NON-TITLE V AIR PERMIT EVALUATION SHEET
(Technical Support Document – TSD)

PERMIT NO.: P######

MINOR MOD. ☐
NON-MINOR MOD. ☒
RENEWAL ☐

PERMIT ENGINEER: Ryan Eberle **DATE PREPARED:** 12/12/25

BUSINESS NAME: Gila River Sand & Gravel (Santan Plant #48)
BUSINESS TYPE: Sand and Gravel Processing & Hot Mix Asphalt Plant

		Yes	No
SOURCE TYPE:	NSPS	☒	☐
	BACT	☐	☒
	MACT	☐	☒
	NESHAP	☒	☐
	BRDT	☒	☐
	Synthetic Minor	☐	☒

DESCRIPTION OF SOURCE

Non-Title V permit renewal and significant modification for an existing facility. The original permit was issued 2/24/10. The facility historically included one (1) fixed and one (1) portable aggregate processing plants. This significant revision is for the addition of one (1) portable aggregate processing plant (2 total) and one (1) portable hot mix asphalt (HMA) plant. Based on the information presented in the permit application, the SIC codes for the facility are 1442 and 2951, and the facility will operate 24 hours per day, 7 days per week, and 52 weeks per year.

Aggregate Processing

The processing of sand and gravel involves the use of different combinations of screens to segregate particle sizes; crushers to reduce oversized material; and storage and loading facilities. The facility mines sand, gravel and rock from a pit, transfers the raw materials to haul trucks which transport the raw material to the crushing plant. The raw material is sorted by

size in three feeders/screens, reduced in size by two crushers, and transferred by conveyors. The correctly sized material is stacked in storage piles. Some of the finished material is sent to the wet plant for washing. The washed material is supplied to the facility tenants for use in concrete. Unwashed material is usually sold to the hot mix asphalt (HMA) plant tenants or used in the facility's own HMA plant. Both washed and unwashed material may also be sold and transported off-site.

The aggregate plant is equipped with spray bars to control particulate matter (PM) emissions by maintaining sufficient moisture in the material being conveyed, crushed and screened.

Hot Mix Asphalt Plant

The hot mix asphalt (HMA) process is a continuous mixing type process, using proportioning cold feed controls for the process materials. The dryer is used not only to dry the material but also to mix the heated and dried aggregates with the liquid asphalt cement. Aggregate, which has been proportioned by size gradations, is introduced to the drum at the same end as the diesel-fired burner. As the drum rotates, the aggregates, as well as the combustion products, move toward the discharge end of the drum away from the burner (parallel flow drum mix).

Liquid asphalt cement flow is controlled by a variable flow pump electronically linked to the new (virgin) aggregate weigh scales. The asphalt cement is introduced in the mixing zone midway down the drum in the elevated temperature zone along with particulate matter (PM) from the baghouse.

The mixture is discharged at the opposite end of the drum from the burner and is conveyed to an HMA storage silo, where it is loaded into transport trucks. The exhaust gases exit the same end of the drum as the mixed asphalt and pass on to the baghouse. The mineral supplement silo is controlled by the drum dryer baghouse.

Non-Road Engines

The five portable internal combustion engines at the facility (one diesel generator, two gasoline generators, and two diesel light towers) are classified as portable non-road engines provided they are not operated at the same location at the facility for more than 12 months at a time. Since the portable engines are classified as non-road engines, they are not subject to NSPS or NESHAP requirements and are exempt from permitting.

Permitted Equipment

A list of permitted equipment is included in Table 1. The aggregate processing equipment has been divided into two groups based on whether the equipment was constructed before 4/22/08 or on or after 4/22/08 to assist with compliance of Federal requirements (see Federal Regulatory Applicability section).

Table 1. Permitted Equipment

Equipment Description	Equipment #	Rated Capacity (ea.)	Quantity	Status
AGGREGATE EQUIPMENT CONSTRUCTED BEFORE 4/22/08				
VGF Feeder	1010-7	800 TPH	1	Existing
Conveyor Belts / Stackers	1001-1 1004-2B 1005-3 1006-3B 1007-4B 1008-5B 1009-6B 1011-8 1012-9 1013-10 1014-11 1015-18 1016-19 1018-21	800 TPH	14	Existing
Shaker Screens	1017-20 1019-22	800 TPH	2	Existing
K400+ Cone Crusher	1021-24	800 TPH	1	Existing
AGGREGATE EQUIPMENT CONSTRUCTED ON OR AFTER 4/22/08				
Portable Aggregate Base (AB) Plant				Existing
VGF Feeder	3001	500 TPH	1	Existing
Conveyor Belts / Stackers	3002 3003 3005 3007 3007 3010	500 TPH	6	Existing
JCI Screen	3004	500 TPH	1	Existing
JCI K400+ Crusher	3006	500 TPH	1	Existing
Portable Manufactured Aggregate (MA) Plant				New
VGF Feeder	FDR-MA	300 TPH	1	New
Conveyor Belts / Stackers	B-1 B-2 B-3 B-4 B-5 B-6 B-7 B-8	300 TPH	10	New

Table 1. Permitted Equipment

Equipment Description	Equipment #	Rated Capacity (ea.)	Quantity	Status
	B-9 B-10			
JCI Screen	SHKR-MA	300 TPH	1	New
JCI K300+ Crusher	K300-MA	300 TPH	1	New
HOT MIX ASPHALT PLANT (Manufactured Before 4/22/08)				
Portable ALMIX Model 6626 Hot Mix Asphalt (HMA) Plant (S/N 731)	DM-1	120 TPH	1	New
Starjet SJ075 HMA Burner	N/A	15.2 MMBtu/hr	1	New
Aggregate Conveyors	CTP-1 CTP-2	120 TPH	2	New
Feed Bins	FB-1-3	120 TPH	3	New
Asphalt Equipment Company 20KSPA Baghouse (S/N AL1010M01)	BH-1	20,000 cfm	1	New
HMA Dreg Slat Conveyor	CTP-3	120 TPH	1	New
HMA Storage Silo	SILO-1	120 TPH	1	New
Mineral Supplement Silo	SILO-2	70 tons	1	New
Heattec Asphalt Cement Heater	049884296-98	0.5 MMBtu/hr	1	New
Parts Washer w/ Solvent Container (Model 501S)	5010223	35 gallons	1	Existing

A list of insignificant activities is included in Table 2a. Insignificant activities are defined in the Gila River Indian Community (GRIC) Code: Title 17 Chapter 9, Part II, Section 1.0 and emissions from insignificant activities are excluded from the permit.

Table 2a. Insignificant Activities

Equipment Description	Rated Capacity (ea.)	Quantity
Gasoline Tank	280 Gallons	1
Diesel Fuel Tank	5,000 Gallons	1
Diesel Fuel Tank	10,000 Gallons	1
Diesel Fuel Tank (HMA)	2,000 Gallons	1
Diesel Fuel Tank (HMA)	16,000 Gallons	1
Asphalt Oil Tank (PG-70-10)	20,000 Gallons	1
Wet Processing Plant	600 TPH	1
Portable Wash Plant	450 TPH	1

Table 2b includes the portable non-road engines, which are exempt from permitting requirements, provided they are not operated at the same location on the site for more than 12 months at a time.

Table 2b. Exempt Portable Non-Road Engines

Equipment Description	Rated Capacity (ea.)	Quantity
Portable Nonroad Diesel Light Tower	8-12 hp	2
Portable Nonroad Gasoline Generator (Honda EB5000X)	12 hp	1

ALLOWABLE EMISSIONS

The emission limits for the facility are presented in Table 3.

Table 3. 12-Month Rolling Total Emission Limits (pounds)

Pollutant	Original	Mod/Renewal	Increase
Nitrogen Oxides (NOx)		57,900	57,900
Volatile Organic Compounds (VOC)	900	34,500	33,600
Carbon Monoxide (CO)		136,700	136,700
Sulfur Oxides (SOx)		11,600	11,600
Particulate Matter <2.5 Micron Diameter ($PM_{2.5}$)		24,200	24,200
PM_{10}		24,200	24,200
PM		60,100	60,100
Total Hazardous Air Pollutants (HAPs)		9,400	9,400

APPLICABLE GRIC REGULATIONS

Part II

Section 1: Definitions
Section 2: Applicability of Permit Requirements
Section 4: Non-Title V Permit Requirements
Section 5: Permit Revisions at a Non-Title V Source
Section 7: Standards of Performance for New Stationary Sources
Section 10: Confidentiality of Information
Section 11: Fees

Part V

Section 1: Open Burning
Section 2: General Requirements for Fugitive Dust-Producing Activities

Part VI

Section 1: Visible Emissions
Section 2: VOC Usage Storage and Handling
Section 3: Degreasing Solvent and Metal Cleaning

Part VII

Section 3: Non-Metallic Mineral Mining and Processing

FEDERAL REGULATORY APPLICABILITY

NSPS - Based on the information provided in the permit application, this source processes non-metallic minerals and produces HMA. Therefore, the facility is subject to the New Source Performance Standards (NSPS) for non-metallic mineral processing (40 CFR, Part 60, Subpart OOO) and HMA production (40 CFR, Part 60, Subpart I). Within Subpart OOO, there are separate requirements for equipment constructed before 4/22/08 and equipment constructed on or after 4/22/08. For example, the opacity limit for crushers constructed before 4/22/08 is 15% and the opacity limit for crushers constructed on or after 4/22/08 is 12%. The internal combustion engines are considered portable nonroad engines and are exempt from the NSPS requirements for internal combustion engines (40 CFR 60 Subparts IIII and JJJJ), provided the engines are not located in the same location at the facility for more than 12 months at a time.

NESHAP/MACT - Based on the information provided in the permit application, this source emits Hazardous Air Pollutants (HAPs) from the internal combustion engines and gasoline storage tank. The facility is not a specifically listed Federal National Emission Standards for Hazardous Air Pollutants (NESHAP) Source Category and is not a major source. NESHAP Subpart ZZZZ regulates stationary internal combustion engines, but does not regulate portable nonroad engines. Therefore, the source is not subject to the NESHAP Subpart ZZZZ, provided the portable nonroad engines are not operated at the same location at the facility for more than 12 months at a time.

The source dispenses gasoline from the gasoline storage tank. Therefore, the facility is classified as a gasoline dispensing facility and is subject to NESHAP CCCCCC. However, the monthly throughput is less than 10,000 gallons, so only the requirements to minimize vapor releases for extended periods of time contained in 40 CFR 63.11116 apply. The federal HAPs list is fully incorporated into Part II, Section 1.0, and a GRIC HAP is defined as any Federally-listed HAP.

ALLOWABLE EMISSION CALCULATIONS

Most of the emissions from HMA production are from a single point source – the rotary drum dryer. Emissions from the drum consist of water (as steam evaporated from the aggregate); PM; NOx; SO2; CO; and small amounts of organic compounds of various species (including VOC, CH4, and HAP). The organic compound and CO emissions result from incomplete combustion of the fuel and from heating and mixing of the liquid asphalt cement inside the

drum. Other point source emissions include PM and HAP emissions from the mineral supplement silo and criteria pollutant (VOC, NOx, PM, SO2, and CO) emissions from the asphalt cement heater.

Fugitive sources of PM emissions include mining operations, truck loading and unloading, transfer of aggregate, screening, crushing, vehicle traffic, and wind erosion from sand and aggregate storage piles. The amount of fugitive emissions generated during the transfer of sand and aggregate depends primarily on the surface moisture content of these materials. Fugitive sources of VOCs, CO, PM, and HAPs emissions include filling the HMA storage silos and loadout of HMA into haul trucks.

Most of the emissions from the portable nonroad engines are emitted through the exhaust (point source) and consist primarily of NOx and CO with smaller quantities of PM, SO2, and VOC. The VOC and CO emissions are primarily the result of incomplete combustion of the fuel.

The solvent cleaning process will yield VOC emissions. Emissions are determined based on a mass balance calculation from solvent usage and VOC content.

The emission calculations for the facility were based on AP-42 emission factors, grain loading requirements for control devices, and material throughputs provided in the permit application. Non-fugitive emissions will be generated from the following sources:

- Drum dryer baghouse (1);
- Asphalt cement (hot oil) heater (1); and
- Solvent cleaning machine (1).

Fugitive emissions for the HMA plant, for the purposes of major source determination (see below), will be generated from the following sources directly associated with HMA production:

- Aggregate processing;
- HMA loadout into haul trucks;
- HMA transfer to storage silos;
- Aggregate handling;
- Storage piles; and
- Unpaved roads.

Other fugitive emissions at the facility (not associated with HMA production) will be generated from the following sources:

- Crushers (3);
- Shaker screens (4);
- Conveyor belts (32);
- Feeders (3);
- Material handling;
- Unpaved road; and

- Storage piles.

Only point source (non-fugitive) emissions are included in the permitted emission limits. Fugitive emissions are not included in the permitted emission limits. The calculations for the emission limits are included as an attachment to this TSD. **Note**, the emission calculations for the portable nonroad engines are also not included in the permitted emission limits.

Major Source/Synthetic Minor Determination

Based on the maximum hourly throughput of the HMA Plant (120 tph), the facility's potential-to-emit (PTE) would not exceed the major source threshold of 100 tpy for NOx, CO, SOx, PM (including PM10 and PM2.5), or VOCs or 10 tpy of a single HAP or 25 tpy of total HAPs at a maximum annual operating time of 8,760 hours.

According to the definition of "major source" in Part II, Section 1.0 and 40 CFR 70.2, the fugitive emissions of a stationary source shall not be considered in determining whether it is a major stationary source unless the source is listed or is being regulated by NSPS or NESHAP as of August 7, 1980. The facility is subject to NSPS for the HMA plant (Subpart I) and for the aggregate plants (Subpart OOO); however, only Subpart I was in effect prior to August 7, 1980. Therefore, in addition to the non-fugitive emissions, only the fugitive emissions from the HMA plant need to be evaluated to determine if the source will be considered a major source with the proposed production limits.

The source of aggregate for the HMA plant will be either the facility's main aggregate plant or the portable manufactured aggregate (MA) plant. The maximum aggregate throughput in the HMA plant is approximately 1.05 MMTPY (million tons per year), which is less than 50% of the maximum annual throughput of the portable MA plant (2.63 MMTPY) and less than 15% of the maximum annual throughput of the main plant (7.58 MMTPY). More than 50% of the aggregate produced at both the main plant and portable MA plant is supplied to other facility tenants or sold off-site and both plants can exist without the HMA plant. Therefore, neither the main plant or portable MA plant significantly support the HMA plant and the fugitive emissions from both the main plant and portable MA plant do not count toward major source determination for the HMA plant.

The fugitive emissions directly associated with the HMA plant include HMA loadout and silo filling, aggregate processing, loader dumping, unpaved haul roads (including material transfer from the main aggregate plant to the HMA plant), and storage piles. Based on the calculations using maximum annual throughput for the HMA plant, the facility does not exceed the major source thresholds for criteria pollutants or HAPs. The annual facility emissions, including fugitive emissions, are shown in Table 4.

Table 4. Total Emissions

Pollutant	Solvent Use		HMA Plant		Fugitive Emissions (HMAP)		Total	
	(lbs/yr)[(2)]	(tons/yr)	(lbs/yr)[(2)]	(tons/yr)	(lbs/yr)	(tons/yr)	(lbs/yr)[(2)]	(tons/yr)
NOx	- - -	- - -	57,817	28.91	0	0.00	57,817	28.91
VOC	804	0.40	33,638	16.82	16,920	8.46	51,363	25.68
CO	- - -	- - -	136,656	68.33	2,659	1.33	139,315	69.66
SOx	- - -	- - -	11,563	5.78	0	0.00	11,563	5.78
PM2.5	- - -	- - -	24,182	12.09	4,569	2.28	28,751	14.38
PM10	- - -	- - -	24,182	12.09	33,539	16.77	57,721	28.86
PM	- - -	- - -	60,077	30.04	119,690	59.85	179,767	89.88
HAPs	- - -	- - -	9,300	4.65	284	0.14	9,584	4.79

BEST REASONABLE AND DEMONSTRATED TECHNOLOGY (BRDT) APPLICABILITY

Based on the information provided in the permit application and the attached emissions calculations, the facility emissions will not exceed the BRDT thresholds for the criteria pollutants and single and total HAPs; however, the facility will emit approximately 3,259 pounds per year of formaldehyde. Formaldehyde is an Ultra HAP (as defined in Part II, Section 1.0) and has a BRDT threshold of 300 pounds per year. Therefore, the facility's formaldehyde emissions exceed the BRDT threshold and a BRDT analysis is required. Table 5 shows the permitted facility emissions and the BRDT thresholds.

Table 5. BRDT Applicability

Pollutant	Annual Emissions (tons)	BRDT Threshold (tons)	BRDT Applicable?
NOx	28.91	>75 but <100	No
VOC	16.82	>75 but <100	No
CO	68.33	>75 but <100	No
SOx	5.78	>75 but <100	No
$PM_{2.5}$	12.09	>75 but <100	No
PM_{10}	30.04	>75 but <100	No
PM	4.65	>75 but <100	No
Lead	0.0079	>75 but <100	No
Any Single HAP	1.63	3	No
Total HAPs	4.65	5	No
Ultra HAPs	3,258.83*	300*	Yes

*Annual emissions in pounds per year (lb/yr).

MODELING ANALYSIS

Formaldehyde was modeled using EPA's SCREEN3 model because its annual emission rate (~3,259 lbs/yr) exceeded the BRDT threshold (300 lbs/yr). The SCREEN3 model is a widely accepted method used to estimate the distance at which a contaminant's maximum concentration would be expected under "worst case" meteorological conditions. Generally, if SCREEN3-modeled concentrations are below applicable regulatory limits, then no further modeling analyses are required.

Per Part II, Section 9(B)(5)(a), the dimensions of the largest nearby solid fixed structure (mineral supplement silo) were included in the SCREEN3 model to assess the potential building downwash and cavity effects caused by the structure. "Nearby" is defined as that distance up to five (5) times the lesser of the height or the width dimension of a structure. The storage silo is located approximately 6 meters from the stack, which is less than the 5L distance (e.g., L = 3.65 meters and 5L = 18.25 meters). Therefore, the cement/lime storage silo was also included in the model analysis. The input values used in the SCREEN3 model are shown in Table 6.

Table 6. SCREEN3 Input Values

Input Parameter	Value	Units	Reference
Stack Height	6.13	m	1
Stack Length	0.61	m	1
Stack Width	0.48	m	1
Equivalent Stack Inside Diameter	0.61	m	2
Stack Exit Velocity	32.1	m/s	1
Stack Gas Exit Temperature	377	K	1
Mineral Supplement Height	~18.3	m	3
Mineral Supplement Silo Length	3.66	m	4
Mineral Supplement Silo Width	3.66	m	4
Receptor Height	1.6	m	
Shortest Distance to Fenceline	430	m	4
Emission Rate (24-hour)	8.93	lb/day	2
Emission Rate (Annual)	3,259	lb/yr	2

1. *Baghouse Data Sheet* provided in permit application.
2. Calculated
3. Photograph of equipment
4. Google Earth

A unitized emission rate of 1 gram per second (g/s) was used as input in the model, and the model output concentration was multiplied by the 24-hour and annual formaldehyde emission rates to determine the maximum formaldehyde concentrations. A comparison of the maximum 24-hour and annual modeled formaldehyde emission rates with the Agency of Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs) is presented in Table 7. Based on the data presented in Table 7, the modeled Formaldehyde concentrations at the fenceline do not exceed the ATSDR MRLs.

Table 7. Modeling Results for Formaldehyde

Source Description	Maximum Concentration			
	24-hr (Acute)		Annual (Chronic)	
	(ug/m^3)	(ppm)	(ug/m^3)	(ppm)
AERSCREEN Result [(1)]	21.44	0.017	3.573	0.0029
Formaldehyde Result (Calculated) [(2)]	1.00	0.0008	0.17	0.00013
ATSDR MRL [(3)]	**49.9**	**0.04**	**10.0**	**0.008**

1. Concentrations in [(ug/m3) / (g/s)] or [ppm / (g/s)]. AERSCREEN results using a generic emission rate of 1 g/s.
2. Formaldehyde Result (ug/m^3) = Formaldehyde emission rate (g/s) x AERSCREEN Result (ug/m^3 / g/s). Daily/annual formaldehyde emission rate = 0.047 g/s (8.93 lb/day or 3,259 lb/yr)
3. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), Minimal Risk Levels (MRLs) for Hazardous Substances, July 2025 - acute exposure MRL (1-14 days) is assumed for daily concentration and chronic exposure MRL (>365 days) is assumed for annual concentration.

ANALYSIS OF IMPORTANT PERMIT CONDITIONS

Condition 26: Sets the emission limits for the facility, and describes the methods to calculate emissions and the allowable emissions from the facility, which were established based on information provided by the Permittee in the permit application.

Conditions 27 through 32: Set the production limitations, visible emission limitations, control requirements, operational restrictions, recordkeeping and reporting, and performance test requirements for the facility. The production limits were based on the sum of material throughputs and equipment specifications provided by the Permittee in the application. The visible emission limitations, operational restrictions and control requirements reflect the policies contained in Part VII, Section 3.0. The performance test conditions establish the required testing frequency, test methods, notification and reporting requirements.

Condition 33: Sets the requirements for Operation and Maintenance (O&M) Plans for the air pollution control equipment at the facility. These conditions reflect policies contained in Part VII, Section 3.0, Subsection 5.1.

Condition 34: Sets the limitations and requirements for gasoline (VOC) usage, storage, and handling. These conditions reflect policies contained in Part VI, Section 2.0.

Condition 35: Sets the limitations and requirements for solvent cleaning, including handling, operating, equipment, and recordkeeping and reporting requirements. A list of prohibited solvent cleaning methods is also included in these conditions. These conditions reflect policies contained in Part VI, Section 3.0.

Condition 36: Sets the requirements stationary internal combustion engines, should the engines be operated in the same location at the facility for more than 12 months at a time.

Condition 37: Sets the limitations and requirements for open burning, including a list of materials that cannot be burned. These conditions reflect policies contained in Part V, Section 1.0.

Condition 38: Sets the limitations and requirements for fugitive dust generating operations, including, but not limited to, storage piles, track out, and haul roads. These conditions include requirements for dust control plans, emission control systems, compliance determination, monitoring and recordkeeping, control measures, and visible emission limitations, which reflect the policies, contained in Part V, Section 2.0.

SUMMARY OF SIGNIFICANT CHANGES FOR PERMIT RENEWAL

- Added hot mix asphalt plant and mineral supplement silo
- Added manufactured aggregate plant
- Added emission limit for PM2.5.
- Added allowable production rates for the HMA and portable aggregate plants to Condition 27
- Added opacity and emission limits for the HMA baghouse to Condition 28
- Added control device requirements for HMA plant and mineral supplement silo to Condition 29
- Added operational restrictions for the HMA plant to Condition 30
- Added additional recordkeeping requirements for rolling total emissions, observations outside equipment operating parameters, control devices, gasoline storage, and visible emission observations to Condition 31.
- Moved solvent cleaner compliance certification reporting requirements from Condition 35 to Condition 31
- Moved Dust Control recordkeeping and reporting requirements from Condition 38 to Condition 31.
- Added performance test requirements for the HMA plant to Condition 32
- Added new Condition 32 for operation and maintenance (O&M) plan requirements for the HMA baghouse and mineral supplement silo dust collector
- Removed two conveyors and the jaw crusher from the main plant equipment list
- Updated nonroad generator equipment list

Gila River Sand & Gravel (Santan Plant)

DRAFT

GRIC Permit No. ####

Facility Operating Parameters

Note, yellow highlighted values were provided in the application

	hr/day	day/wk	wk/yr	hr/yr
Operating Schedule	24	7	52	8736

Sand and Gravel Plant Operating Parameters

	Production				Coarse Aggregate			Sand		
	Hourly (TPH)	Daily (TPD) (1)	Max Annual (TPY) (2)	Proposed Annual (TPY) (3)	Percent of Total (3)	TPD (4)	TPY	Percent of Total (3)	TPD (4)	TPY
Main Plant	1,600	38,400	14,016,000	7,580,000	32.5%	12,480	2,463,500	67.5%	25,920	5,116,500
Portable K400 Aggregate Base (AB) Plant	500	12,000	4,380,000	4,380,000	50.0%	6,000	2,190,000	50.0%	6,000	2,190,000
Portable Manufactured Aggregate (MA) Plant (HMAP)	300	7,200	2,628,000	2,628,000	50.0%	3,600	1,314,000	50.0%	3,600	1,314,000
Facility Total	**2,400**	**57,600**	**21,024,000**	**14,588,000**		**22,080**	**5,967,500**		**35,520**	**8,620,500**

Notes:

1. Calculated daily throughput based on hourly rating and operating hours. For example, 1600 tons/hour x 24 hrs/day = 38400 tons/day
2. Calculated annual throughput based on hourly rating and annual operating hours. For example, 500 tons/hour x 8760 hrs/yr = 4380000 tons/year
3. Based on information contained in the original permit application
4. Material daily throughput based on fraction of total daily throughput
   For example (Coarse Aggregate): 38400 tons/day x (2463500 tpy / 14016000 tpy) = 6749.32 tons/day

Vehicle Travel

Vehicle Type	Mean Vehicle Weight (5) (tons)	Avg. Load Weight (Tons)	Trips / Year	Trip Distance (ft. 1-way)	VMT per day (6)	VMT per year	Control Efficiency (7)
Light Duty	4	4	43,800	3,000	137	49,773	
Loaders	46.5	13	1,078,154	200	224	81,678	
Aggregate Haul Trucks (-HMAP)	31.5	20	648,240	2,000	1,349	491,091	
Mine Trucks	90	70	200,229	9,000	1,875	682,597	
Average All Vehicles	62.0				3,586	1,305,139	80%

Gila River Sand & Gravel (Santan Plant)

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Facility Operating Parameters

Notes:

5. Average Mean Vehicle Weight = Sum of (weight * fraction of total vehicle distance) for each vehicle class.
6. VMT (miles/day) = VMT (miles/year) / (Operating Weeks Per Year x Operating Days Per Week)
7. Control efficiency based on AP-42, Chapter 13.2.2.3 (controls for unpaved roads); Maricopa County Air Quality Department, Emissions Inventory Help Sheet for Vehicle Travel on Unpaved Roads, 2020; San Diego Air Pollution Control District, Haul Road Emissions, April 2025; and facility road speed limit of 15 mph.

ICE Operating Parameters (Portable Non-Road Engines)

Unit ID	Generator Name (Manufacture Date)	Power (kW)	Power (hp)	Hours of Operation (annually)	Total hp-hrs	Total kW-hrs
ICE1	Diesel Light Tower (2006)	6	8	8,760	70,080	52,560
ICE2	Diesel Light Tower (01/2013)	6	8	8,760	70,080	52,560
ICE4	Honda Gasoline Generator - Class 2 (03/2008)	6	12	8,760	105,120	52,560
ICE5	Diesel Generator (05/2014)	495	664	8,760	5,814,844	4,336,200
ICE6				8,760	0	0
					6,060,124	**4,493,880**

Storage Piles

	Size (acres)	Control Efficiency
Storage Piles (Aggregate)	50	70%
Storage Piles (Sand)	50	70%

Solvent Use

Annual Solvent Usage	120	gallons
Disposal Quantity	0	gallons
Solvent Type	Safety-Kleen	
VOC Content (1)	100%	
Density (1)	6.7	lb/gal

Gila River Sand & Gravel (Santan Plant)

DRAFT

GRIC Permit No. ####

Facility Operating Parameters

Hot Mix Asphalt Plant Operating Parameters

	Avg. hr/day	day/wk	wk/yr	hr/yr
Full Operating Schedule	24.0	7	52	8,760

	Production Limits			
	Hourly (TPH)	Daily (TPD) (1)	Max Annual (TPY)	Accepted Annual (TPY)
Hot Mix Asphalt Plant (HMAP)	120	2,880	1,051,200	1,051,200
Mineral Supplement Silo (2)	0.1	2.5		915

Notes:

1. Calculated daily throughput based on hourly rating and operating hours. For example, 120 tons/hour x 24 hrs/day = 2880 tons/day

2. Hourly mineral supplement usage = Hourly HMAP Production * [(Annual supplement usage) / (Annual HMAP production)]

Control Equipment	Maximum Design Flowrate (cfm)
Dryer Baghouse (ALMix SJ075)	20,000
Mineral Supplement Silo (3)	N/A

Notes:

3. Mineral Supplement silo is vented through the dryer baghouse per O&M Plan.

				Accepted Annual TPY			Max Annual TPY			
Vehicle Type	Mean Vehicle Weight (tons)	Avg. Load Weight (Tons)	Trip Distance (ft. 1-way)	Trips / Year	VMT per day (4)	VMT per year	Trips / Year	VMT per day (4)	VMT per year	Control Eff. (5)
Asphalt Haul Trucks	31.5	20	3,170	52,560	173.38	63,112	52,560	173.38	63,112	
Asphalt Loaders	46.5	13	300	80,862	25.24	9,189	80,862	25.24	9,189	
Aggregate Haul Trucks	86.3	70	600	15,017	9.38	3,413	15,017	9.38	3,413	
Average of Vehicle Weights (4)	35.79				208	75,714		208	75,714	80%

Gila River Sand & Gravel (Santan Plant) DRAFT

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Facility Operating Parameters

Notes:

4. VMT (miles/day) = VMT (miles/year) / (Operating Weeks Per Year x Operating Days Per Week)
5. Control efficiency based on AP-42, Chapter 13.2.2.3 (controls for unpaved roads); Maricopa County Air Quality Department, Emissions Inventory Help Sheet for Vehicle Travel on Unpaved Roads, 2020; San Diego Air Pollution Control District, Haul Road Emissions, April 2025; and facility road speed limit of 15 mph.

Storage Piles

	Size (acres)	Control Efficiency
Aggregate Storage Piles	10	70%
Asphalt Chip Storage Piles	0.25	100%

Gila River Sand & Gravel (Santan Plant) DRAFT

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Point Source Emissions

	Solvent			Hot Mix Asphalt Plant		
Pollutant	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)
NOx	- - -	- - -	- - -	158.40	57,817	28.91
VOC	2.21	804	0.40	92.16	33,638	16.82
CO	- - -	- - -	- - -	374.40	136,656	68.33
SOx	- - -	- - -	- - -	31.68	11,563	5.78
PM2.5	- - -	- - -	- - -	66.25	24,182	12.09
PM10	- - -	- - -	- - -	66.25	24,182	12.09
PM	- - -	- - -	- - -	164.59	60,077	30.04
HAPs	- - -	- - -	- - -	25.48	9,300	4.65

Portable Nonroad Engine Emissions (exempt)

	Internal Combustion (CI)			Internal Combustion (SI)		
Pollutant	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)
NOx	15.24	5,562	2.78	3.59	1,309	0.65
VOC	9.74	3,554	1.78	3.59	1,309	0.65
CO	96.75	35,312	17.66	193.65	70,683	35.34
SOx	33.45	314	0.16	0.17	62	0.03
PM10	1.03	330	0.17	0.04	14	0.01
PM	1.03	330	0.17	0.04	14	0.01
HAPs	0.16	59	0.03	- - -	- - -	- - -

Fugitive Emissions (Mine)

	Aggregate Processing			Aggregate Handling			Unpaved Roads			Storage Piles		
	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)
NOx	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
VOC	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
CO	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
SOx	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
PM2.5	21.17	5,017	2.51	15.38	3,322	1.66	184	67,059	33.53	12.59	4,594	2.30
PM10	139.68	32,950	16.47	33.75	8,549	4.27	1,842	670,594	335.30	82.29	30,035	15.02
PM	394.56	92,655	46.33	71.31	18,060	9.03	7,229	2,631,190	1,315.60	164.57	60,070	30.03
HAPs	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

Fugitive Emissions (HMAP)

	Hot Mix Asphalt Plant														
	Aggregate Processing			Loadout & Silo Filling			Aggregate Handling			Unpaved Roads			Storage Piles		
Pollutant	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)
NOx	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
VOC	- - -	- - -	- - -	46.36	16,920	8.46	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
CO	- - -	- - -	- - -	7.28	2,659	1.33	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
SOx	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
PM2.5	0	146	0.07	3.19	1,165	0.58	0.26	94	0.05	7.43	2,705	1.35	1.26	459	0.23
PM10	4.66	1,701	0.85	3.19	1,165	0.58	1.69	616	0.31	74.32	27,054	13.53	8.23	3,003	1.50
PM	13.88	5,067	2.53	3.19	1,165	0.58	3.57	1,301	0.65	291.62	106,151	53.08	16.46	6,007	3.00
HAPs	- - -	- - -	- - -	0.78	284	0.14	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

Total Emissions

	Point Source Emissions			Fugitive Emissions (HMAP)			Facility Total Emissions		
Pollutant	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)
NOx	158.40	57,817	28.91	0.00	0	0.00	158.40	57,817	28.91
VOC	94.37	34,442	17.22	46.36	16,920	8.46	140.73	51,363	25.68
CO	374.40	136,656	68.33	7.28	2,659	1.33	381.68	139,315	69.66
SOx	31.68	11,563	5.78	0.00	0	0.00	31.68	11,563	5.78
PM2.5	66.25	24,182	12.09	12.54	4,569	2.28	78.79	28,751	14.38
PM10	66.25	24,182	12.09	92.09	33,539	16.77	158.34	57,721	28.86
PM	164.59	60,077	30.04	328.72	119,691	59.85	493.31	179,768	89.88
HAPs	25.48	9,300	4.65	0.78	284	0.14	26.26	9,584	4.79

Emission Limits

	Point Sources	
Pollutant	(lb/day)	(lbs/yr)
NOx	160.00	57,900
VOC	100.00	34,500
CO	380.00	136,700
SOx	40.00	11,600
PM2.5	70.00	24,200
PM10	70.00	24,200
PM	170.00	60,100
HAPs	26.00	9,400

Gila River Sand & Gravel (Santan Plant) DRAFT

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Major Source Determination

Potential-To-Emit (PTE) for Point Sources

Pollutant	Solvent Use			HMA Plant			Fugitive Emissions (HMAP)			Total			Major Source Threshold	Determination
	(lb/day)[1]	(lbs/yr)[2]	(tons/yr)	(lb/day)[1]	(lbs/yr)[2]	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)[1]	(lbs/yr)[2]	(tons/yr)	(tons/yr)	
NOx	- - -	- - -	- - -	158.40	57,817	28.91	0.00	0	0.00	158.40	57,817	28.91	100	Minor
VOC	2.21	804	0.40	92.16	33,638	16.82	46.36	16,920	8.46	140.73	51,363	25.68	100	Minor
CO	- - -	- - -	- - -	374.40	136,656	68.33	7.28	2,659	1.33	381.68	139,315	69.66	100	Minor
SOx	- - -	- - -	- - -	31.68	11,563	5.78	0.00	0	0.00	31.68	11,563	5.78	100	Minor
PM2.5	- - -	- - -	- - -	66.25	24,182	12.09	12.52	4,569	2.28	78.77	28,751	14.38	100	Minor
PM10	- - -	- - -	- - -	66.25	24,182	12.09	91.89	33,539	16.77	158.14	57,721	28.86	100	Minor
PM	- - -	- - -	- - -	164.59	60,077	30.04	327.92	119,690	59.85	492.51	179,767	89.88	100	Minor
HAPs	- - -	- - -	- - -	25.48	9,300	4.65	0.78	284	0.14	26.26	9,584	4.79	25	Minor

Notes:

1. Daily PTE = (daily emissions @ proposed operating hours) * (24 hrs / proposed operating hours)
2. Annual PTE = Daily PTE * 365 days

Fugitive Emissions (HMAP)

Pollutant	Hot Mix Asphalt Plant														
	Aggregate Processing			Loadout & Silo Filling			Aggregate Handling			Unpaved Roads			Storage Piles		
	(lb/day)[1]	(lbs/yr)[2]	(tons/yr)	(lb/day)[1]	(lbs/yr)[2]	(tons/yr)	(lb/day)[1]	(lbs/yr)[2]	(tons/yr)	(lb/day)[3]	(lbs/yr)[4]	(tons/yr)	(lb/day)[1]	(lbs/yr)[2]	(tons/yr)
NOx	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
VOC	- - -	- - -	- - -	46.36	16,920	8.46	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
CO	- - -	- - -	- - -	7.28	2,659	1.33	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
SOx	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -
PM2.5	0.40	146	0.07	3.19	1,165	0.58	0.26	94	0.05	7.41	2,705	1.35	1.26	459	0.23
PM10	4.66	1,701	0.85	3.19	1,165	0.58	1.69	616	0.31	74.12	27,054	13.53	8.23	3,003	1.50
PM	13.88	5,066	2.53	3.19	1,165	0.58	3.57	1,301	0.65	290.82	106,151	53.08	16.46	6,007	3.00
HAPs	- - -	- - -	- - -	0.78	284	0.14	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -	- - -

Notes:

1. Daily PTE = (daily emissions @ proposed operating hours) * (24 hrs / proposed operating hours)
2. Annual PTE = Daily PTE * 365 days
3. Daily PTE = Annual PTE / 365 days
4. Annual PTE for unpaved roads = (annual emissions @ proposed limit) * (max annual production / proposed production limit)

Gila River Sand & Gravel (Santan Plant) DRAFT

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Best Reasonable and Demonstrated Technology (BRDT) Analysis Applicability

Hot Mix Asphalt Plant

Pollutant	Total Emissions (tons/yr)	BRDT Threshold (tons/yr)	Exceeds BRDT Threshold?	Trigger Compound
NOx	28.91	**>75 but <100**	**No**	- - -
VOC	16.82	**>75 but <100**	**No**	- - -
CO	68.33	**>75 but <100**	**No**	- - -
SOx	5.78	**>75 but <100**	**No**	- - -
PM2.5	12.09	**>75 but <100**	**No**	- - -
PM10	30.04	**>75 but <100**	**No**	- - -
PM	4.65	**>75 but <100**	**No**	- - -
Lead	0.0079	**>75 but <100**	**No**	- - -
Single HAP	1.63	**3**	**No**	Formaldehyde
Total HAPs	4.65	**5**	**No**	- - -
Ultra HAPs	3,258.83*	**300***	**Yes**	Formaldehyde

Notes:

* Pounds per year

AERSCREEN Analysis for GRSG Santan Hot Mix Asphalt Plant

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Formaldehyde Emission Rate (24-hour)	8.93	lb/day =	0.047	g/s
Formaldehyde Emission Rate (Annual)	3,259	lb/yr =	0.047	g/s
Stack Length	24	in. =	0.61	m
Stack Width	19	in. =	0.48	m
Equivalent Stack Diameter	24.10	in. =	0.61	m
Stack Flowrate	20,000	acfm =	333.33	acfs
Stack Velocity	105.26	ft/s =	32.08	m/s
Stack Temperature (assumed)	220	^{o}F =	377	^{o}K
Stack Height	20.1	ft. =	6.13	m
Cement/Lime Silo Height	60.0	ft. =	18.29	m
Cement/Lime Silo Length	12	ft. =	3.66	m
Cement/Lime Silo Width	12	ft. =	3.66	m
Shortest Distance for Fenceline	1410	ft. =	429.75	m

HAPs Modeling

Source Description	Maximum Concentration at Fenceline			
	24-hour		Annual	
	(ug/m^3)	(ppm)	(ug/m^3)	(ppm)
AERSCREEN Result [1]	21.44	0.017	3.573	0.0029
Formaldehyde Result (Calculated) [2]	1.00	0.0008	0.17	0.00013
ATSDR MRL [3]	**49.9**	**0.04**	**10.0**	**0.008**

Notes:

1. Concentrations in [(ug/m^3) / (g/s)] or [ppm / (g/s)]. AERSCREEN results using a generic emission rate of 1 g/s.

2. Formaldehyde Result (ug/m^3) = Formaldehyde emission rate (g/s) x AERSCREEN Result (ug/m^3 / g/s)

3. Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR), Minimal Risk Levels (MRLs) for Hazardous Substances, July 2025 - acute exposure MRL (1-14 days) is assumed for 24-hour concentration and chronic exposure MRL (>365 days) is assumed for annual concentration.

$$Concentration\left(\frac{\mu g}{m^3}\right) = Concentration\,(ppm) \times \frac{30.03\,g}{mol} \times \frac{1\,mol}{24.05\,L} \times \frac{1000\,L}{m^3}$$

Gila River Sand & Gravel (Santan Plant)

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Facility HAPs Summary

HAP Name	CAS Number	HMAP Emissions Point Source		Total Non-Fugitive Emissions			Ultra HAP
		lbs/day	lbs/yr	lbs/day	lbs/yr	tons/yr	
1,1,1-Trichloroethane (methyl chloroform)	00071-55-6	1.38E-01	5.05E+01	**1.38E-01**	**5.05E+01**	**2.52E-02**	
2-Methylnaphthalene	00056-49-5	4.90E-01	1.79E+02	**4.90E-01**	**1.79E+02**	**8.94E-02**	
Acenaphthene	00083-32-9	4.08E-03	1.49E+00	**4.08E-03**	**1.49E+00**	**7.44E-04**	
Acenaphthylene	00208-96-8	6.34E-02	2.31E+01	**6.34E-02**	**2.31E+01**	**1.16E-02**	
Anthracene	00120-12-7	8.94E-03	3.26E+00	**8.94E-03**	**3.26E+00**	**1.63E-03**	
Antimony	07440-36-0	5.18E-04	1.89E-01	**5.18E-04**	**1.89E-01**	**9.46E-05**	
Arsenic	07440-38-2	1.85E-03	6.63E-01	**1.85E-03**	**6.63E-01**	**3.32E-04**	
Benz(a)anthracene	00056-55-3	6.05E-04	2.21E-01	**6.05E-04**	**2.21E-01**	**1.10E-04**	
Benzene	00071-43-2	1.12E+00	4.10E+02	**1.12E+00**	**4.10E+02**	**2.05E-01**	
Benzo(a)pyrene	00050-32-8	2.82E-05	1.03E-02	**2.82E-05**	**1.03E-02**	**5.15E-06**	
Benzo(b)fluoranthene	00205-99-2	2.97E-04	1.08E-01	**2.97E-04**	**1.08E-01**	**5.42E-05**	
Benzo(e)pyrene	00192-97-2	3.17E-04	1.16E-01	**3.17E-04**	**1.16E-01**	**5.78E-05**	
Benzo(g,h,i)perylene	00191-24-2	1.15E-04	4.20E-02	**1.15E-04**	**4.20E-02**	**2.10E-05**	
Benzo(k)fluoranthene	00205-82-3	1.18E-04	4.31E-02	**1.18E-04**	**4.31E-02**	**2.15E-05**	
Beryllium	07440-41-7	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**	
Cadmium	07440-43-9	1.18E-03	4.31E-01	**1.18E-03**	**4.31E-01**	**2.16E-04**	
Chromium	07440-47-3	1.72E-02	6.19E+00	**1.72E-02**	**6.19E+00**	**3.10E-03**	
Chrysene	00218-01-9	5.18E-04	1.89E-01	**5.18E-04**	**1.89E-01**	**9.46E-05**	
Cobalt	07440-48-4	7.49E-05	2.73E-02	**7.49E-05**	**2.73E-02**	**1.37E-05**	
Ethylbenzene	00100-41-4	6.91E-01	2.52E+02	**6.91E-01**	**2.52E+02**	**1.26E-01**	
Fluoranthene	00206-44-0	1.76E-03	6.43E-01	**1.76E-03**	**6.43E-01**	**3.21E-04**	
Fluorene	00086-73-7	3.17E-02	1.16E+01	**3.17E-02**	**1.16E+01**	**5.78E-03**	
Formaldehyde	00050-00-0	8.93E+00	3.26E+03	**8.93E+00**	**3.26E+03**	**1.63E+00**	X
Hexane	00110-54-3	2.65E+00	9.67E+02	**2.65E+00**	**9.67E+02**	**4.84E-01**	

Gila River Sand & Gravel (Santan Plant)

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Facility HAPs Summary

HAP Name	CAS Number	HMAP Emissions Point Source		Total Non-Fugitive Emissions			Ultra HAP
		lbs/day	lbs/yr	lbs/day	lbs/yr	tons/yr	
Hex-Chromium	18540-29-9	1.30E-03	4.73E-01	**1.30E-03**	**4.73E-01**	**2.37E-04**	
Indeno(1,2,3-cd)pyrene	00193-39-5	2.02E-05	7.36E-03	**2.02E-05**	**7.36E-03**	**3.68E-06**	
Isooctane (2,2,4-Trimethylpentane)	00540-84-1	1.15E-01	4.20E+01	**1.15E-01**	**4.20E+01**	**2.10E-02**	
Lead	07439-92-1	4.32E-02	1.58E+01	**4.32E-02**	**1.58E+01**	**7.88E-03**	
Manganese	07439-96-5	2.22E-02	8.09E+00	**2.22E-02**	**8.09E+00**	**4.05E-03**	
Mercury	07439-97-6	7.49E-03	2.73E+00	**7.49E-03**	**2.73E+00**	**1.37E-03**	
Naphthalene	00091-20-3	1.87E+00	6.84E+02	**1.87E+00**	**6.84E+02**	**3.42E-01**	
Nickel	07440-02-0	1.81E-01	6.62E+01	**1.81E-01**	**6.62E+01**	**3.31E-02**	
Perylene	00198-55-0	2.53E-05	9.25E-03	**2.53E-05**	**9.25E-03**	**4.63E-06**	
Phenanathrene	00085-01-8	6.67E-02	2.43E+01	**6.67E-02**	**2.43E+01**	**1.22E-02**	
Pyrene	00129-00-0	8.64E-03	3.15E+00	**8.64E-03**	**3.15E+00**	**1.58E-03**	
Selenium	07782-49-2	1.01E-03	3.68E-01	**1.01E-03**	**3.68E-01**	**1.84E-04**	
Toluene	00108-88-3	8.35E+00	3.05E+03	**8.35E+00**	**3.05E+03**	**1.52E+00**	
Total PCDD/PCDF	*Dioxin/Furan*	3.66E-07	1.33E-04	**3.66E-07**	**1.33E-04**	**6.67E-08**	
Total Phosphorus	07723-14-0	8.06E-02	2.94E+01	**8.06E-02**	**2.94E+01**	**1.47E-02**	
Xylenes (Total)	01330-20-7	5.76E-01	2.10E+02	**5.76E-01**	**2.10E+02**	**1.05E-01**	
				2.55E+01	**9.30E+03**	**4.65E+00**	

Gila River Sand & Gravel (Santan Plant)

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Hot Mix Asphalt Plant Criteria Pollutant Emission Calculations

Operating Parameters

	Avg. hr/day	day/wk	wk/yr	hr/yr
Full Operating Schedule	24.0	7	52	8,760

	Production Limits		
	Hourly (TPH)	Daily (TPD) (1)	Annual (TPY)
Hot Mix Asphalt Plant (HMAP)	120	2880	1,051,200
Cement/Lime Silo	0.1	2.5	915

Control Equipment	Maximum Design Flowrate (cfm)
Dryer Baghouse (ALMix SJ075)	20,000
Mineral Supplement Silo (3)	N/A

	Dryer Baghouse Emissions (HM1)			Cement/Lime Silo Loading Emissions (LS1)			Asphalt Heater Emissions (EP-11)				Total Emissions		
	EF (2)	Emissions		EF (2)	Emissions		EF (6)	EF (7)	Emissions				
Criteria Pollutant	(lb/ton HMA)	(lb/day) (4)	(lbs/yr) (5)	(lb/ton)	(lb/day) (4)	(lbs/yr) (5)	(lb/1000 gal.)	(lb/hr)	(lb/day) (8)	(lbs/yr) (9)	(lb/day)	(lbs/yr)	(tons/yr)
NOx	0.055	158.40	57,816				2.00E-02	0.00	0.00	1.05	158.40	57,817	28.91
VOC	0.032	92.16	33,638				5.56E-04	0.00	0.00	0.03	92.16	33,638	16.82
CO	0.13	374.40	136,656				1.20E-03	0.00	0.00	0.06	374.40	136,656	68.33
SO_2	0.011	31.68	11,563				2.00E-04	0.00	0.00	0.01	31.68	11,563	5.78
PM2.5	0.023	66.24	24,178	0.0049	0.01	4.5	2.00E-03	0.00	0.00	0.10	66.25	24,182	12.09
PM10	0.023	66.24	24,178	0.0049	0.01	4.5	2.00E-03	0.00	0.00	0.10	66.25	24,182	12.09
PM (3,10)	0.040	164.57	60,069	0.0089	0.02	8.1	2.00E-03	0.00	0.00	0.10	164.59	60,077	30.04

Notes:

1. Calculated daily throughput based on hourly rating and operating hours. For example, 120 tons/hour x 24 hrs/day = 2880 tons/day

2. Emission factors were obtained from AP-42 5th Ed. Final Section 11.1, updated March 2004, Tables 11.1-3 (PM10 w/ fabric filter), 11.1-7 (CO, NOx & SO2 for No. 2 fuel oil-fired dryers), 11.1-8 (VOC for No. 2 fuel oil-fired dryers) and Final Section 11.12 updated June 2006, Table 11.12-2 (PM from cement/lime - emissions are controlled by baghouse/dust collector).

3. Emission factor for PM obtained from GRIC AQMP - Part VII, Section 3.0, Subsection 3.2(B) - grain loading requirement for hot mix asphalt baghouse in grains per dry standard cubic feet (gr/dscf).

4. Daily emissions, except PM (lbs/day) = emission factor (lb/ton HMA) x daily production limit (tons/day).
Daily emissions of PM (lbs/day) = {EF (gr/dscf) x Control Device Flowrate (cfm) / (7000 gr/lb) x Operating Time (hrs/day) x (60 min/hr)} **OR** {EF (lb/ton HMA) x daily production limit (tons/day)} - See Note 10.

5. Annual emissions, except PM (lbs/yr) = emission factor (lb/ton HMA) x annual production limit (tons/year).
Annual emissions of PM (lbs/yr) = {Daily Emissions (lb/day) x Operating Time (days/wk) x Operating Time (wk/yr)} **OR** {EF (lb/ton HMA) x annual production limit (tons/day)} - See Note 10.

6. Emission factors obtained from ADEQ Template 051715 emission factors workbook.

7. Emission factors for the hot oil heater were converted from lb/1000 gal. to lbs/hr according to the following equation:
lb/hr = [emission factor (lb/1000 gal.)] / [diesel heat content (MMBtu/gal)] * [Burner rating (MMBtu/hr)]

Where: diesel heat content = 137.03 MMBtu/1000 gal.
burner rating = 0.82 MMBtu/hr

8. Daily emissions = emission factor (lb/hr) x 24 hours

9. Annual emissions = daily emissions (lb/day) x 365 days

Gila River Sand & Gravel (Santan Plant) DRAFT

GRIC Permit No. ####

Hot Mix Asphalt Plant Criteria Pollutant Emission Calculations

10. Since the application was completed using AP-42 emission factors and there is a limit on the grain loading for the control device, the total PM emissions are the emissions calculated from AP-42 controlled emission factors or from grain loading requirements in the GRIC AQMP, whichever is more (see below). Annual emissions for grain loading = lb/day / 24 (hr/day) * hours of operation at accepted annual production limit. Controlled emission factor source: AP-42 5th Ed., Final Section 11.1, updated March 2004, Table 11.1-3 and Final Section 11.12 updated June 2006, Table 11.12-2. Grain loading requirement from GRIC AQMP - Part VII, Section 3.0, Subsection 3.1(C)(1). Emissions are controlled by a baghouse.

	AP-42 Emission Factor			Grain		
	EF [2]	PM Emissions		EF [3]	PM Emissions	
Criteria Pollutant	(lb/ton)	(lb/day) [4]	(lbs/yr) [5]	(gr/dscf)	(lb/day) [4]	(lbs/yr) [5]
PM (Dryer/Burner Baghouse)	0.033	95.04	34,689.60	0.04	164.57	60,068.57
PM (Lime Silo)	0.0089	0.02	8.14			
Total		95.06	34,697.74		164.57	60,068.57

Gila River Sand & Gravel (Santan Plant)

DRAFT

GRIC Permit No. ####

Hot Mix Asphalt Plant Hazardous Air Pollutant Emission Calculatic

Operating Parameters

	Avg. hr/day	day/wk	wk/yr
Operating Schedule	24.0	7	52

	Production Limits		
	Hourly (TPH)	Daily (TPD) (1)	Annual (TPY)
Hot Mix Asphalt Plant (HMAP)	120	2880	1,051,200

ORGANICS

	Dryer Burner/Baghouse Emissions (HM1)			Asphalt Heater Emissions (EP-11)				Total Emissions		
	EF (1)	Emissions		EF (2)	Emissions			Emissions		
	(lb/ton HMA)	(lb/day)	(lbs/yr)	(lb/gal)	(lb/hr) (3)	(lb/day) (4)	(lbs/yr) (5)	(lb/day)	(lbs/yr)	(tons/yr)
Individual HAPs										
Benzene	3.9E-04	1.1E+00	4.1E+02					1.12E+00	4.10E+02	2.05E-01
Ethylbenzene	2.4E-04	6.9E-01	2.5E+02					6.91E-01	2.52E+02	1.26E-01
Formaldehyde	3.1E-03	8.9E+00	3.3E+03	3.50E-06	1.28E-05	3.07E-04	1.12E-01	8.93E+00	3.26E+03	1.63E+00
n-Hexane	9.2E-04	2.6E+00	9.7E+02					2.65E+00	9.67E+02	4.84E-01
Isooctane (2,2,4-Trimethylpentane)	4.0E-05	1.2E-01	4.2E+01					1.15E-01	4.20E+01	2.10E-02
Toluene	2.9E-03	8.4E+00	3.0E+03					8.35E+00	3.05E+03	1.52E+00
1,1,1-Trichloroethane (methyl chloroform)	4.8E-05	1.4E-01	5.0E+01					1.38E-01	5.05E+01	2.52E-02
Xylenes (Total)	2.0E-04	5.8E-01	2.1E+02					5.76E-01	2.10E+02	1.05E-01
POM HAPs										
Acenaphthene	1.4E-06	4.0E-03	1.5E+00	5.30E-07	1.93E-06	4.64E-05	1.69E-02	4.08E-03	1.49E+00	7.44E-04
Acenaphthylene	2.2E-05	6.3E-02	2.3E+01	2.00E-07	7.30E-07	1.75E-05	6.39E-03	6.34E-02	2.31E+01	1.16E-02
Anthracene	3.1E-06	8.9E-03	3.3E+00	1.80E-07	6.57E-07	1.58E-05	5.75E-03	8.94E-03	3.26E+00	1.63E-03
Benzo(a)anthracene	2.1E-07	6.0E-04	2.2E-01					6.05E-04	2.21E-01	1.10E-04
Benzo(b)fluoranthene	1.0E-07	2.9E-04	1.1E-01	1.00E-07	3.65E-07	8.76E-06	3.20E-03	2.97E-04	1.08E-01	5.42E-05
Benzo(k)fluoranthene	4.1E-08	1.2E-04	4.3E-02					1.18E-04	4.31E-02	2.15E-05
Benzo(g,h,i)perylene	4.0E-08	1.2E-04	4.2E-02					1.15E-04	4.20E-02	2.10E-05
Benzo(a)pyrene	9.8E-09	2.8E-05	1.0E-02					2.82E-05	1.03E-02	5.15E-06
Benzo(e)pyrene	1.1E-07	3.2E-04	1.2E-01					3.17E-04	1.16E-01	5.78E-05
Chrysene	1.8E-07	5.2E-04	1.9E-01					5.18E-04	1.89E-01	9.46E-05
Fluoranthene	6.1E-07	1.8E-03	6.4E-01	4.40E-08	1.61E-07	3.85E-06	1.41E-03	1.76E-03	6.43E-01	3.21E-04
Fluorene	1.1E-05	3.2E-02	1.2E+01	3.20E-08	1.17E-07	2.80E-06	1.02E-03	3.17E-02	1.16E+01	5.78E-03
Indeno(1,2,3-cd)pyrene	7.0E-09	2.0E-05	7.4E-03					2.02E-05	7.36E-03	3.68E-06
2-Methylnaphthalene	1.7E-04	4.9E-01	1.8E+02					4.90E-01	1.79E+02	8.94E-02
Naphthalene	6.5E-04	1.9E+00	6.8E+02	1.70E-05	6.20E-05	1.49E-03	5.43E-01	1.87E+00	6.84E+02	3.42E-01
Perylene	8.8E-09	2.5E-05	9.3E-03					2.53E-05	9.25E-03	4.63E-06
Phenanthrene	2.3E-05	6.6E-02	2.4E+01	4.90E-06	1.79E-05	4.29E-04	1.57E-01	6.67E-02	2.43E+01	1.22E-02
Pyrene	3.0E-06	8.6E-03	3.2E+00	3.20E-08	1.17E-07	2.80E-06	1.02E-03	8.64E-03	3.15E+00	1.58E-03
TOTAL ORGANIC HAPs		**25.12**	**9,169.42**		**9.68E-05**	**2.32E-03**	**0.85**	**25.12**	**9,170.27**	**4.59**

Gila River Sand & Gravel (Santan Plant) DRAFT

GRIC Permit No. ####

Hot Mix Asphalt Plant Hazardous Air Pollutant Emission Calculatic

Notes:

1. Emission factors for hot mix asphalt plant were obtained from AP-42 5th Ed. Final Section 11.1, updated March 2004, Table 11.1-10, controlled emission factors for No. 2 fuel oil-fired drum mix dryers.
2. HAP emission factor for HMA plant hot oil systems provided in AP-42 Final Section 11.1 updated March 2004, Table 11.1-13.
3. Emission factors for the hot oil heater were converted from lb/gal. to lbs/hr according to the following equation:

lb/hr = [emission factor (lb/gal.) * 1000] / [diesel heat content (MMBtu/gal)] * [Burner rating (MMBtu/hr)]

Where: diesel heat content = 137.03 MMBtu/1000 gal.

burner rating = 0.50 MMBtu/hr

4. Daily emissions = emission factor (lb/hr) x 24 hours
5. Annual emissions = daily emissions (lb/day) x 365 days

METALS

DRUM MIX	Dryer Burner/Baghouse Emissions (HM1)				Mineral Supplement Filling (EP-07A)				Total Emissions		
	EF [6]	Emissions			EF [4]	Emissions			Emissions		
Toxic Air Contaminant	(lb/ton HMA)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/ton mat'l)	(lb/day)	(lbs/yr)	(tons/yr)	(lb/day)	(lbs/yr)	(tons/yr)
Antimony	1.80E-07	5.18E-04	1.89E-01	9.46E-05					5.18E-04	1.89E-01	9.46E-05
Arsenic	5.60E-07	1.61E-03	5.89E-01	2.94E-04	1.00E-06	2.40E-04	7.48E-02	3.74E-05	1.85E-03	6.63E-01	3.32E-04
Beryllium	0.00E+00	0.00E+00	0.00E+00	0.00E+00					0.00E+00	0.00E+00	0.00E+00
Cadmium	4.10E-07	1.18E-03	4.31E-01	2.15E-04	1.98E-10	4.75E-08	1.48E-05	7.41E-09	1.18E-03	4.31E-01	2.16E-04
Hex-Chromium	4.50E-07	1.30E-03	4.73E-01	2.37E-04					1.30E-03	4.73E-01	2.37E-04
Chromium	5.50E-06	1.58E-02	5.78E+00	2.89E-03	5.50E-06	1.32E-03	4.11E-01	2.06E-04	1.72E-02	6.19E+00	3.10E-03
Cobalt	2.60E-08	7.49E-05	2.73E-02	1.37E-05					7.49E-05	2.73E-02	1.37E-05
Lead	1.50E-05	4.32E-02	1.58E+01	7.88E-03					4.32E-02	1.58E+01	7.88E-03
Manganese	7.70E-06	2.22E-02	8.09E+00	4.05E-03					2.22E-02	8.09E+00	4.05E-03
Mercury	2.60E-06	7.49E-03	2.73E+00	1.37E-03					7.49E-03	2.73E+00	1.37E-03
Nickel	6.30E-05	1.81E-01	6.62E+01	3.31E-02					1.81E-01	6.62E+01	3.31E-02
Selenium	3.50E-07	1.01E-03	3.68E-01	1.84E-04					1.01E-03	3.68E-01	1.84E-04
Phosphorous	2.80E-05	8.06E-02	2.94E+01	1.47E-02					8.06E-02	2.94E+01	1.47E-02
Total Metal HAPs		**0.36**	**130.11**	**0.07**		**0.00**	**0.49**	**0.00**	**0.36**	**130.60**	**0.07**

Notes:

6. Emission factors for hot mix asphalt plant were obtained from AP-42 5th Ed. Final Section 11.1, updated March 2004, Table 11.1-12, controlled emission factors for No. 2 fuel oil-fired drum mix dryers.

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DRUM MIX	Dryer Burner/Baghouse Emissions (HM1)			Hot Oil Heater Emissions (HO1)				Total Emissions		
	EF [7]	Emissions		EF [8]	Emissions			Emissions		
Toxic Air Contaminant	(lb/ton HMA)	(lb/day)	(lbs/yr)	(lb/gal)	(lb/hr) [3]	(lb/day) [4]	(lbs/yr) [5]	(lb/day)	(lbs/yr)	(tons/yr)
Total PCDD/PCDF	1.20E-10	3.46E-07	1.26E-04	2.30E-10	8.39E-10	2.01E-08	7.35E-06	3.66E-07	1.33E-04	6.67E-08

Notes:

7. Emission factors for hot mix asphalt plant were obtained from AP-42 5th Ed. Final Section 11.1, updated March 2004, Table 11.1-10, controlled emission factors for fuel oil fired drum mix dryers.
8. Emission factors for hot mix asphalt plant were obtained from AP-42 5th Ed. Final Section 11.1, updated March 2004, Table 11.1-13, hot oil system fiered w/ no.2 fuel oil.

Gila River Sand & Gravel (Santan Plant)

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GRIC Permit No. ####

Solvent Cleaning Emissions

Annual Solvent Usage	120	gallons
Disposal Quantity	0	gallons
Solvent Type	Safety-Kleen	
VOC Content [1]	100%	
Density [1]	7	lb/gal

	hr/day	day/wk	wk/yr
Operating Schedule	24	7	52

Criteria Pollutant	Daily Emissions [2]	Annual Emissions [3]	
	(lbs/day)	(lbs/year)	(tons/year)
VOC	2.21	804.00	0.40

NOTES:

1. Based on MSDS for Safety-Kleen 105 Solvent Virgin
2. Daily Emissions = Annual Emissions / # of Operating Days
3. Annual Emissions = (Annual Usage - Disposal Quantity) x Density

Gila River Sand & Gravel (Santan Plant)

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Aggregate Processing Fugitive Emission Calculations

	hr/day	day/wk	wk/yr
Operating Schedule	24	7	52

	Total Production			
	Hourly (TPH)	Daily (TPD)	Max Annual (TPY)	Proposed Annual (TPY)
Hot Mix Asphalt Plant (HMAP)	120	2,880	1,051,200	1,051,200

PM2.5 Emissions

Process Line	Source	Hourly (TPH)	Daily (TPD)	Proposed Annual (TPY)	Emission Factor [1] lb/ton	Controlled / Uncontrolled	# of Drop Points/ Equipment	PM2.5 Emissions [2,3] lb/day	lbs/yr	tons/yr
Hot Mix Asphalt Plant (HMAP)	Feed Bin	120	2,880	1,051,200	0.000013	Controlled	1	0.04	14	0.01
	Screens	120	2,880	1,051,200	0.00005	Controlled	2	0.29	105	0.05
	Conveyors	120	2,880	1,051,200	0.000013	Controlled	2	0.07	27	0.01
					TOTAL:			**0.40**	**146**	**0.07**

PM10 Emissions

Process Line	Source	Hourly (TPH)	Daily (TPD)	Proposed Annual (TPY)	Emission Factor [1] lb/ton	Controlled / Uncontrolled	# of Drop Points/ Equipment	PM10 Emissions [2,3] lb/day	lbs/yr	tons/yr
Hot Mix Asphalt Plant (HMAP)	Grizzly Feeders	120	2,880	1,051,200	0.000046	Controlled	1	0.13	48	0.02
	Screens	120	2,880	1,051,200	0.00074	Controlled	2	4.26	1,556	0.78
	Conveyors	120	2,880	1,051,200	0.000046	Controlled	2	0.26	97	0.05
					TOTAL:			**4.66**	**1,701**	**0.85**

PM Emissions

Process Line	Source	Hourly (TPH)	Daily (TPD)	Proposed Annual (TPY)	Emission Factor [1] lb/ton	Controlled / Uncontrolled	# of Drop Points/ Equipment	PM Emissions [2,3] lb/day	lbs/yr	tons/yr
Hot Mix Asphalt Plant (HMAP)	Grizzly Feeders	120	2,880	1,051,200	0.00014	Controlled	1	0.40	147	0.07
	Screens	120	2,880	1,051,200	0.0022	Controlled	2	12.67	4,625	2.31
	Conveyors	120	2,880	1,051,200	0.00014	Controlled	2	0.81	294	0.15
					TOTAL:			**13.88**	**5,067**	**2.53**

Notes:

1. Based on controlled emission factors for applicable activity provided in Table 11.19.2-2 (Crushed Stone Processing and Pulverized Mineral Processing), AP-42 5th Ed. Final Section 11.19.2 updated August 2004. Material is washed. There is no PM2.5 emission factor for fines screening, so PM2.5 is assumed to be 30% of PM10 emissions

2. Daily Emissions (lb/day) = EF (lb/ton) x Material Throughput (tons/day).
   Annual Emissions (lb/yr) = EF (lb/ton) x Annual Material Throughput (ton/yr)

3. Includes emissions from transfer of material from equipment to adjacent conveyor or equipment.

Gila River Sand & Gravel (Santan Plant)

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Hot Mix Asphalt Plant Material Handling Fugitive Emission Calculations

	hr/day	day/wk	wk/yr
Operating Schedule	24	7	52

	Total Production			
	Hourly (TPH)	Daily (TPD) (1)	Max Annual (TPY) (2)	Proposed Annual (TPY) (3)
Hot Mix Asphalt Plant (HMAP)	120	2,880	1,051,200	1,051,200

PM2.5 Emissions

Source	# of Drops	EF[1]	PM2.5 Emissions		
		lb/ton	lb/day	lbs/yr	tons/yr
Hot Mix Asphalt Plant (HMAP)	3	0.000089	0.26	94	0.05
		TOTAL:	**0.26**	**94**	**0.05**

PM10 Emissions

Source	# of Drops	EF[1]	PM10 Emissions		
		lb/ton	lb/day	lbs/yr	tons/yr
Hot Mix Asphalt Plant (HMAP)	3	0.000586	1.69	616	0.31
		TOTAL:	**1.69**	**616**	**0.31**

PM Emissions

Source	# of Drops	EF[1]	PM Emissions		
		lb/ton	lb/day	lbs/yr	tons/yr
Hot Mix Asphalt Plant (HMAP)	3	0.001238	3.57	1,301	0.65
		TOTAL:	**3.57**	**1,301**	**0.65**

Notes:

1. Emission Factor Source: AP-42 5th Ed. Section 13.2.4.3 Equation 1 as follows:

$EF = k * (0.0032) * (U/5)^{1.3} / (M/2)^{1.4}$ (lb/ton), where

M (Moisture) =	1.5	%	
U' (Wind speed) =	2.23	mph	
k(for $PM_{2.5}$) =	0.053		(AP-42 5th Ed. Section 13.2.4.3)
k(for PM_{10}) =	0.35		(AP-42 5th Ed. Section 13.2.4.3)
k(for PM) =	0.74		(AP-42 5th Ed. Section 13.2.4.3)

$U' = U * (h_p/h_m)^{1.5}$

Where: U' = wind speed at loader dump height

U = wind speed at meteorological tower height (6.3 mph - Western Regional Climate Center for Phoenix, AZ)

h_p = loader dump height (5 m)

h_m = meteorological tower height (10 m)

PM10 Emission Factor Calculations = 0.35 x (0.0032) x (2.23/5) ^1.3 / (1.5/2) ^1.4 = **0.000586 lb/ton**

#REF!

PM Emission Factor Calculations = 0.74 x (0.0032) x (2.23/5) ^1.3 / (1.5/2) ^1.4 = **0.001238 lb/ton**

2. Drop points:

Source	Truck Dumping	Feed Bin Loading	Loadout to Storage Piles	Loadout to Haul Trucks	TOTAL
Hot Mix Asphalt Plant (HMAP)	1	1	1		**3**

Gila River Sand & Gravel (Santan Plant) DRAFT

GRIC Permit No.

Hot Mix Asphalt Plant Fugitive Criteria Pollutant Emission Calculations

	Production Limits		
	Hourly (TPH)	Daily (TPD)	Annual (TPY)
Hot Mix Asphalt Plant (HMAP)	120	2880	1,051,200

	Plant Loadout Emissions (HML1)			Silo Filling Emissions (HMS1)			Total Emissions		
	EF [1]	Emissions		EF [2]	Emissions				
Criteria Pollutant	(lb/ton HMA)	(lb/day)	(lbs/yr)	(lb/ton HMA)	(lb/day)	(lbs/yr)	(lb/day)	(lbs/yr)	(tons/yr)
NOx									
VOC	3.909E-03	11.26	4109.57	1.22E-02	35.10	12810.64	**46.36**	**16,920.22**	**8.46**
CO	1.349E-03	3.89	1418.32	1.18E-03	3.40	1240.40	**7.28**	**2,658.72**	**1.33**
SO_2									
$PM_{2.5}$ [3]	5.219E-04	1.50	548.66	5.86E-04	1.69	615.89	**3.19**	**1,164.55**	**0.58**
PM_{10} [3]	5.219E-04	1.50	548.66	5.86E-04	1.69	615.89	**3.19**	**1,164.55**	**0.58**
PM [3]	5.219E-04	1.50	548.66	5.86E-04	1.69	615.89	**3.19**	**1,164.55**	**0.58**

Notes:

1. Emission Factor Source: AP-42 5th Ed., updated April 2004, Tables 11.1-14 and 11.1-16.

Emission Factor Equations:

Total PM EF[5] Plant Loadout EF= 0.000181+ 0.00141 (-V) e^((0.0251)(T+460)-20.43)

CO EF Plant Loadout EF= 0.00558 (-V) e^((0.0251)(T+460)-20.43)

TOC EF Plant Loadout EF= 0.0172 (-V) e^((0.0251)(T+460)-20.43)

T = Mix Temp = 325 F Source: AP-42 Table 11.1-14

V = Asphalt Volatility = -0.5 Source: AP-42 Table 11.1-14

VOC EF Plant Loadout EF = TOC EF x % VOC/Toxic per note "a" in table 11.1-16

Example Calculation:

Total PM EF5 (Plant Loadout) = 0.000181 + 0.00141 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 5.22E-04 lb/ton HMA

CO EF (Plant Loadout) = 0.00558 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 1.35E-03 lb/ton HMA

TOC EF (Plant Loadout) = 0.0172 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 4.16E-03 lb/ton HMA

% VOC of TOC EF = 94%

VOC EF (Plant Loadout) = 0.0042 x 94 % = 3.91E-03 lb VOC/ton HMA

VOC (Plant Loadout) = [EF(VOC) x HMA Produced(TPY)] = (0.0039 x 1051200) = 4,109.57 lbs/yr

2. Emission Factor Source: AP-42 5th Ed., updated April 2004, Tables 11.1-14 and 11.1-16.

Emission Factor Equations:

Total PM EF[5]	Silo Filling	EF= 0.000332 + 0.00105 (-V) e^((0.0251)(T+460)-20.43)
CO EF	Silo Filling	EF= 0.00488 (-V) e^((0.0251)(T+460)-20.43)
TOC EF	Silo Filling	EF= 0.0504 (-V) e^((0.0251)(T+460)-20.43)

T = Mix Temp =	325 F	Source: AP-42 Table 11.1-14
V = Asphalt Volatility =	-0.5	Source: AP-42 Table 11.1-14

VOC EF Silo Filling EF = TOC EF x % VOC/Toxic per note "a" in table 11.1-16

Example Calculation:

Total PM EF5 (Silo Filling) = 0.000332 + 0.00105 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 5.86E-04 lb/ton HMA

CO EF (Silo Filling) = 0.00488 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 1.18E-03 lb/ton HMA

TOC EF (Silo Filling) = 0.0504 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 1.22E-02 lb/ton HMA

% VOC of TOC EF = 100%

VOC EF (Silo Filling) = 0.0122 x 100 % = 1.22E-02 lb /ton HMA

VOC (Silo Filling) = [EF(VOC) x HMA Produced(TPY)] = (0.0122 x 1051200) = 12,810.64 lbs/yr

3. For plant loadout and silo filling - assumed to be all PM2.5, and therefore also PM and PM10, based on AP-42 Table 11.1-14 Note "b"

Gila River Sand & Gravel (Santan Plant)

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GRIC Permit No. ####

Hot Mix Asphalt Plant Fugitive Hazardous Air Pollutant Emission Calculations

	Production Limits		
	Hourly (TPH)	Daily (TPD)	Annual (TPY)
Hot Mix Asphalt Plant (HMAP)	120	2880	1,051,200

ORGANICS

Hazardous Ai r Pollutants	Plant Loadout Emissions (HML1)				Silo Filling Emissions (HMS1)				Total Emissions		
	TOC/PM EF [3]	EF [1] (lb/ton HMA)	Emissions (lb/day)	Emissions (lbs/yr)	TOC/PM EF [3]	EF [2] (lb/ton HMA)	Emissions (lb/day)	Emissions (lbs/yr)	(lb/day)	(lbs/yr)	(tons/yr)
Individual HAPs											
Benzene	0.052%	2.16E-06	6.23E-03	2.27E+00	0.032%	3.90E-06	1.12E-02	4.10E+00	**1.75E-02**	**6.37E+00**	**3.19E-03**
Bromomethane (Methyl bromide)	0.0096%	3.99E-07	1.15E-03	4.20E-01	0.0049%	5.97E-07	1.72E-03	6.28E-01	**2.87E-03**	**1.05E+00**	**5.24E-04**
2-Butanone (Methyl ethyl ketone)	0.049%	2.04E-06	5.87E-03	2.14E+00	0.039%	4.75E-06	1.37E-02	5.00E+00	**1.96E-02**	**7.14E+00**	**3.57E-03**
Carbon Disulfide	0.013%	5.41E-07	1.56E-03	5.68E-01	0.016%	1.95E-06	5.62E-03	2.05E+00	**7.17E-03**	**2.62E+00**	**1.31E-03**
Chloroethane (Ethyl chloride)	0.00021%	8.73E-09	2.52E-05	9.18E-03	0.004%	4.87E-07	1.40E-03	5.12E-01	**1.43E-03**	**5.22E-01**	**2.61E-04**
Chloromethane (Methyl chloride)	0.015%	6.24E-07	1.80E-03	6.56E-01	0.023%	2.80E-06	8.07E-03	2.95E+00	**9.87E-03**	**3.60E+00**	**1.80E-03**
Cumene	0.11%	4.57E-06	1.32E-02	4.81E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	**1.32E-02**	**4.81E+00**	**2.40E-03**
Ethylbenzene	0.28%	1.16E-05	3.35E-02	1.22E+01	0.038%	4.63E-06	1.33E-02	4.87E+00	**4.69E-02**	**1.71E+01**	**8.55E-03**
Formaldehyde	0.088%	3.66E-06	1.05E-02	3.85E+00	0.69%	8.41E-05	2.42E-01	8.84E+01	**2.53E-01**	**9.22E+01**	**4.61E-02**
n-Hexane	0.15%	6.24E-06	1.80E-02	6.56E+00	0.1%	1.22E-05	3.51E-02	1.28E+01	**5.31E-02**	**1.94E+01**	**9.68E-03**
Isooctane (2,2,4-Trimethylpentane)	0.0018%	7.49E-08	2.16E-04	7.87E-02	0.00031%	3.78E-08	1.09E-04	3.97E-02	**3.24E-04**	**1.18E-01**	**5.92E-05**
Methylene Chloride	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00027%	3.29E-08	9.48E-05	3.46E-02	**9.48E-05**	**3.46E-02**	**1.73E-05**
MTBE	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**
Styrene	0.0073%	3.04E-07	8.74E-04	3.19E-01	0.0054%	6.58E-07	1.90E-03	6.92E-01	**2.77E-03**	**1.01E+00**	**5.05E-04**
Tetrachloroethene	0.0077%	3.20E-07	9.22E-04	3.37E-01	0.00%	0.00E+00	0.00E+00	0.00E+00	**9.22E-04**	**3.37E-01**	**1.68E-04**
Toluene	0.21%	8.73E-06	2.52E-02	9.18E+00	0.062%	7.56E-06	2.18E-02	7.94E+00	**4.69E-02**	**1.71E+01**	**8.56E-03**
1,1,1-Trichloroethane (methyl chloroform)	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**
Trichloroethene	0.00%	0.00E+00	0.00E+00	0.00E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	**0.00E+00**	**0.00E+00**
Trichlorofluoromethane	0.0013%	5.41E-08	1.56E-04	5.68E-02	0.00%	0.00E+00	0.00E+00	0.00E+00	**1.56E-04**	**5.68E-02**	**2.84E-05**
Xylenes (m-/p-)	0.41%	1.71E-05	4.91E-02	1.79E+01	0.2%	2.44E-05	7.02E-02	2.56E+01	**1.19E-01**	**4.35E+01**	**2.18E-02**
Xylenes (o-)	0.08%	3.33E-06	9.58E-03	3.50E+00	0.057%	6.95E-06	2.00E-02	7.30E+00	**2.96E-02**	**1.08E+01**	**5.40E-03**
POM HAPs											
Acenaphthene	0.26%	8.86E-07	2.55E-03	9.32E-01	0.47%	1.19E-06	3.44E-03	1.25E+00	**5.99E-03**	**2.19E+00**	**1.09E-03**
Acenaphthylene	0.028%	9.55E-08	2.75E-04	1.00E-01	0.014%	3.55E-08	1.02E-04	3.74E-02	**3.77E-04**	**1.38E-01**	**6.89E-05**
Anthracene	0.07%	2.39E-07	6.87E-04	2.51E-01	0.13%	3.30E-07	9.51E-04	3.47E-01	**1.64E-03**	**5.98E-01**	**2.99E-04**
Benzo(a)anthracene	0.019%	6.48E-08	1.87E-04	6.81E-02	0.056%	1.42E-07	4.09E-04	1.49E-01	**5.96E-04**	**2.18E-01**	**1.09E-04**
Benzo(b)fluoranthene	0.008%	2.59E-08	7.46E-05	2.72E-02	0.00%	0.00E+00	0.00E+00	0.00E+00	**7.46E-05**	**2.72E-02**	**1.36E-05**
Benzo(k)fluoranthene	0.0022%	7.50E-09	2.16E-05	7.88E-03	0.00%	0.00E+00	0.00E+00	0.00E+00	**2.16E-05**	**7.88E-03**	**3.94E-06**
Benzo(g,h,i)perylene	0.0019%	6.48E-09	1.87E-05	6.81E-03	0.00%	0.00E+00	0.00E+00	0.00E+00	**1.87E-05**	**6.81E-03**	**3.40E-06**
Benzo(a)pyrene	0.0023%	7.84E-09	2.26E-05	8.24E-03	0.00%	0.00E+00	0.00E+00	0.00E+00	**2.26E-05**	**8.24E-03**	**4.12E-06**
Benzo(e)pyrene	0.0078%	2.66E-08	7.66E-05	2.80E-02	0.0095%	2.41E-08	6.95E-05	2.54E-02	**1.46E-04**	**5.33E-02**	**2.67E-05**
Chrysene	0.103%	3.51E-07	1.01E-03	3.69E-01	0.21%	5.33E-07	1.54E-03	5.60E-01	**2.55E-03**	**9.30E-01**	**4.65E-04**
Dibenz(a,h)anthracene	0.00037%	1.26E-09	3.63E-06	1.33E-03	0.00%	0.00E+00	0.00E+00	0.00E+00	**3.63E-06**	**1.33E-03**	**6.63E-07**
Fluoranthene	0.05%	1.70E-07	4.91E-04	1.79E-01	0.15%	3.81E-07	1.10E-03	4.00E-01	**1.59E-03**	**5.80E-01**	**2.90E-04**
Fluorene	0.77%	2.63E-06	7.56E-03	2.76E+00	1.01%	2.56E-06	7.39E-03	2.70E+00	**1.49E-02**	**5.46E+00**	**2.73E-03**
Indeno(1,2,3-cd)pyrene	0.00047%	1.60E-09	4.61E-06	1.68E-03	0.00%	0.00E+00	0.00E+00	0.00E+00	**4.61E-06**	**1.68E-03**	**8.42E-07**

ORGANICS

Hazardous Ai r Pollutants	Plant Loadout Emissions (HML1)				Silo Filling Emissions (HMS1)				Total Emissions		
	TOC/PM EF [3]	EF [1] (lb/ton HMA)	Emissions (lb/day)	Emissions (lbs/yr)	TOC/PM EF [3]	EF [2] (lb/ton HMA)	Emissions (lb/day)	Emissions (lbs/yr)	(lb/day)	(lbs/yr)	(tons/yr)
2-Methylnaphthalene	2.38%	8.11E-06	2.34E-02	8.53E+00	5.27%	1.34E-05	3.85E-02	1.41E+01	**6.19E-02**	**2.26E+01**	**1.13E-02**
Naphthalene	1.25%	4.26E-06	1.23E-02	4.48E+00	1.82%	4.62E-06	1.33E-02	4.86E+00	**2.56E-02**	**9.34E+00**	**4.67E-03**
Perylene	0.022%	7.50E-08	2.16E-04	7.88E-02	0.03%	7.62E-08	2.19E-04	8.01E-02	**4.35E-04**	**1.59E-01**	**7.95E-05**
Phenanthrene	0.81%	2.76E-06	7.95E-03	2.90E+00	1.8%	4.57E-06	1.32E-02	4.80E+00	**2.11E-02**	**7.71E+00**	**3.85E-03**
Pyrene	0.15%	5.11E-07	1.47E-03	5.38E-01	0.44%	1.12E-06	3.22E-03	1.17E+00	**4.69E-03**	**1.71E+00**	**8.56E-04**
Phenol	1.18%	4.02E-06	1.16E-02	4.23E+00	0.00%	0.00E+00	0.00E+00	0.00E+00	**1.16E-02**	**4.23E+00**	**2.11E-03**
								Total Organic HAPs	**0.78**	**283.80**	**0.14**

Notes:

1. Emission Factor Source: AP-42 5th Ed., updated April 2004, Tables 11.1-14, 11.1-15, and 11.1-16.

Emission Factor Equations:

Organic PM EF — Plant Loadou EF= 0.00141 (-V) e^((0.0251)(T+460)-20.43)

Total Organic Compounds (TOC) EF — Plant Loadou EF= 0.0172 (-V) e^((0.0251)(T+460)-20.43)

T = Mix Temp = 325 F Source: AP-42 Table 11.1-14

V = Asphalt Volatility = -0.5 Source: AP-42 Table 11.1-14

PAH HAPs — Plant Loadou EF = Organic PM EF x % Toxic

VOC HAPs — Plant Loadou EF = TOC EF x % Toxic

Example Calculation:

Organic PM EF (Plant Loadout) = 0.00141 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 3.41E-04 lb/ton HMA

Total Organic Compounds (TOC) EF (Plant Loadout) = 0.0172 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 4.16E-03 lb/ton HMA

% Acenaphthene of Organic PM EF = 0.26%

PAH HAPs (Acenaphthene) = 0.000341 x 0.0026 % = 8.86E-07 lb Acenaphthene/ton HMA

Acenaphthene (Plant Loadout) = [EF(Acenaphthene) x HMA Produced(TPY)] = (0.000000886 x 1051200) = 9.32E-01 lbs/yr

2. Emission Factor Source: AP-42 5th Ed., updated April 2004, Tables 11.1-14, 11.1-15, and 11.1-16.

Emission Factor Equations:

Organic PM — Silo Filling EF= 0.00105 (-V) e^((0.0251)(T+460)-20.43)

TOC — Silo Filling EF= 0.0504 (-V) e^((0.0251)(T+460)-20.43)

T = Mix Temp = 325 F Source: AP-42 Table 11.1-14

V = Asphalt Volatility = -0.5 Source: AP-42 Table 11.1-14

PAH HAPs — Silo Filling EF = Organic PM EF x % Toxic

VOC HAPs — Silo Filling EF = TOC EF x % Toxic

Example Calculation:

Organic PM (Silo Filling) = 0.00105 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 2.54E-04 lb/ton HMA

TOC (Silo Filling) = 0.0504 x (-(-0.5)) x e^((0.0251 x (325 + 460)) - 20.43) = 1.22E-02 lb/ton HMA

% Acenaphthene of Organic PM = 0.47%

PAH HAPs (Acenaphthene) = 0.000254 x 0.0047 % = 1.19E-06 lb Acenaphthene/ton HMA

Acenaphthene (Silo Filling) = [EF(Acenaphthene) x HMA Produced(TPY)] = (0.00000119 x 1051200) = 1.25E+00 lbs/yr

3. Per note "c" in Table 11.1-15 and note "a" in Table 11.1-16

Gila River Sand & Gravel (Santan Plant)

DRAFT

GRIC Permit No. ####

Unpaved Road Fugitive Emission Calculations

Vehicle Type	Vehicle Weight (tons)	VMT per day	VMT per year	Control Efficiency
Asphalt Haul Trucks	31.5	173.38	63,112	0%
Asphalt Loaders	46.5	25.24	9,189	0%
Aggregate Haul Trucks	86.3	9.38	3,413	0%
Average of Vehicles	35.79	208.00	75,714	80%

$$E = \left[k \left(\frac{s}{12} \right)^{a} \times \left(\frac{W}{3} \right)^{b} \right]$$

Source of Equation: See Table Notes (1)

Equation Parameter	PM2.5	PM10	PM
E, annual size-specific uncontrolled emission factor for upaved industrial roads (lb/VMT) (2)	**0.18**	**1.79**	**7.01**
k, Particle size multiplier for particle size range, (lb/VMT) (Source: AP-42 Table 13.2.2-2)	**0.15**	**1.5**	**4.9**
s, surface material silt content, (%) (Source: AP-42 Chapter 13.2.2)	**4.8**	**4.8**	**4.8**
W, mean weight (tons) of the vehicles traveling the road	**35.79**	**35.79**	**35.79**
a, constant for PM_{10} / PM on industrial roads (Source: AP-42 Table 13.2.2-2)	**0.9**	**0.9**	**0.7**
b, constant for PM, PM_{10} and $PM_{2.5}$ on industrial roads (Source: AP-42 Table 13.2.2-2)	**0.45**	**0.45**	**0.45**
P, days with precipitation >0.01in.	**40**	**40**	**40**

Emissions

Pollutant	Assumed Control Efficiency (3)	Uncontrolled Emissions (4)			Controlled Emissions (5)		
		lb/day	lbs/yr	tons/yr	lb/day	lbs/yr	tons/yr
PM2.5	**80%**	37.16	13,527	6.76	7.43	2,705	1.35
PM10	**80%**	371.62	135,270	67.64	74.32	27,054	13.53
PM	**80%**	1458.12	530,756	265.38	291.62	106,151	53.08

Table Notes:

1. Emission Factor Source: AP-42 5th Ed., Section 13.2.2, Equations 1a and 2, Unpaved Roads, Rev.: November 2006
2. Emissions (lbs/yr) = Emission factor (lb/VMT) x (VMT/year)

Example Calculations For : Uncontrolled PM10 emissions (in lbs per year) from PM10

Based on Equation listed in Table Note (2),

ion Factor for PM10 (Asphalt Haul Trucks) = [1.5 x (4.8/12)^0.9 x (35.79/3)^0.45] = 1.79 lb/VMT

Therefore, Annual Uncontrolled Emissions of PM10 from Asphalt Haul Trucks = (lb/VMT) x 63111.82 (VMT/y 112755.68 lbs/yr

3. Control efficiency based on AP-42, Chapter 13.2.2.3 (controls for unpaved roads) and Maricopa County Air Quality Department, Emissions Inventory Help Sheet for Vehicle Travel on Unpaved Roads, 2008.
4. Controlled Emissions (lbs/yr) = Uncontrolled Emissions (lbs/yr) x (1 - Control Efficiency) = 135270.07 lbs/yr x (1 - 0.8) = 27054.01 lbs/yr
5. Total VMT per year for loaders 9188.81 + 3412.99 VMT/yr

Gila River Sand & Gravel (Santan Plant) DRAFT

GRIC Permit No. ####

Hot Mix Asphalt Plant Storage Pile Fugitive Emission Calculations

Storage Pile	Description	Silt (s)[1] (%)	p [2]	f [3] (%)	Area (Acres)[4]	Emission Factor (lb/day/acre)[5]			Control Efficiency	PM Emissions			PM10 Emissions			PM2.5 Emissions		
						PM	PM_{10}	$PM_{2.5}$	(%)	lb/day	lb/yr[6]	tons/yr	lb/day	lb/yr[6]	tons/yr	lb/day	lb/yr[6]	tons/yr
Aggregates	Ground Storage Pile	1.6	40	25	5	4.180	2.090	0.320	70%	6.27	2288	1.14	3.13	1144	0.57	0.48	175	0.09
Sand	Ground Storage Pile	2.60	40	25	5	6.792	3.396	0.519	70%	10.19	3719	1.86	5.09	1859	0.93	0.78	284	0.14
Asphalt Chips	Bunker #1	1.6	40	25	0.0625	4.180	2.090	0.320	100%	0.00	0.00	0.00000	0.00	0.00	0.00000	0.00	0.00	0.00000
	Bunker #2	1.6	40	25	0.0625	4.180	2.090	0.320	100%	0.00	0.00	0.00000	0.00	0.00	0.00000	0.00	0.00	0.00000
	Bunker #3	1.6	40	25	0.0625	4.180	2.090	0.320	100%	0.00	0.00	0.00000	0.00	0.00	0.00000	0.00	0.00	0.00000
	Bunker #4	1.6	40	25	0.0625	4.180	2.090	0.320	100%	0.00	0.00	0.00000	0.00	0.00	0.00000	0.00	0.00	0.00000
									Totals	**16.46**	**6,007**	**3.00**	**8.23**	**3,003**	**1.50**	**1.26**	**459**	**0.23**

Notes:

1. Silt content obtained from EPA AP-42, Section 13.2.4, Table 13.2.4-1 - Storage Piles based on crushed limestone.

2. p is the number of days with greater than 0.01 in. of precipitation per year. The value of p is obtained from EPA AP-42, Section 13.2.2, Figure 13.2.2-1.

3. f is the % of time the unobstructed wind speed exceeds 12 mph at the mean pile height.

4. Surface area of piles based on RFI responses provided 02/25/25.

5. Emission factor for PM in lb/day/acre calculated using the following equation from EPA's Control of Open Fugitive Dust Sources, Chapter 4 (1988) and the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook, Section 9.3 (2006):

6. Emissions (lb/yr) = Emission Factor (lb/day/acre) * Acres * 365 days/yr * (1 - control efficiency).

Gila River Sand & Gravel (Santan Plant)

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GRIC Permit No. ####

Aggregate Processing Fugitive Emission Calculations

	hr/day	day/wk	wk/yr
Operating Schedule	24	7	52

	Total Production			
	Hourly (TPH)	Daily (TPD)	Max Annual (TPY)	Proposed Annual (TPY)
Main Plant	1,600	38,400	14,016,000	7,580,000
Portable K400 Aggregate Base (AB) Plant	500	12,000	4,380,000	4,380,000
Portable Manufactured Aggregate (MA) Plant (HMAP)	300	7,200	2,628,000	2,628,000

PM2.5 Emissions

Process Line	Source	Hourly (TPH)	Daily (TPD)	Proposed Annual (TPY)	Emission Factor [1] lb/ton	Controlled / Uncontrolled	# of Drop Points/ Equipment	PM2.5 Emissions [2] lb/day	lbs/yr	tons/yr
Main	Grizzly Feeders	1,600	38,400	7,580,000	0.000013	Controlled	1	0.50	99	0.05
	Screens	1,600	38,400	7,580,000	0.00005	Controlled	2	3.84	758	0.38
	Conveyors	1,600	38,400	7,580,000	0.000013	Controlled	16	7.99	1,577	0.79
	Crushers	1,600	38,400	7,580,000	0.00010	Controlled	1	3.84	758	0.38
Portable K400	Grizzly Feeders	500	12,000	4,380,000	0.000013	Controlled	1	0.16	57	0.03
	Screens	500	12,000	4,380,000	0.00005	Controlled	1	0.60	219	0.11
	Conveyors	500	12,000	4,380,000	0.000013	Controlled	6	0.94	342	0.17
	Crushers	500	12,000	4,380,000	0.00010	Controlled	1	1.20	438	0.22
Portable K400 Aggregate Base (AB) Plant	Grizzly Feeders	300	7,200	2,628,000	0.000013	Controlled	1	0.09	34	0.02
	Screens	300	7,200	2,628,000	0.00005	Controlled	1	0.36	131	0.07
	Conveyors	300	7,200	2,628,000	0.000013	Controlled	10	0.94	342	0.17
	Crushers	300	7,200	2,628,000	0.00010	Controlled	1	0.72	263	0.13
					TOTAL:			**21.17**	**5,017**	**2.51**

PM10 Emissions

Process Line	Source	Hourly (TPH)	Daily (TPD)	Proposed Annual (TPY)	Emission Factor [1] lb/ton	Controlled / Uncontrolled	# of Drop Points/ Equipment	PM10 Emissions [2] lb/day	PM10 Emissions [2] lbs/yr	PM10 Emissions [2] tons/yr
Main	Grizzly Feeders	1,600	38,400	7,580,000	0.000046	Controlled	1	1.77	349	0.17
	Screens	1,600	38,400	7,580,000	0.00074	Controlled	2	56.83	11,218	5.61
	Conveyors	1,600	38,400	7,580,000	0.000046	Controlled	16	28.26	5,579	2.79
	Crushers	1,600	38,400	7,580,000	0.00054	Controlled	1	20.74	4,093	2.05
Portable K400	Grizzly Feeders	500	12,000	4,380,000	0.000046	Controlled	1	0.55	201	0.10
	Screens	500	12,000	4,380,000	0.00074	Controlled	1	8.88	3,241	1.62
	Conveyors	500	12,000	4,380,000	0.000046	Controlled	6	3.31	1,209	0.60
	Crushers	500	12,000	4,380,000	0.00054	Controlled	1	6.48	2,365	1.18
Portable K400 Aggregate Base (AB) Plant	Grizzly Feeders	300	7,200	2,628,000	0.000046	Controlled	1	0.33	121	0.06
	Screens	300	7,200	2,628,000	0.00074	Controlled	1	5.33	1,945	0.97
	Conveyors	300	7,200	2,628,000	0.000046	Controlled	10	3.31	1,209	0.60
	Crushers	300	7,200	2,628,000	0.00054	Controlled	1	3.89	1,419	0.71
					TOTAL:			**139.68**	**32,950**	**16.47**

PM Emissions

Process Line	Source	Hourly (TPH)	Daily (TPD)	Proposed Annual (TPY)	Emission Factor [1] lb/ton	Controlled / Uncontrolled	# of Drop Points/ Equipment	PM Emissions [2] lb/day	PM Emissions [2] lbs/yr	PM Emissions [2] tons/yr
Main	Grizzly Feeders	1,600	38,400	7,580,000	0.00014	Controlled	1	5.38	1,061	0.53
	Screens	1,600	38,400	7,580,000	0.0022	Controlled	2	168.96	33,352	16.68
	Conveyors	1,600	38,400	7,580,000	0.00014	Controlled	16	86.02	16,979	8.49
	Crushers	1,600	38,400	7,580,000	0.0012	Controlled	1	46.08	9,096	4.55
Portable K400	Grizzly Feeders	500	12,000	4,380,000	0.00014	Controlled	1	1.68	613	0.31
	Screens	500	12,000	4,380,000	0.0022	Controlled	1	26.40	9,636	4.82
	Conveyors	500	12,000	4,380,000	0.00014	Controlled	6	10.08	3,679	1.84
	Crushers	500	12,000	4,380,000	0.0012	Controlled	1	14.40	5,256	2.63
Portable K400 Aggregate Base (AB) Plant	Grizzly Feeders	300	7,200	2,628,000	0.00014	Controlled	1	1.01	368	0.18
	Screens	300	7,200	2,628,000	0.0022	Controlled	1	15.84	5,782	2.89
	Conveyors	300	7,200	2,628,000	0.00014	Controlled	10	10.08	3,679	1.84
	Crushers	300	7,200	2,628,000	0.0012	Controlled	1	8.64	3,154	1.58
					TOTAL:			**394.56**	**92,655**	**46.33**

Notes:

1. Based on controlled emission factors for applicable activity provided in Table 11.19.2-2, AP-42 5th Ed. Final Section 11.19.2 updated August 2004. There is no PM2.5 emission factor for fines screening, so PM2.5 is assumed to be 30% of PM10 emissions

2. Daily Emissions (lb/day) = EF (lb/ton) x Material Throughput (tons/day).
   Annual Emissions (lb/yr) = EF (lb/ton) x Annual Material Throughput (ton/yr)

Gila River Sand & Gravel (Santan Plant)

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Material Handling Fugitive Emission Calculations

	hr/day	day/wk	wk/yr
Operating Schedule	24	7	52

	Total Production			
	Hourly (TPH)	Daily (TPD) (1)	Max Annual (TPY) (2)	Proposed Annual (TPY) (3)
Main Plant	1,600	38,400	14,016,000	7,580,000
Portable K400 Aggregate Base (AB) Plant	500	12,000	4,380,000	4,380,000
Portable Manufactured Aggregate (MA) Plant (HMAP)	300	7,200	2,628,000	2,628,000

PM2.5 Emissions

Source	# of Drops	EF[1]	PM2.5 Emissions		
		lb/ton	lb/day	lbs/yr	tons/yr
Main Plant	4	0.000089	13.67	2,698	1.35
Portable K400 Aggregate Base (AB) Plant	4	0.000089	1.07	390	0.19
Portable Manufactured Aggregate (MA) Plant (HMAP)	4	0.000089	0.64	234	0.12
		TOTAL:	**15.38**	**3,322**	**1.66**

PM10 Emissions

Source	# of Drops	EF[1]	PM10 Emissions		
		lb/ton	lb/day	lbs/yr	tons/yr
Main Plant	4	0.000586	22.50	4,442	2.22
Portable K400 Aggregate Base (AB) Plant	4	0.000586	7.03	2,567	1.28
Portable Manufactured Aggregate (MA) Plant (HMAP)	4	0.000586	4.22	1,540	0.77
		TOTAL:	**33.75**	**8,549**	**4.27**

PM Emissions

Source	# of Drops	EF[1]	PM Emissions		
		lb/ton	lb/day	lbs/yr	tons/yr
Main Plant	4	0.001238	47.54	9,384	4.69
Portable K400 Aggregate Base (AB) Plant	4	0.001238	14.86	5,422	2.71
Portable Manufactured Aggregate (MA) Plant (HMAP)	4	0.001238	8.91	3,253	1.63
		TOTAL:	**71.31**	**18,060**	**9.03**

Notes:

1. Emission Factor Source: AP-42 5th Ed. Section 13.2.4.3 Equation 1 as follows:

$EF = k * (0.0032) * (U/5)^{1.3} / (M/2)^{1.4}$ (lb/ton), where

M (Moisture) =	1.5	%	
U' (Wind speed) =	2.23	mph	
k(for $PM_{2.5}$) =	0.053		(AP-42 5th Ed. Section 13.2.4.3)
k(for PM_{10}) =	0.35		(AP-42 5th Ed. Section 13.2.4.3)
k(for PM) =	0.74		(AP-42 5th Ed. Section 13.2.4.3)

$U' = U * (h_p/h_m)^{1.5}$

Where: U' = wind speed at loader dump height

U = wind speed at meteorological tower height (6.3 mph - Western Regional Climate Center for Phoenix, AZ)

h_p = loader dump height (5 m)

h_m = meteorological tower height (10 m)

PM10 Emission Factor Calculations = 0.35 x (0.0032) x (2.23/5) ^1.3 / (1.5/2) ^1.4 = **0.000586 lb/ton**

Example Calculation: PM10 = 7580000 TPY x 0.000586 lb/ton = 4441.88 lbs/yr

PM Emission Factor Calculations = 0.74 x (0.0032) x (2.23/5) ^1.3 / (1.5/2) ^1.4 = **0.001238 lb/ton**

2. Drop points:

Source	Truck Dumping	Feed Bin Loading	Loadout to Storage Piles	Loadout to Haul Trucks	TOTAL
Main Plant	1	1	1	1	**4**
Portable K400 Aggregate Base (AB) Plant	1	1	1	1	**4**
Portable Manufactured Aggregate (MA) Plant (HMAP)	1	1	1	1	**4**

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Unpaved Road Fugitive Emission Calculations

Vehicle Type	Vehicle Weight (tons)	VMT per day	VMT per year	Control Efficiency
All Vehicles	61.99	3585.55	1,305,139	80%

$$E = \left[k \left(\frac{s}{12} \right)^{a} \times \left(\frac{W}{3} \right)^{b} \right]$$

Source of Equation: See Table Notes (2)

Equation Parameter	PM2.5	PM10	PM
E, annual size-specific uncontrolled emission factor for upaved industrial roads (lb/VMT) (2)	**0.26**	**2.57**	**10.08**
k, Particle size multiplier for particle size range, (lb/VMT) (Source: AP-42 Table 13.2.2-2)	**0.15**	**1.5**	**4.9**
s, surface material silt content, (%) (Source: AP-42 Chapter 13.2.2)	**4.8**	**4.8**	**4.8**
W, mean weight (tons) of the vehicles traveling the road	**61.99**	**61.99**	**61.99**
a, constant for industrial roads (Source: AP-42 Table 13.2.2-2)	**0.9**	**0.9**	**0.7**
b, constant for industrial roads (Source: AP-42 Table 13.2.2-2)	**0.45**	**0.45**	**0.45**

PM10 Emissions

Pollutant	Assumed Control Efficiency	Uncontrolled PM10 Emissions (3)			Controlled PM10 Emissions (4)		
		lb/day	lbs/yr	tons/yr	lb/day	lbs/yr	tons/yr
PM2.5	**80%**	921	335,297	167.65	184	67,059	33.53
PM10	**80%**	9,211	3,352,968	1,676.48	1,842	670,594	335.30
PM	**80%**	36,143	13,155,952	6,577.98	7,229	2,631,190	1,315.60

Table Notes:

1. Emission Factor Source: AP-42 5th Ed., Section 13.2.2, Equations 1a and 2, Unpaved Roads, Rev.: November 2006
2. Emissions (lbs/yr) = Emission factor (lb/VMT) x (VMT/year)

   Example Calculation Uncontrolled PM10 emissions (in lbs per year) from PM10

   Based on Equation listed in Table Note (2),

   Emission Factor for PM10 (All Vehicles) = [1.5 x (4.8/12)^0.9 x (61.99/3)^0.45] = 2.57 lb/VMT

   Therefore, Annual Uncontrolled Emissions of PM10 from All Vehicles = 2.57 (lb/VMT) x 1305139.36 (VMT/yr) = 3,352,968.27 lbs/yr
3. Controlled Emissions (lbs/yr) = Uncontrolled Emissions (lbs/yr) x (1 - Control Efficiency) = 3352968.27 lbs/yr x (1 - 0.8) = 670593.65 lbs/yr

Gila River Sand & Gravel (Santan Plant) DRAFT

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Hot Mix Asphalt Plant Storage Pile Fugitive Emission Calculations

Storage Pile	Description	Silt (s)[1] (%)	p [2]	f [3] (%)	Area (Acres)[4]	Emission Factor (lb/day/acre)[5]			Control Efficiency	PM Emissions			PM10 Emissions			PM2.5 Emissions		
						PM	PM_{10}	$PM_{2.5}$	(%)[6]	lb/day	lb/yr[7]	tons/yr	lb/day	lb/yr[7]	tons/yr	lb/day	lb/yr[7]	tons/yr
Aggregates	Ground Storage Pile	1.6	40	25	50	4.180	2.090	0.320	70%	62.70	22884	11.44	31.35	11442	5.72	4.79	1750	0.87
Sand	Ground Storage Pile	2.60	40	25	50	6.792	3.396	0.519	70%	101.88	37186	18.59	50.94	18593	9.30	7.79	2844	1.42
									Totals	**164.57**	**60,070**	**30.03**	**82.29**	**30,035**	**15.02**	**12.59**	**4,594**	**2.30**

Notes:

1. Silt content obtained from EPA AP-42, Section 13.2.4, Table 13.2.4-1 - Storage Piles based on crushed limestone.

2. p is the number of days with greater than 0.01 in. of precipitation per year. The value of p is obtained from EPA AP-42, Section 13.2.2, Figure 13.2.2-1.

3. f is the % of time the unobstructed wind speed exceeds 12 mph at the mean pile height.

4. Surface area of piles based on RFI responses provided 02/25/25.

5. Emission factor for PM in lb/day/acre calculated using the following equation from EPA's Control of Open Fugitive Dust Sources, Chapter 4 (1988) and the Western Regional Air Partnership (WRAP) Fugitive Dust Handbook, Section 9.3 (2006):

6. Conservatively assumed.

7. Emissions (lb/yr) = Emission Factor (lb/day/acre) * Acres * 365 days/yr * (1 - control efficiency).