Number: 165-0007

Parent Company: Evergy, Inc.

Parent Company Address: P.O. Box 418679, Kansas City, MO 64141

Installation Name: Kansas City Power & Light Company - Iatan Generating Station

Installation Address: 20250 Highway 45 - North, Weston, MO 64098

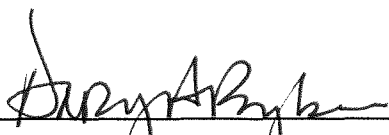
Location Information: Platte County, S8, T54N, R36W

Application for Authority to Construct was made for:

Hauling off-site non-hazardous industrial waste to the landfill at Iatan. This review was conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*.

Standard Conditions (on reverse) are applicable to this permit.

Standard Conditions (on reverse) and Special Conditions are applicable to this permit.



Director or Designee
Department of Natural Resources

APR 22 2019

Effective Date

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two years from the effective date of this permit. Permittee should notify the Enforcement and Compliance Section of the Air Pollution Control Program if construction or modification is not started within two years after the effective date of this permit, or if construction or modification is suspended for one year or more.

You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications and conditions listed in your application, this permit and the project review. In the event that there is a discrepancy between the permit application and this permit, the conditions of this permit shall take precedence. Specifically, all air contaminant control devices shall be operated and maintained as specified in the application, associated plans and specifications.

You must notify the Enforcement and Compliance Section of the Department's Air Pollution Control Program of the anticipated date of start up of this (these) air contaminant source(s). The information must be made available within 30 days of actual startup. Also, you must notify the Department's regional office responsible for the area within which you are located within 15 days after the actual start up of this (these) air contaminant source(s).

A copy of the permit application and this permit and permit review shall be kept at the installation address and shall be made available to Department's personnel upon request.

You may appeal this permit or any of the listed special conditions to the Administrative Hearing Commission (AHC), P.O. Box 1557, Jefferson City, MO 65102, as provided in RSMo 643.075.6 and 621.250.3. If you choose to appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed. If it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC.

If you choose not to appeal, this certificate, the project review and your application and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate your air contaminant source(s), but in no way relieves you of your obligation to comply with all applicable provisions of the Missouri Air Conservation Law, regulations of the Missouri Department of Natural Resources and other applicable federal, state and local laws and ordinances.

The Air Pollution Control Program invites your questions regarding this air pollution permit. Please contact the Construction Permit Unit using the contact information below.

Contact Information:

Missouri Department of Natural Resources
Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102-0176
(573) 751-4817

The regional office information can be found at the following website:
<http://dnr.mo.gov/regions/>

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

The special conditions listed in this permit were included based on the authority granted to the Missouri Air Pollution Control Program by the Missouri Air Conservation Law (specifically 643.075) and by the Missouri Rules listed in Title 10, Division 10 of the Code of State Regulations (specifically 10 CSR 10-6.060). For specific details regarding conditions, see 10 CSR 10-6.060 paragraph (12)(A)10. "Conditions required by permitting authority."

**Kansas City Power & Light Company - Iatan Generating Station
Platte County, S8, T54N, R36W**

1. Off-site Industrial Waste Limit
 - A. Kansas City Power & Light Company - Iatan Generating Station shall haul no more than 20,000 tons of off-site non-hazardous industrial waste to the landfill in any consecutive 12-month period.
 - B. Kansas City Power & Light Company - Iatan Generating Station shall demonstrate compliance with Special Condition 1.A using Attachment A or another equivalent paper/electronic form that shall contain at a minimum the following information,
 - a) Installation name
 - b) Installation ID
 - c) Permit number
 - d) Current monthly off-site non-hazardous industrial waste to the landfill
 - e) 12-month rolling total of monthly off-site non-hazardous industrial waste to the landfill
 - f) Indication of current compliance with Special Condition 1.A.
2. Record Keeping and Reporting Requirements
 - A. Kansas City Power & Light Company - Iatan Generating Station shall maintain all records required by this permit for not less than five years and shall make them available immediately to any Missouri Department of Natural Resources' personnel upon request.
 - B. Kansas City Power & Light Company - Iatan Generating Station shall report to the Air Pollution Control Program's Compliance/Enforcement Section, by mail at P.O. Box 176, Jefferson City, MO 65102 or by email at AirComplianceReporting@dnr.mo.gov, no later than 10 days after the end of the month during which any record required by this permit shows an exceedance of a limitation imposed by this permit.

REVIEW OF APPLICATION FOR AUTHORITY TO CONSTRUCT AND OPERATE
SECTION (5) REVIEW

Project Number: 2019-01-030
Installation ID Number: 165-0007
Permit Number: 042019-012

Installation Address:
Kansas City Power & Light Company -
Iatan Generating Station
20250 Highway 45 - North
Weston, MO 64098

Parent Company:
Eversource Energy, Inc.
P.O. Box 418679
Kansas City, MO 64141

Platte County, S8, T54N, R36W

REVIEW SUMMARY

- Kansas City Power & Light Company - Iatan Generating Station has applied for authority to haul off-site non-hazardous industrial waste to the landfill at Iatan.
- The application was deemed complete on February 13, 2019.
- HAP emissions are not expected from the proposed equipment.
- None of the New Source Performance Standards (NSPS) apply to the project.
- None of the NESHAPs apply to this installation. None of the currently promulgated MACT regulations apply to the proposed equipment.
- No air pollution control equipment is being used in association with the new equipment.
- This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutants are conditioned below de minimis levels by Special Condition 1.
- This installation is located in Platte County, a maintenance area for ozone and an attainment/unclassifiable area for all other criteria pollutants.
- This installation is on the List of Named Installations found in 10 CSR 10-6.020(3)(B), Table 2. The installation is classified as item number 21, fossil-fuel boilers (or combination thereof) totaling more than 250 million British thermal units per hour heat input. The installation's major source level is 100 tpy and fugitive emissions are counted toward major source applicability.

- Ambient air quality modeling was not performed since potential emissions of the application are conditioned below de minimis levels.
- Emissions testing is not required for the equipment as a part of this permit. Testing may be required as part of other state, federal or applicable rules.
- Submittal of an application to amend the part 70 operating permit is required for this installation within 1 year of the off-site non-hazardous industrial waste hauling operation occurring after this permit's issuance.
- Approval of this permit is recommended with special conditions.

INSTALLATION DESCRIPTION

KCPL Iatan is a primarily coal fired, electric generating station consisting of two main units. Unit 1 was permitted in 1977. It is a wall fired, dry bottom boiler rated at 7,800 MMBtu/hr input. Unit 2 was permitted in 2006. It is a supercritical, wall fired, dry bottom boiler rated at 8,100 MMBtu/hr input. The primary fuel is subbituminous coal with fuel oil for startup and flame stabilization. Controls include separate, dedicated selective catalytic reduction (SCR) units, baghouses, and wet scrubbers. Other emission units include an auxiliary boiler, coal receiving/handling, limestone receiving/handling, coal combustion residuals handling and landfill, haul roads, emergency engines, fuel tanks, degreasing units, and a cooling tower. The installation is a major source of PM, PM₁₀, PM_{2.5}, SO₂, NO_x, VOC, CO, sulfuric acid mist (SAM), and HAPs. The installation's source status of fluorides (excluding hydrogen fluoride), hydrogen sulfide (H₂S), total reduced sulfur, and reduced sulfur compounds has not been determined. The following new source review permits have been issued to KCPL Iatan.

Table 1: Permit History

Permit Number	Description
0277-EPA	PSD permit for Unit 1
1293-004	Section (5) permit for Unit 1 ESP changes
012006-019	Section (8) permit for Unit 2, auxiliary units, landfill, and upgrades to Unit 1
012006-019A	Amendment for Unit 2 to be supercritical
012006-019B	Amendment for Unit 1 modifications, and emission limits
012006-019C	Amendment for wording clarification
012006-019D	Amendment for adding sulfuric acid mist BACT, auxiliary changes
032014-004	Temporary permit for PWC
022016-005	Spray Dry Evaporator and PWC
012006-019E	Cooling Tower BACT limit changes

PROJECT DESCRIPTION

KCP&L plans to haul no more than 20,000 tons of off-site non-hazardous industrial waste to the landfill at latan. The Project emissions include increasing the fugitive emissions from truck activity on paved and unpaved haul roads, truck unloading "drops" of the non-hazardous industrial waste into the landfill, vehicle activity on the landfill (pile maintenance), and wind erosion at the landfill (EP35) for the additional non-hazardous industrial waste hauled to the latan landfill. The non-hazardous industrial waste will include waste such as coal combustion by-products (e.g., fly ash, bottom ash, economizer ash), FGD by-products (e.g. gypsum, lime cake), coal, etc. This is the same type of waste that is currently deposited in the landfill.

EMISSIONS/CONTROLS EVALUATION

The emission factors used in this analysis were obtained from the EPA document AP-42, *Compilation of Air Pollutant Emission Factors*, Fifth Edition (AP-42).

Emissions from haul roads and vehicular activity areas:

- Calculated using the predictive equations from AP-42 Section 13.2.2 "Unpaved Roads," November 2006 and AP-42 Section 13.2 .1 "Paved Roads," January 2011.
- A loaded truck weight of 50 tons and unloaded truck weight of 20 tons was used.
- The paved portion of the haul road is approximately 5.14 miles and the unpaved portion is approximately 0.38 miles. The vehicular activity area for the pile maintenance was estimated to be 284 feet.
- A paved silt loading value of 2.4 g/m² was used for the paved portions since KCP&L is required to periodically water, wash and/or otherwise clean all of the paved portions of the haul roads as necessary to achieve control of fugitive emissions per Special Condition 10.A. in permit 012016-019D. A surface material silt content of 6.4% was used for the unpaved portions.

Emissions from truck unloading at pile and the wind erosion:

- Load-in at the storage pile were calculated using the predictive equation from AP-42 Section 13.2.4 with a moisture content of 0.7%.
- Emissions from wind erosion of storage piles were calculated using equations from AP-42 Section 13.2.5 "Industrial Wind Erosion," November 2006.

The following table provides an emissions summary for this project. Existing potential emissions were taken from permit 022016-005. Existing actual emissions were taken from the installation's 2017 EIQ. Potential emissions of the application represent the potential of the new equipment, assuming continuous operation (8760 hours per year) and accounting for the 20,000 tons per 12 month limit in Special Condition 1.

Table 2: Emissions Summary (tpy)

Pollutant	Regulatory <i>De Minimis</i> Levels	Existing Potential Emissions	Existing Actual Emissions (2017 EIQ)	Potential Emissions of the Project
PM	25.0	Major	N/D	5.02
PM ₁₀	15.0	1,831.09	338.82	1.77
PM _{2.5}	10.0	953.68	263.25	0.28
SO ₂	40.0	3,151.11	437.99	N/A
NOx	40.0	5,667.40	2,923.11	N/A
VOC	40.0	187.14	38.07	N/A
CO	100.0	6,751.87	1,231.00	N/A
GHG (CO ₂ e)	75,000	15,012,996.83	N/D	N/A
GHG (mass)	0.0	N/D	N/D	N/A
Combined HAPs	25.0	5376.38	2.73	N/A
Arsenic	¹ 0.005	N/D	N/D	N/A
Beryllium	¹ 0.008	N/D	N/D	N/A
Cadmium	¹ 0.01	N/D	N/D	N/A
Chromium	¹ 5	N/D	N/D	N/A
Cobalt	¹ 0.1	N/D	N/D	N/A
Lead	¹ 0.01	N/D	N/D	N/A
Manganese	¹ 0.8	N/D	N/D	N/A
Mercury	¹ 0.01	N/D	N/D	N/A
Nickel	¹ 1	N/D	N/D	N/A
Selenium	¹ 0.1	N/D	N/D	N/A
Hydrogen chloride	¹ 10	N/D	N/D	N/A
Sulfuric acid mist	7.0	N/D	N/D	N/A
Hydrogen fluoride	¹ 0.1	N/D	N/D	N/A
Acrylic acid	¹ 0.6	N/D	N/D	N/A

N/A = Not Applicable; N/D = Not Determined

¹ = SMAL

PERMIT RULE APPLICABILITY

This review was conducted in accordance with Section (5) of Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*. Potential emissions of all pollutants are conditioned below de minimis levels.

APPLICABLE REQUIREMENTS

Kansas City Power & Light Company - Iatan Generating Station shall comply with the following applicable requirements. The Missouri Air Conservation Laws and Regulations should be consulted for specific record keeping, monitoring, and reporting requirements. Compliance with these emission standards, based on information submitted in the application, has been verified at the time this application was approved. For a complete list of applicable requirements for your installation, please consult your operating permit.

GENERAL REQUIREMENTS

- *Operating Permits*, 10 CSR 10-6.065
- *Start-Up, Shutdown, and Malfunction Conditions*, 10 CSR 10-6.050
- *Submission of Emission Data, Emission Fees and Process Information*, 10 CSR 10-6.110
 - Part 70 sources are required to submit a full EIQ each year.
- *Restriction of Particulate Matter to the Ambient Air Beyond the Premises of Origin*, 10 CSR 10-6.170
- *Restriction of Emission of Visible Air Contaminants*, 10 CSR 10-6.220
- *Restriction of Emission of Odors*, 10 CSR 10-6.165

STAFF RECOMMENDATION

On the basis of this review conducted in accordance with Section (5), Missouri State Rule 10 CSR 10-6.060, *Construction Permits Required*, it is recommended that this permit be granted with special conditions.

PERMIT DOCUMENTS

The following documents are incorporated by reference into this permit:

- The Application for Authority to Construct form, dated January 23, 2019, received January 24, 2019, designating Evergy, Inc. as the owner and operator of the installation.

APPENDIX A

Abbreviations and Acronyms

%percent	Mgal1,000 gallons
°Fdegrees Fahrenheit	MWmegawatt
acfmactual cubic feet per minute	MHDRmaximum hourly design rate
BACTBest Available Control Technology	MMBtuMillion British thermal units
BMPsBest Management Practices	MMCFmillion cubic feet
BtuBritish thermal unit	MSDSMaterial Safety Data Sheet
CAMCompliance Assurance Monitoring	NAAQSNational Ambient Air Quality Standards
CASChemical Abstracts Service	NESHAPs National Emissions Standards for Hazardous Air Pollutants
CEMSContinuous Emission Monitor System	NO_xnitrogen oxides
CFRCode of Federal Regulations	NSPSNew Source Performance Standards
COcarbon monoxide	NSRNew Source Review
CO₂carbon dioxide	PMparticulate matter
CO_{2e}carbon dioxide equivalent	PM_{2.5}particulate matter less than 2.5 microns in aerodynamic diameter
COMSContinuous Opacity Monitoring System	PM₁₀particulate matter less than 10 microns in aerodynamic diameter
CSRCode of State Regulations	ppmparts per million
dscfdry standard cubic feet	PSDPrevention of Significant Deterioration
EIQEmission Inventory Questionnaire	PTEpotential to emit
EPEmission Point	RACTReasonable Available Control Technology
EPAEnvironmental Protection Agency	RALRisk Assessment Level
EUEmission Unit	SCCSource Classification Code
fpsfeet per second	scfmstandard cubic feet per minute
ftfeet	SDSSafety Data Sheet
GACTGenerally Available Control Technology	SICStandard Industrial Classification
GHGGreenhouse Gas	SIPState Implementation Plan
gpmgallons per minute	SMALScreening Model Action Levels
grgrains	SO_xsulfur oxides
GWPGlobal Warming Potential	SO₂sulfur dioxide
HAPHazardous Air Pollutant	SSMStartup, Shutdown & Malfunction
hrhour	tphtons per hour
hphorsepower	tpytons per year
lbpound	VMTvehicle miles traveled
lbs/hrpounds per hour	VOCVolatile Organic Compound
MACTMaximum Achievable Control Technology	
µg/m³micrograms per cubic meter	
m/smeters per second	

Project Emissions Summary - Iatan

	PM	PM ₁₀	PM _{2.5}
	TPY	TPY	TPY
Haul road - Off-site Waste Hauling	2.4	0.5	0.1
Landfill material handling^a	2.6	1.2	0.2
Total	5.0	1.8	0.3

(a) Includes truck unloading, pile maintenance, and wind erosion

Pollutant	Preliminary Estimated Project Potential Emissions	PSD Significance Levels
	(Tons per Year)	(Tons per Year)
PM	5.02	25
PM₁₀	1.77	15
PM_{2.5}	0.28	10

latan
Haul Road Information Calculations

Data for Haul Trucks

Annual Consumption Rate

20,000 tons per year

Material	Type of Truck	Unloaded (tons) (truck weight)	Loaded (tons) (truck weight plus material)	Truck Capacity (tons)	Annual Consumption Rate (tons)	Max # of Trucks per year	ROUNDUP - Max # of Trucks per year
Off-site Industrial Waste	Tractor Trailer	20	50	30	20,000	667	667

Haul Road Emission Calculations

Paved Haul Road Emissions

$$E = k * (sL)^{0.91} * (W)^{1.02}$$

Equation 1 from AP 42 Section 13.2.1.3.

where E is the particulate emission factor having the units matching k

Parameter	Value	Description of parameter
sL	2.4	Ubiquitous Silt Loading Default Value, g/m ²
W	see below	Mean vehicle weight [(loaded truck weight + unloaded truck weight)/2], tons
VMT	see below	Vehicle miles traveled (length traveled round trip)
VMT/hr	see below	Vehicle miles traveled per hour = VMT*maximum trips per hour
VMT/yr	see below	Vehicle miles traveled per year = VMT*maximum trips per year

	k (lb/VMT)
PM2.5	0.00054
PM10	0.0022
PM30 (TSP)	0.011

Notes: Ubiquitous silt loading value is a winter multiplier of 4 (applied year-round) times the < 500 average daily traffic baseline value of 0.6 g/m² resulting in 2.4 g/m². The multiplier and baseline values are from AP-42 Table 13.2.1-2.
Constant k, lb/VMT is from AP 42 Table 13.2.1-1

Unpaved (Gravel) Roads

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

hourly

where E is the size specific emission factor, lb/VMT

$$E_{ext} = k * (s/12)^a * (W/3)^b * [(365-P)/365]$$

annual

Equation 1b from AP 42 Section 13.2.2.2.

where Eext is the annual size-specific emission factor extrapolated for natural mitigation, lb/VMT

Parameter	Value	Description of parameter
s	6.4	Surface material silt content, % (Plant road - municipal solid waste landfills)
W	see below	Mean vehicle weight [(loaded truck weight + unloaded truck weight)/2], tons
VMT	see below	Vehicle miles traveled (length traveled round trip)
VMT/hr	see below	Vehicle miles traveled per hour = VMT*maximum trips per hour
VMT/yr	see below	Vehicle miles traveled per year = VMT*maximum trips per year
P	101.00	Number of days a year with at least 0.254 mm (0.01 in) of precipitation (Taken from Figure 13.2.1-2)

	k	a	b
PM2.5	0.15	0.9	0.45
PM10	1.5	0.9	0.45
PM30 (TSP)	4.9	0.7	0.45

Notes: Constants k, a, and b are from AP 42 Table 13.2.2-2

	Vehicle Type	Paved	Max # Trips/yr*	VMT - Length (round trip) (miles)	Truck Weight		Control (%)	Factor "E" lb PM/VMT	Factor "E" lb PM10/VMT	Factor "E" lb PM2.5/VMT	Traveled VMT/yr	Uncontrolled PM tpy	Controlled PM tpy	Uncontrolled PM10 tpy	Controlled PM10 tpy	Uncontrolled PM2.5 tpy	Controlled PM2.5 tpy
					Loaded tons	Unloaded tons											
	Tractor Trailer	no	667	5.5	50	20	0%	10.45	2.76	0.30	3,660.00	2.44	2.44	0.55	0.55	0.10	0.10
paved	Tractor Trailer	yes	667	5.14	50	20	0%	0.92	0.18	0.05	3,426.67	1.57	1.57	0.31	0.31	0.08	0.08
unpaved	Tractor Trailer	no	667	0.36	50	20	0%	0.53	2.57	0.26	253.33	0.87	0.87	0.24	0.24	0.02	0.02

(a) annual tons of material divided by the truck capacity 20000 tons per year / 30 tons

Pile Maintenance

Pile Maintenance - Unpaved Haul Road Emissions: From AP-42, Section 13.2.2 (11/06)

Emission Factor =>
$$E = k \cdot \left(\frac{s}{12}\right)^a \times \left(\frac{W}{3}\right)^b$$

Haul road equation was modified to reflect that material is pushed not hauled
Vehicle Miles Traveled (VMT) = 2 * Length of Segment * Maximum Hourly Amount Pushed
Weight of Vehicle

Where:

E = Emission factor (pounds per VMT)

Parameter	Value	Description of parameter
s	8.4	Surface material silt content, % (Plant road - municipal solid waste landfills)
W	see below	Vehicle weight, tons
VMT	see below	Vehicle miles traveled (length traveled)
VMT/hr	see above for modified equation	Vehicle miles traveled per hour = VMT* maximum trips per hour
VMT/yr	see above for modified equation	Vehicle miles traveled per year = VMT* maximum trips per year

	k	a	b
PM2.5	0.15	0.9	0.45
PM10	1.5	0.9	0.45
PM30 (TSP)	4.9	0.7	0.45

Notes: Constants k, a, and b are from AP 42 Table 13.2.2-2

ID	Description	Vehicle Type	# of vehicles	Max hourly amt pushed ton/year	Max hourly amt pushed ton/day	Control	Length of Segment feet	Weight (W)		VMT/day	PM lb/VMT	PM10 lb/VMT	PM2.5 lb/VMT	PM Emissions		PM Emissions		PM10 Emissions		PM10 Emissions		PM2.5 Emissions		PM2.5 Emissions	
								Uncontrolled						Controlled		Uncontrolled		Controlled		Uncontrolled		Controlled			
								lb/day	tpy					lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy	lb/day	tpy
LF1	Landfill Pile Maintenance - Dozer	Dozer	1	20,000	55	0%	284	85,000	42.5	0.1	10.4	2.8	0.28	1.4	0.3	1.4	0.3	0.4	0.07	0.4	0.07	3.9E-02	0.01	3.9E-02	0.01

latan
Landfill Active Pile Calculations

Landfill Active Pile

AP-42 Table 13.2.5-3 - Subarea Distribution for regimes of us/ur

Surface Area	109,031 ft ²
	10,130 m ²
Height	25 ft
Base Length	284 ft
Height to base ratio	0.09 < 0.2, do not need to divide into subareas - assume relatively flat pile

Threshold Friction Velocity = 1.12 Table 13.2.5-2 Based on Uncrusted Coal Pile

<https://www.ncdc.noaa.gov/sites/default/files/attachments/wind1996.pdf>

Kansas City, MO	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
DIR	SSW	SSW	S	S	S	S	S	S	S	S	S	S	S
SPD	11	11	12	12	10	10	9	9	10	11	11	11	11
mph	58	56	63	62	59	67	75	54	63	60	52	55	75
m/sec	PGU 26.10	25.20	28.35	27.90	26.55	30.15	33.75	24.30	28.35	27.00	23.40	24.75	33.75

Anemometer height 10.00 m

Month	u _{6.1} ⁺ (m/s)	u ₁₀ ⁺ (m/s)	u ⁺ (m/s)	u ⁺ - ut [*] (m/s)	P (g/m ² /yr)	E (g/yr), PM emissions	Total	
							lb/yr	tpy
Jan	26.1	26.1	1.38	0.26	10.60	107408.13	236.79	0.12
Feb	25.2	25.2	1.34	0.22	8.09	81907.78	180.57	0.09
Mar	28.4	28.4	1.50	0.38	18.05	182855.67	403.12	0.20
Apr	27.9	27.9	1.48	0.36	16.43	166429.40	366.91	0.18
May	26.6	26.6	1.41	0.29	11.96	121160.87	267.11	0.13
Jun	30.2	30.2	1.60	0.48	25.20	255244.56	562.71	0.28
Jul	33.8	33.8	1.79	0.67	42.66	432104.65	952.61	0.48
Aug	24.3	24.3	1.29	0.17	5.83	59080.96	130.25	0.07
Sep	28.4	28.4	1.50	0.38	18.05	182855.67	403.12	0.20
Oct	27.0	27.0	1.43	0.31	13.38	135582.00	298.90	0.15
Nov	23.4	23.4	1.24	0.12	3.84	38927.67	85.82	0.04
Dec	24.8	24.8	1.31	0.19	6.93	70160.18	154.67	0.08
					PM SUM	1,833,718	4,043	2.0

Based on equations from AP-42 Chapter 13.2.5 Industrial Wind Erosion

Material Handling Summary

Emission ID	Description	ton/year	Control (%)	Operation hr/yr	Emission Factor (lb/ton)			Source	PM After Control	PM ₁₀ After Control	PM _{2.5} After Control
					PM	PM ₁₀	PM _{2.5}		ton/yr	ton/yr	ton/yr
latan	Truck unloading at pile	20,000	0%	8,760	2.87E-02	1.36E-02	2.06E-03	AP-42, Section 13.2.4: Aggregate Handling and Storage Piles, Equation 1	0.3	0.1	0.0
	Wind erosion ^a		0%	8,760				AP-42 Section 13.2.5 Industrial Wind Erosion (11/06)	2.0	1.0	0.2
	Pile maintenance		0%	8,760				AP-42 Section 13.2.2 Unpaved Roads (11/06) Eq 1a	0.3	0.1	0.0

(a) Particle size multiplier (k) for PM₁₀ = 0.5 and PM_{2.5} = 0.075

Drop Equation for load in/load out

AP-42 Section 13.2.4 Aggregate Handling and Storage Piles (10/06) Equation 1

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

Particle size multiplier (drops)	PM	PM ₁₀	PM _{2.5}
k	0.74	0.35	0.053

U = mean wind speed (mph)	11.00
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M = material moisture content	Value
Industrial Waste	0.70

Default Moisture Content

Material	Emission Factors (lb/ton)		
	PM	PM ₁₀	PM _{2.5}
Industrial Waste	2.87E-02	1.36E-02	2.06E-03

PM Total	PM ₁₀ Total	PM _{2.5} Total
ton/yr	ton/yr	ton/yr
2.6	1.2	0.2

New Material Handling