TECHNICAL REVIEW AND EVALUATION
GENERAL PERMIT FOR CRUSHING AND SCREENING PLANTS

I. INTRODUCTION

A. The Crushing and Screening General Permit is a permit for a facility class (crushing and screening plants) that contains 10 or more facilities that are similar in nature, have substantially similar emissions, and would be subject to the same or substantially similar requirements. The general permit will last for 5 years from the date of its issuance. Equipment that is covered under the general permit will be required to have an "Authorization to Operate" (ATO). The ATO will identify the piece of equipment by having the manufacture, date of manufacture, maximum capacity, and serial number and /or equipment number along with the annual operating hour limitation, if any, depending on the equipment and the county of operation. This general permit allows for portable crushing and screening plants to move to other locations statewide. This general permit also allows the Permittee to co-locate a concrete batch plant with the crushing and screening plant.

B. The Permittee shall use the myDEQ web portal to obtain authorizations to operate for each location at which the equipment will operate. The Permittee shall conduct all permitting services and transactions, including move notices, through the myDEQ online portal. In order to get authorization to operate under the general permit, the Permittee shall pay to the Department a flat permit processing fee of $500 and obtain the permit and the authorization to operate. The Permittee must also pay, for each calendar year, the applicable administrative or inspection fees as described in the Arizona Administrative Code Title 18, Chapter 2, Article 5, section 511 (A.A.C. R18-2-511).

C. Due the fact that this is a statewide general permit there is the potential that the Permittee may operate in a PM_{10} or $PM_{2.5}$ non-attainment area in the state of Arizona. The $PM_{10/2.5}$ non-attainment areas for purposes of this permit are listed in Table 1 below:

Table 1: Non-Attainment Areas- Summary and Classification

County	Townships
Maricopa	All
Pinal County and the Phoenix Planning Area	T1S, R8E; T2S, R8E; T3S, R7E; T3S, R8E; T4S, R8E (excluding all lands within the Gila River Indian Community); T5S, R4E (Only sections 12, 13, 24 and 25); T5S, R5E – R8E (excluding all lands within the Gila River Indian Community); T6S, R3E – R8E; T7S, R3E – R8E Sections 1-6. Phoenix Planning Area: T1N, R8E.
Santa Cruz	The Nogales area located in the southern part of Santa Cruz County. The portions of the following Townships which are within the State of Arizona and lie east of 111 degrees longitude: T23S, R13E, T23S, R14E, T24S, R13E, T24S, R14E.
Gila and Pinal	T1S, R13E (sections 7–36); T1S, R14E (sections 25–36);T2S, R13E; T2S, R14E; T2S, R15E; T3S, R13E; T3S, R14E; T3S, R15E; T3S, R16E (except that portion in the San Carlos Apache Indian Reservation); T4S, R13E; T4S, R14E; T4S, R15E; T4S, R16E; T5S, R13E; T5S, R14E; T5S, R15E; T5S, R16E; T6S, R13E; T6S, R14E; T6S, R15E; and T6S, R16E. Miami

County	Townships
	planning area T1N, R13E; T1N, R14E; T1N, R15E; T1S, R13E (sections 1–6); T1S, R14E (sections 1-24); T1S, R14 1/2E; and T1S, R15E.
Pima	The Rillito planning area which is located in the southern part of Pima County. The following townships are located in non-attainment areas: T11S-R9E, T11S-R10E, T11S-R11E, T11S-R12E, T12S-R8E, T12S-R9E, T12S-R10E, T12S-R11E and T12S-R12E. The Ajo planning area Township T12S, R6W, T12S, R5W (sections 6–8, 17-20, and 29-32).
Yuma	The Lower Colorado River Valley, in the southwestern part of Yuma County. The following townships are located in non-attainment areas: T7S-R21W, T7S-R22W, T8S-R21W, T8S-R22W, T8S-R23W, T8S-R24W, T9S-R21W, T9S-R22W, T9S-R23W, T9S-R24W, T9S-R25W, T10S-R21W, T10S-R22W, T10S-R23W, T10S-R24W, and T10S-R25W.
Cochise	The Douglas and Paul Spur areas; the following townships are located in non-attainment areas: T23S-R25E: T23S-R26E, T23S-R27E, T23S-R28E, T24S-R25E, T24S-R26E, T24S-R27E, and T24S-R28E.

Notes: No operations are permitted within the portion of Pinal County: T4S, R3E – R4E, T5S, R3E – R4E (excluding sections 12, 13, 24, and 25) identified as $PM_{2.5}$ non-attainment area in Appendix "A".

II. POTENTIAL TO EMIT

Following tables 2 through 6 show the potential to emit for PM_{10} attainment and non-attainment areas:

A. PM_{10} Attainment Areas

Emissions are based on modeling-based throughput limitation of 6,500 tpd for C&S and 1275 cubic yards per day of CBP. Generators HP is assumed to be 1000 HP non-certified.

Table 2- PTE for C&S Plant with Collocated CBP in Attainment Areas

	C&S Plant	CBP	Generators	Total		90% of major source thresholds	*Annual Emissions
	Pounds per day			Pounds per day	Tons per year	Tons per year	Tons per year
PM	104.39	17.58	16.80	138.77	25.3	90	20.5
PM_{10}	46.02	8.36	16.80	71.18	13.0	90	10.5
$PM_{2.5}$	5.72	3.15	16.80	25.67	4.7	90	3.8
CO		8.57	132.00	140.57	25.7	90	20.7
NO_x		34.29	576.00	610.29	111.4	90	90.0
SO_2		0.37	0.29	0.66	0.1	90	0.1
VOC		0.58	16.92	17.50	3.2	90	2.6

*Synthetic minor limitation to restrict facility emissions below the major source thresholds for all pollutants by limiting operating hours in the ATO.

B. PM_{10} Non-attainment Areas outside Maricopa County

For collocated C&S and CBP plants, emissions in Table 3 are based on modeling-based throughput limitation of 4095 tpd for C&S plant and 1275 cubic yards per day of CBP. For standalone C&S plant, emissions in Table 4 are based on modeling-based throughput limitation of 4410. Generators HP is assumed to be 1000 HP non-certified.

Table 3: PTE for C&S Plant with Collocated CBP in PM_{10} Non-attainment Areas

	C&S Plant	CBP	Generators	Total		90% of major source thresholds	*Annual Emissions
	Pounds per day			Pounds per day	Tons per year	Tons per year	Tons per year
PM	65.77	17.58	16.80	100.15	18.3	90	14.8
PM_{10}	28.99	8.36	16.80	54.15	9.9	90	8.0
$PM_{2.5}$	3.60	3.15	16.80	23.56	4.3	90	3.5
CO		8.57	132.00	140.57	25.7	90	20.7
NO_x		34.29	576.00	610.29	111.4	90	90.0
SO_2		0.37	0.29	0.66	0.1	90	0.1
VOC		0.58	16.92	17.50	3.2	90	2.6

*Synthetic minor limitation to restrict facility emissions below the major source thresholds for all pollutants by limiting operating hours in the ATO.

`Table 4: PTE for Standalone C&S plant in PM_{10} Non-attainment Areas

	C&S Plant	Generators	Total		90% of major source thresholds	*Annual Emissions
	Pounds per day		Pounds per day	Tons per year	Tons per year	Tons per year
PM	70.82	16.80	87.62	16.0	90	13.7
PM_{10}	31.22	16.80	48.02	8.8	90	7.5
$PM_{2.5}$	3.88	16.80	20.68	3.8	90	3.2
CO		132.00	132.00	24.1	90	20.6
NO_x		576.00	576.00	105.1	90	90.0
SO_2		0.29	0.29	0.1	90	0.0
VOC		16.92	16.92	3.1	90	2.6

*Synthetic minor limitation to restrict facility emissions below the major source thresholds for all pollutants by limiting operating hours in the ATO.

C. Maricopa County

For collocated C&S and CBP plants, emissions in Table 5 are based on modeling-based throughput limitation of 4095 tpd for C&S plant and 1275 cubic yards per day of CBP. For

standalone C&S plant, emissions in Table 6 are based on modeling-based throughput limitation of 4410. Generators HP is assumed to be 750 HP non-certified.

Table 5: PTE for C&S Plant with Collocated CBP in Maricopa County

	C&S Plant	CBP	Generators	Total		90% of BACT Thresholds for Maricopa County	*Annual Emissions
	Pounds per day			Pounds per day	Tons per year	Tons per year	Tons per year
PM_{10}	28.99	8.36	12.60	49.95	9.1	13.5	3.9
$PM_{2.5}$	3.66	3.15	12.60	19.36	3.5	9.0	1.5
CO		8.57	99.00	107.57	19.6	90.0	8.3
NO_x		34.29	432.00	466.29	85.1	36.0	36.0
SO_2		0.37	0.22	0.58	0.1	36.0	0.0
VOC		0.58	12.69	13.27	2.4	36.0	1.0

*Synthetic minor limitation restrict facility emissions below the Maricopa County BACT thresholds for all pollutants by limiting operating hours in the ATO.

Table 6: PTE for Standalone C&S Plant in Maricopa County

	C&S Plant	Generators	Total		90% of BACT Thresholds for Maricopa County	*Annual Emissions
	Pounds per day		Pounds per day	Tons per year	Tons per year	Tons per year
PM_{10}	31.22	12.60	43.82	8.0	13.5	3.7
$PM_{2.5}$	3.88	12.60	16.48	3.0	9.0	1.4
CO		99.00	99.00	18.1	90.0	8.3
NO_x		432.00	432.00	78.8	36.0	36.0
SO_2		0.22	0.22	0.0	36.0	0.0
VOC		12.69	12.69	2.3	36.0	1.1

*Synthetic minor limitation restrict facility emissions below the Maricopa County BACT thresholds for all pollutants by limiting operating hours in the ATO.

III. MINOR NEW SOURCE REVIEW

In accordance with R18-2-334, The Minor NSR program is applicable for any regulated minor NSR pollutants with the PTE equal to or greater than the permitting exemption thresholds defined at R18-2-101(99).

Table 7: Permit Exemption Thresholds

Pollutant	Permit Exemption Thresholds (tpy)
PM_{10}	7.5
$PM_{2.5}$	5.0
CO	50.0
NOx	20.0
SO2	20.0
VOC	20.0

Analysis of the applicability of the Minor NSR program was conducted for the C&S General Permit.

As evident from the potential to emit calculations above, PTE for all minor NSR pollutants for the crushing & screening plant and collocated concrete batch plant, as well as standalone crushing & screening plant are greater than the permit exemption thresholds. Hence, the permit is subject to minor NSR review.

All sources subject to the Minor NSR program must comply with one of the following requirements:

A. Implement Reasonably Available Control Technology (RACT), or

B. Conduct ambient air quality assessment to demonstrate that emissions from the will not interfere with attainment or maintenance of a NAAQS.

Accordingly, a modeling analysis was done for the throughput limits established for various scenarios in the general permit to demonstrate compliance with the NAAQS. See Section VII of this document a detailed discussion of the modeling analysis.

IV. OPERATING LIMITATIONS

Based on the modeled results (refer to Section VII for detailed modeling analysis), the production limitations for crushing and screening plants along with collocated concrete batch plants have been established. Table 8 on the following page below summarizes the production limitations:

Table 8: Modeling - Based Production Limitations

Facility	**Maximum Daily Operation**	
	PM_{10} Attainment Area	**PM_{10} Nonattainment Area**
Stand-alone crushing and screening plant	6,500 tons per day	4,410 tons per day
Crushing and screening plant collocated with concrete batch plants	C&S: 6,500 tons per day CBP: 1,275 yd^3 per day	C&S: 4,095 tons per day CBP: 1,275 yd^3 per day

Also, based on modeling to demonstrate compliance with 1-hr NO2 standards, the non-certified generators in Maricopa County are limited to combined horsepower of 750 HP.

V. APPLICABLE REGULATIONS

The Department has identified the applicable regulations that apply to each unit under this General Permit. Tables 9-12 below summarize the findings of the Department with respect to the regulations that are applicable to each e/missions unit.

Table 9: Regulations Applicable Statewide

Unit ID	Control Equipment	Applicable Regulations	Verification
Crushing and Screening Plants	Baghouses, wet scrubbers, spray bars, wet suppressant, and enclosures	A.A.C. R18-2-722 40 CFR 60 Subpart OOO	Crushing and screening plants equipment constructed prior to August 31, 1983 are subject Standards of Performance for Existing or Crushed Stone Processing Plants under A.A.C. R18-2-722. Equipment constructed after August 31, 1983 are subject to NSPS under 40 CFR 60 Subpart OOO.
Concrete Batch Plant	Baghouses and wet suppressants	A.A.C. R18-2-702.B A.A.C. R18-2-723	Concrete batch plants are subject to Standards of Performance for Existing Concrete Batch Plants under A.A.C. R18-2-723. .
Boiler		A.A.C. R18-2-724 NESHAP Subpart JJJJJJ	A.A.C. R18-2-719- Standards of Performance for Fossil-fuel fired industrial and commercial equipment is applicable to the boiler. National Emission Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR 63 Subpart JJJJJJ are applicable to both existing and new boilers.
Direct fired fuel burning equipment		A.A.C. R18-2-730	Standards of Performance for Unclassified sources is applicable to the direct fuel fired equipment.
Fugitive dust sources	Water and other reasonable precautions	A.A.C. R-18-2, Article 6, A.A.C. R18-2-702.B	These standards are applicable to all fugitive dust sources at the facility.
Mobile sources	Water Sprays/Water Truck for dust control	A.A.C. R-18-2, Article 8	These standards are applicable to off-road mobile sources, which either move while emitting air pollutants or are frequently moved during the course of their utilization.

Unit ID	Control Equipment	Applicable Regulations	Verification
Spray Painting	N/A	A.A.C. R-18-2-727	This standard is applicable to any spray painting operation at the facility.
Abrasive Blasting	Wet blasting, Dust collecting equipment or other approved methods	A.A.C. R-18-2-726	This standard is applicable to any abrasive blasting operation at the facility.
Demolition or Renovation Operations	N/A	A.A.C. R18-2-1101.A.8	This standard is applicable to any asbestos related demolition or renovation operations.
Internal Combustion Engines	None	A.A.C. R18-2-719	A.A.C. R18-2-719-Standards of Performance for Existing Stationary Rotating Machinery is applicable to existing engines.
		40 CFR 60 Subpart IIII	NSPS 40 CFR 60 Subpart IIII standards are applicable to compression ignition engines manufactured after April 1, 2006.
		40 CFR 60 Subpart JJJJ	NSPS 40 CFR 60 Subpart JJJJ standards are applicable to spark ignition engines manufactured after July 1, 2008.
		40 CFR 63 Subpart ZZZZ	National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 63 Subpart ZZZZ standards are applicable to internal combustion engines. Engines subject to 40 CFR 60 Subpart IIII or JJJJ do not have any additional requirements to comply with 40 CFR 63 Subpart ZZZZ.

Table 10: Applicable Regulations for Maricopa County

Unit ID	Control Equipment	Applicable Regulations	Verification
Crushing and Screening and Concrete Batch Plants	Wet scrubbers, spray bars, wet suppressants and enclosures	Maricopa County Rule 316	Nonmetallic Mineral Processing located in Maricopa County

Unit ID	Control Equipment	Applicable Regulations	Verification
Facility Wide Requirements	None	Maricopa County Rule 100	General Provisions and Definitions
		Maricopa County Rule 200	Permit Requirements
		Maricopa County Rule 220	Non-Title V Permit Provisions
		Maricopa County Rule 230	General Permits
		Maricopa County Rule 300	Visible Emissions
		Maricopa County Rule 310	Fugitive Dust from Dust-Generating Operations
		Maricopa County Rule 312	Abrasive Blasting
		Maricopa County Rule 315	Spray Coating Operations
		Maricopa County Rule 320	Odors And Gaseous Air Contaminants
Internal Combustion Engines	None	Maricopa County Rule 324	Stationary Rotating Machinery subject to State rules located in Maricopa County.

Table 11: Applicable Regulations for Pima County

Unit ID	Control Equipment	Applicable Regulations	Verification
Crushing and Screening plant	Spray Bars	P.C.C. §17.16.370	The regulations are applicable to Crushing and Screening Plants located in Pima County.
Concrete Batch Plant		P.C.C. §17.16.380	The regulations are applicable to Concrete Batch Plants located in Pinal County.
Fugitive Dust sources		P.C.C. §17.16.070, 80, 90, 100 and 110	The regulations are applicable to all the fugitive dust sources located in Pinal County

Table 12: Applicable Regulations for Pinal County

Unit ID	Control Equipment	Applicable Regulations	Verification
Facility wide Requirements		Pinal Code §5-24-1030.F Pinal Code §5-24-1030.G	The regulations listed are applicable to facility-wide in Pinal County.
Fugitive dust		Pinal Code §4-2-040 Pinal Code §4-2-050	The regulations listed are applicable to fugitive dust sources in Pinal County.

VI. MONITORING REQUIREMENTS

A. The Permittee must maintain daily records of the operating hours of the equipment covered under the General Permit which are subject to an hourly restriction.

B. The Permittee must maintain records of the total daily throughput of material for the crushing & screening plant (in tons per day), and for the concrete batch plant (in cubic yards per day) covered under this General Permit.

C. The Permittee must keep on-site records of maintenance performed on all emission related equipment.

D. At the time the compliance certifications are submitted, the Permittee must submit reports of all monitoring, recordkeeping, and testing activities required by the permit.

E. The Permittee is required to conduct a visual survey on all process equipment, when in operation, and all fugitive dust sources. If the source appears to exceed the standard, the Permittee must conduct an EPA Reference Method 9 observation. The Permittee must keep records of all surveys and EPA Reference Method 9 observations performed. These records will include the emission point observed, location of observer, name of observer, date and time of observation, and the results of the observation. If the observation shows a Method 9 opacity reading in excess of the opacity standard, the Permittee will be required to initiate appropriate corrective action to reduce the opacity below the standard. The Permittee will keep a record of the corrective action performed. These logs must be maintained on-site and be available to ADEQ representative upon request.

F. The Permittee must burn only ultra-low sulfur fuel in the engines, heaters and boilers. The Permittee must keep records of fuel supplier certifications. The certification shall contain information regarding the name of fuel supplier, lower heating value of the fuel and sulfur content.

VII. MODELING ANALYSIS

A. Changes Made To Previous General Permit (GP) Modeling

Compared to the previous modeling efforts for the Crushing & Screening GP (dated April 23, 2012), this modeling analysis has added modeling for one-hour standards for nitrogen dioxide (NO_2) and sulfur dioxide (SO_2). Moreover, ADEQ has updated the meteorological data sets for modeling by incorporating AERMINUTE data and the ADJ_U* option in the AERMET meteorological data processing.

B. Modeling Scenarios

Table 13 presents the modeling scenarios used for this modeling analysis. These scenarios were identical to those used in the previous C&S GP modeling (dated April 23, 2012) with an exception that a generator rated 750 horsepower (hp) rather than 1000 hp was modeled in Maricopa County.

Table 13 Modeling Scenarios for Crushing & Screening Plants

Facility	Modeling Scenario for Demonstrating the Compliance of NAAQS	
	PM_{10} Attainment Area	PM_{10} Non-attainment Area
Crushing & screening plant (C&S) alone	6,500 tons per day One large generator rated 1,000 hp	4,410 tons per day One large generator rated 750 for Maricopa County and 1,000 hp for other areas
Collocation of crushing and screening plant (C&S) and concrete batch plant (CBP)	C&S: 6,500 tons per day CBP: 1,275 yd^3 per day One large generator rated 1,000 hp	C&S: 4,095 tons per day CBP: 1,275 yd3 per day One large generator rated 750 for Maricopa County and 1,000 hp for other areas

C. Model Selection

ADEQ used the most recent version of the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD, version 16216r) for this modeling analysis. AERMOD is the EPA's preferred near-field dispersion modeling system for a wide range of regulatory applications. The AERMOD modeling system includes four regulatory component

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BRIPPRIME: the building input processor

ADEQ did not use the terrain processor (AERMAP) and the building input processor (BRIPPRIME) for this modeling analysis because both of them require site-specific information. Moreover, ADEQ determined that an assumption of "Flat Terrain" was reasonable, since the emission sources of a C&S are mainly ground level sources or near ground sources and the worst-case impacts are expected to occur in or near the ambient area boundary.

ADEQ used AERMET (version 16216) to process the meteorological data collected from 11 Automated Surface Observing Stations (ASOS) across the State of Arizona. For details, please see Section E.

D. Source Inputs

1. Emission Rates

Particulate Matter (PM) is the primary pollutant emitted from a crushing & screening plant as well as a concrete batch plant. If there are internal combustion engines (generators) or boilers within the facility, gaseous pollutants such as SO_2, NOx, and CO are also generated.

a. Emission Rate Factor

In general, the emissions were estimated according to latest AP-42 emission factors for concrete batching, crushing & screening, internal combustion engines, boilers, wind erosion, and unpaved roads. In particular, a consistent approach was developed for estimating $PM_{2.5}$ and PM_{10} emissions for batch drop operations and material transfer operations. This approach was based on AP-42 Section 13.2.4 Equation 1:

$$E = k(0.032)\frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

E = emission factor (lb/ton)

k = particle size multiplier (dimensionless), 0.35 for PM_{10} and 0.053 for $PM_{2.5}$

U = mean wind speed (miles per hour)

M = material moisture content (%)

State-wide meteorological data sets were reviewed and a mean wind speed of 7.5 miles per hour was determined. Due to very limited data available for the parameter M, the moisture content was arbitrary set as 5% for controlled emissions.

b. Emission Inventory

ADEQ has developed an emission inventory for a C&S with an operating capacity of 325 tph (Tables 14). Note that this capacity was used for the convenience of emission estimation only, and it is not the maximum allowable throughput for the C&S GP. To model the operating capacity other than 325 tons per hour, the emission rates listed in Table 14 were adjusted as discussed later. The operating capacity for a CBP in this modeling analysis was fixed at 1275 yd^3 per day. Table 15 lists the corresponding emission rates for all sources in the CBP. Besides the sources above, emissions from unpaved roads and a large internal combustion engine (generator) were also modeled. The emission rates of pollutants from these sources are summarized in Table 16.

c. Modeled Emission Rates

<u>24-hour $PM_{2.5}$ and PM_{10} standards</u>

As indicated above, ADEQ estimated maximum hourly emission rates for C&S sources based on an operating capacity of 325 tons per hour. If a C&S was modeled to run at a specific capacity (tons/day), the modeled hourly emission rates for applicable sources were adjusted by using Emission Rate Flag HROFDY in AERMOD:

$$HROFY = \frac{\text{modeled operating capacity (tons per day)}}{325 \text{ tons per hour} \times 24 \text{ hours}}$$

Many batch drop and material transfer operations in a C&S are not continuous and the emission sources are typically characterized as intermittent sources. The Emission Rate Flag approach substitutes an intermittent source with a continuous source that emits an identical amount of PM_{10} or $PM_{2.5}$ over a 24-hour time period. Such treatment should provide a reasonable approximation of 24-hour average impact.

Short-term standards for gaseous pollutants

Maximum hourly emission rates were modeled for comparisons to short-term air quality standards for NO_2, SO_2 and CO.

Annual standards

ADEQ used 24-hour average emission rates to model annual standards for $PM_{2.5}$, and the maximum hourly emission rates to model annual NO_2.

2. Sources Layout

The layout of C&S plants generally differs from one site to another. To simplify the modeling analysis, ADEQ developed a generic site plan for a C&S, alone or co-located with a CBP, as shown in Figure 1 and Figure 2, respectively. ADEQ determined the layout of sources according to the site plans of several existing plants with necessary simplifications for modeling purposes.

3. Source Release Parameters

The emission sources, categorized by source type (release characteristics), are as follows:

Point Sources: cement silo, boiler, and generator;

Area Sources: aggregate storage pile wind erosion, sand storage pile wind erosion, combined transfer points in crushing & screening plants;

Volume Sources: crushing & screening operations, batch drop operations, material transfer operations, trucks/front-end loaders traveling on unpaved roads.

Tables 17-19 summarize the source release parameters used in the modeling analysis. ADEQ determined these parameters following the ADEQ air modeling guidelines as well as the methodology for modeling fugitive dust sources developed by National Stone, Sand & Gravel Association. The representative physical dimensions for stacks, crushers, screens, storage piles, hoppers, bins, silos, trucks, and front-end loaders were

determined on the basis of actual measurements or testing data from three facilities in Maricopa County.

Table 14: Maximum Hourly Emission Rates for Crushing & Screening Plant[1]

Area Source			
Source ID	*Source Description*	*$PM_{2.5}$ (g/s)*	*PM_{10} (g/s)*
CS_WEAS	Aggregate Storage Pile	1.16E-05	1.16E-05
CS_WEFS	Fines Storage Pile	2.61E-05	2.61E-05
CS_TRANS	Transfer Points	1.51E-02	7.34E-02
Volume Sources			
Source ID	*Source Description*	*$PM_{2.5}$ (g/s)*	*PM_{10} (g/s)*
CS_PCRSH	Primary Crusher-Jaw	4.10E-03	2.22E-02
CS_SCR1	Screen #1	2.05E-03	3.03E-02
CS_SCR2	Screen #2	2.05E-03	3.03E-02
CS_FSCR	Fine Screen	4.55E-03	9.03E-02
CS_SCRSH	Secondary Crusher -Core	4.10E-03	2.22E-02
CS_TCRSH	Tertiary Crusher	4.10E-03	2.22E-02
CSLT01	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT02	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT03	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT04	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT05	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT06	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT07	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT08	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT09	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT10	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT11	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT12	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT13	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT14	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT15	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT16	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT17	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT18	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT19	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT20	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT21	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT22	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT23	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT24	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT25	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT26	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT27	C&S Loader Traffic	1.91E-04	1.91E-03
CSLT28	C&S Loader Traffic	1.91E-04	1.91E-03

[1] Emission rates were estimated based on an operating capacity of 325 tons per hour

Table 15: Maximum Hourly Emission Rates for Concrete Batch Plant[2]

Point Sources						
Source ID	*Source Description*	*$PM_{2.5}$ (g/s)*	*PM_{10} (g/s)*	*NOx (g/s)*	*SO_2 (g/s)*	*CO (g/s)*
CBP_CSTS	Cement Supplement Transfer to Cement Silo	1.84E-04	1.20E-03	-	-	-
CBP_CTCS	Cement Transfer to Cement Silo	8.40E-05	5.60E-04	-	-	-
CBP_BOIL	Boiler	1.17E-02	1.17E-02	1.80E-01	1.92E-03	4.51E-02
Area Sources						
Source ID	*Source Description*	*$PM_{2.5}$ (g/s)*	*PM_{10} (g/s)*			
CBP_WEAS	Aggregate Storage Pile	1.16E-05	1.16E-05			
CBP_WESS	Sand Storage Pile	6.53E-06	6.53E-06			
Volume Sources						
Source ID	*Source Description*	*$PM_{2.5}$ (g/s)*	*PM_{10} (g/s)*			
CBP_ADGS	Aggregate Delivery to Ground Storage	4.98E-04	3.29E-03			
CBP_SDGS	Sand Delivery to Ground Storage	3.81E-04	2.52E-03			
CBP_ATC	Aggregate Transfer to Conveyor	4.98E-04	3.29E-03			
CBP_STC	Sand Transfer to Conveyor	3.81E-04	2.52E-03			
CBP_ATEB	Aggregate Transfer to Elevation Bins	4.98E-04	3.29E-03			
CBP_STEB	Sand Transfer to Elevation Bins	3.81E-04	2.52E-03			
CBP_WHL	Weigh Hopper Loading	3.98E-04	2.65E-03			
CBP_TML	Truck Mix Loading (controlled)	1.56E-03	1.04E-02			
CBPLT01	CBP Loader Traffic	5.86E-04	5.86E-03			
CBPLT02	CBP Loader Traffic	5.86E-04	5.86E-03			
CBPLT03	CBP Loader Traffic	5.86E-04	5.86E-03			

[2] Emission rates were estimated based on an operating capacity of 1275 yd^3 per day.

Table 16: Emission Rates for Other Sources

Point Sources						
Source ID	*Source Description*	*$PM_{2.5}$ (g/s)*	*PM_{10} (g/s)*	*NOx (g/s)*	*SO_2 (g/s)*	*CO (g/s)*
GEN_LAR (1000 hp)	Generator >= 600 hp	8.84E-02	8.84E-02	3.03E+00	1.53E-03	6.93E-01
GEN_LAR (750 hp)	Generator >= 600 hp	6.63E-02	6.63E-02	2.27E+00	1.15E-03	5.20E-01
Volume Sources						
Source ID	*Source Description*	*$PM_{2.5}$ (g/s)*	*PM_{10} (g/s)*			
TRUCK01	Truck Traffic	3.06E-04	3.06E-03			
TRUCK02	Truck Traffic	3.06E-04	3.06E-03			
TRUCK03	Truck Traffic	3.06E-04	3.06E-03			
TRUCK04	Truck Traffic	3.06E-04	3.06E-03			
TRUCK05	Truck Traffic	3.06E-04	3.06E-03			
TRUCK06	Truck Traffic	3.06E-04	3.06E-03			
TRUCK07	Truck Traffic	3.06E-04	3.06E-03			
TRUCK08	Truck Traffic	3.06E-04	3.06E-03			
TRUCK09	Truck Traffic	3.06E-04	3.06E-03			
TRUCK10	Truck Traffic	3.06E-04	3.06E-03			
TRUCK11	Truck Traffic	3.06E-04	3.06E-03			
TRUCK12	Truck Traffic	3.06E-04	3.06E-03			
TRUCK13	Truck Traffic	3.06E-04	3.06E-03			
TRUCK14	Truck Traffic	3.06E-04	3.06E-03			
TRUCK15	Truck Traffic	3.06E-04	3.06E-03			
TRUCK16	Truck Traffic	3.06E-04	3.06E-03			
TRUCK17	Truck Traffic	3.06E-04	3.06E-03			
TRUCK18	Truck Traffic	3.06E-04	3.06E-03			
TRUCK19	Truck Traffic	3.06E-04	3.06E-03			
TRUCK20	Truck Traffic	3.06E-04	3.06E-03			
TRUCK21	Truck Traffic	3.06E-04	3.06E-03			
TRUCK22	Truck Traffic	3.06E-04	3.06E-03			
TRUCK23	Truck Traffic	3.06E-04	3.06E-03			
TRUCK24	Truck Traffic	3.06E-04	3.06E-03			
TRUCK25	Truck Traffic	3.06E-04	3.06E-03			
TRUCK26	Truck Traffic	3.06E-04	3.06E-03			
TRUCK27	Truck Traffic	3.06E-04	3.06E-03			
TRUCK28	Truck Traffic	3.06E-04	3.06E-03			
TRUCK29	Truck Traffic	3.06E-04	3.06E-03			
TRUCK30	Truck Traffic	3.06E-04	3.06E-03			
TRUCK31	Truck Traffic	3.06E-04	3.06E-03			
TRUCK32	Truck Traffic	3.06E-04	3.06E-03			
TRUCK33	Truck Traffic	3.06E-04	3.06E-03			
TRUCK34	Truck Traffic	3.06E-04	3.06E-03			
TRUCK35	Truck Traffic	3.06E-04	3.06E-03			
TRUCK36	Truck Traffic	3.06E-04	3.06E-03			
TRUCK37	Truck Traffic	3.06E-04	3.06E-03			
TRUCK38	Truck Traffic	3.06E-04	3.06E-03			
TRUCK39	Truck Traffic	3.06E-04	3.06E-03			
TRUCK40	Truck Traffic	3.06E-04	3.06E-03			
TRUCK41	Truck Traffic	3.06E-04	3.06E-03			
TRUCK42	Truck Traffic	3.06E-04	3.06E-03			
TRUCK43	Truck Traffic	3.06E-04	3.06E-03			

TRUCK44	Truck Traffic	3.06E-04	3.06E-03
TRUCK45	Truck Traffic	3.06E-04	3.06E-03
TRUCK46	Truck Traffic	3.06E-04	3.06E-03
TRUCK47	Truck Traffic	3.06E-04	3.06E-03
TRUCK48	Truck Traffic	3.06E-04	3.06E-03
TRUCK49	Truck Traffic	3.06E-04	3.06E-03
TRUCK50	Truck Traffic	3.06E-04	3.06E-03
TRUCK51	Truck Traffic	3.06E-04	3.06E-03
TRUCK52	Truck Traffic	3.06E-04	3.06E-03
TRUCK53	Truck Traffic	3.06E-04	3.06E-03
TRUCK54	Truck Traffic	3.06E-04	3.06E-03

Figure 1 Sources Layout of a Generic Crushing & Screening Plant (refer to Table 9 and Table 11 for detailed source descriptions)

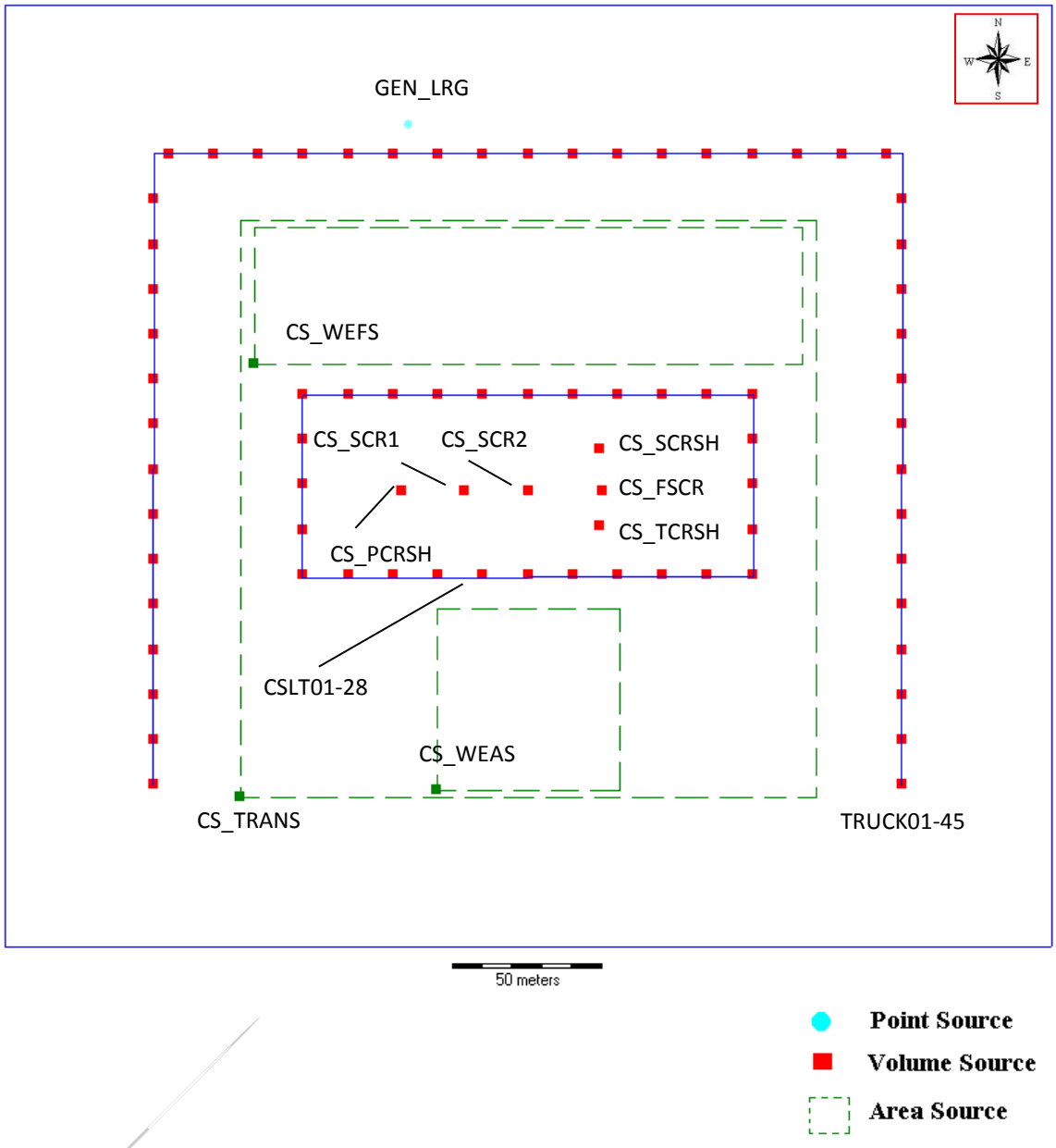


Figure 2 Sources Layout of a Generic Crushing and Screening Plant Co-located with a Concrete Batch Plant (refer to Tables 1-3 for detailed source descriptions)

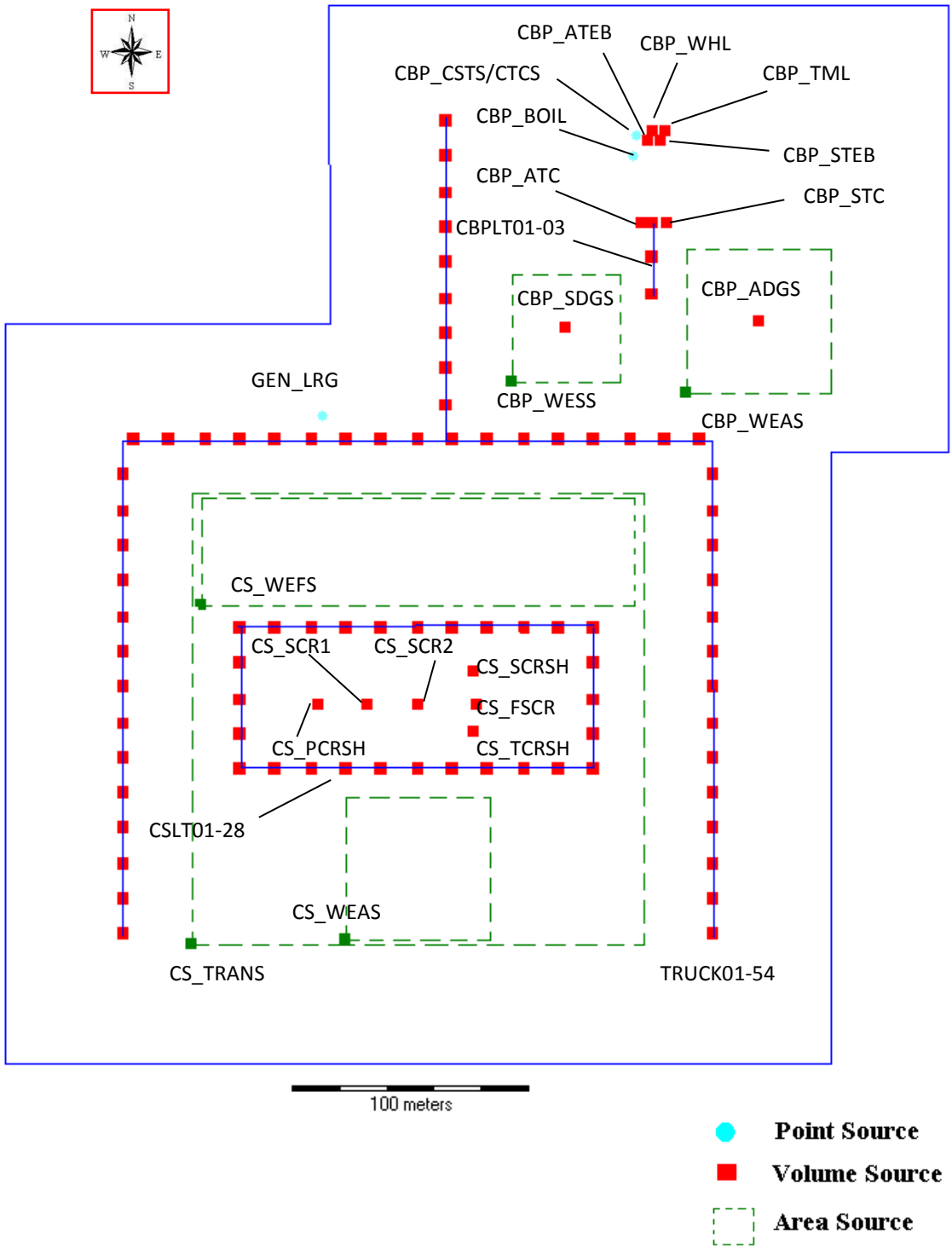


Table 17: Modeling Source Parameters for Crushing and Screening Plant

Area Source					
Source ID	*Source Description*	*Release Height (m)*	X-Length (m)	Y-Length (m)	Angel (degree)
CS_WEAS	Aggregate Storage Pile	1.83	60.96	60.96	0.00
CS_WEFS	Fines Storage Pile	1.83	182.88	45.72	0.00
CS_TRANS	Transfer Points	1.52	192.02	192.02	0.00
Volume Sources					
Source ID	*Source Description*	*Release Height (m)*	Initial Horizontal Dimensions (m)	Initial Vertical Dimensions (m)	
CS_PCRSH	Primary Crusher-Jaw	5.18	0.43	2.41	
CS_SCR1	Screen #1	7.62	0.85	3.54	
CS_SCR2	Screen #2	7.62	0.85	3.54	
CS_FSCR	Fine Screen	7.62	0.85	3.54	
CS_SCRSH	Secondary Crusher -Core	7.62	0.37	3.54	
CS_TCRSH	Tertiary Crusher	6.10	0.27	2.83	
CSLT01	C&S Loader Traffic	3.00	7.00	2.80	
CSLT02	C&S Loader Traffic	3.00	7.00	2.80	
CSLT03	C&S Loader Traffic	3.00	7.00	2.80	
CSLT04	C&S Loader Traffic	3.00	7.00	2.80	
CSLT05	C&S Loader Traffic	3.00	7.00	2.80	
CSLT06	C&S Loader Traffic	3.00	7.00	2.80	
CSLT07	C&S Loader Traffic	3.00	7.00	2.80	
CSLT08	C&S Loader Traffic	3.00	7.00	2.80	
CSLT09	C&S Loader Traffic	3.00	7.00	2.80	
CSLT10	C&S Loader Traffic	3.00	7.00	2.80	
CSLT11	C&S Loader Traffic	3.00	7.00	2.80	
CSLT12	C&S Loader Traffic	3.00	7.00	2.80	
CSLT13	C&S Loader Traffic	3.00	7.00	2.80	
CSLT14	C&S Loader Traffic	3.00	7.00	2.80	
CSLT15	C&S Loader Traffic	3.00	7.00	2.80	
CSLT16	C&S Loader Traffic	3.00	7.00	2.80	
CSLT17	C&S Loader Traffic	3.00	7.00	2.80	
CSLT18	C&S Loader Traffic	3.00	7.00	2.80	
CSLT19	C&S Loader Traffic	3.00	7.00	2.80	
CSLT20	C&S Loader Traffic	3.00	7.00	2.80	
CSLT21	C&S Loader Traffic	3.00	7.00	2.80	
CSLT22	C&S Loader Traffic	3.00	7.00	2.80	
CSLT23	C&S Loader Traffic	3.00	7.00	2.80	
CSLT24	C&S Loader Traffic	3.00	7.00	2.80	
CSLT25	C&S Loader Traffic	3.00	7.00	2.80	
CSLT26	C&S Loader Traffic	3.00	7.00	2.80	
CSLT27	C&S Loader Traffic	3.00	7.00	2.80	
CSLT28	C&S Loader Traffic	3.00	7.00	2.80	

Table 18: Modeling Source Parameters for Concrete Batch Plant (CBP)

Point Sources					
Source ID	*Source Description*	*Release Height (m)*	*Stack Temperature (K)*	*Stack Velocity (m/s)*	*Stack Diameter (m)*
CBP_CSTS	Cement Supplement Transfer to Cement Silo	12.20	408.00	4.00	0.32
CBP_CTCS	Cement Transfer to Cement Silo	12.20	408.00	4.00	0.32
CBP_BOIL	Boiler	12.19	533.00	7.62	0.30
Area Sources					
Source ID	*Source Description*	*Release Height (m)*	*X-length*	*Y-length*	*Angel (degree)*
CBP_WEAS	Aggregate Storage Pile	1.83	60.96	60.96	0.00
CBP_WESS	Sand Storage Pile	1.83	45.72	45.72	0.00
Volume Sources					
Source ID	*Source Description*	*Release Height (m)*	*Initial Horizontal Dimensions (m)*	*Initial Vertical Dimensions (m)*	
CBP_ADGS	Aggregate Delivery to Ground Storage	6.17	1.60	2.20	
CBP_SDGS	Sand Delivery to Ground Storage	6.17	1.60	2.20	
CBP_ATC	Aggregate Transfer to Conveyor	3.51	0.85	0.43	
CBP_STC	Sand Transfer to Conveyor	3.51	0.85	0.43	
CBP_ATEB	Aggregate Transfer to Elevation Bins	8.08	0.71	0.43	
CBP_STEB	Sand Transfer to Elevation Bins	8.08	0.71	0.43	
CBP_WHL	Weigh Hopper Loading	4.72	0.85	0.14	
CBP_TML	Truck Mix Loading (controlled)	3.05	0.25	0.50	
CBPLT01	CBP Loader Traffic	3.00	7.00	2.80	
CBPLT02	CBP Loader Traffic	3.00	7.00	2.80	
CBPLT03	CBP Loader Traffic	3.00	7.00	2.80	

Table 19: Modeling Source Parameters for Other Sources

Point Sources					
Source ID	*Source Description*	*Release Height (m)*	*Stack Temperature (K)*	*Stack Velocity (m/s)*	*Stack Diameter (m)*
GEN_LAR	Generator >= 600 hp	5.00	750	75	0.22

Volume Sources				
Source ID	*Source Description*	*Release Height (m)*	Initial Horizontal Dimensions (m)	Initial Vertical Dimensions (m)
TRUCK01	Truck Traffic	3.00	7.00	2.80
TRUCK02	Truck Traffic	3.00	7.00	2.80
TRUCK03	Truck Traffic	3.00	7.00	2.80
TRUCK04	Truck Traffic	3.00	7.00	2.80
TRUCK05	Truck Traffic	3.00	7.00	2.80
TRUCK06	Truck Traffic	3.00	7.00	2.80
TRUCK07	Truck Traffic	3.00	7.00	2.80
TRUCK08	Truck Traffic	3.00	7.00	2.80
TRUCK09	Truck Traffic	3.00	7.00	2.80
TRUCK10	Truck Traffic	3.00	7.00	2.80
TRUCK11	Truck Traffic	3.00	7.00	2.80
TRUCK12	Truck Traffic	3.00	7.00	2.80
TRUCK13	Truck Traffic	3.00	7.00	2.80
TRUCK14	Truck Traffic	3.00	7.00	2.80
TRUCK15	Truck Traffic	3.00	7.00	2.80
TRUCK16	Truck Traffic	3.00	7.00	2.80
TRUCK17	Truck Traffic	3.00	7.00	2.80
TRUCK18	Truck Traffic	3.00	7.00	2.80
TRUCK19	Truck Traffic	3.00	7.00	2.80
TRUCK20	Truck Traffic	3.00	7.00	2.80
TRUCK21	Truck Traffic	3.00	7.00	2.80
TRUCK22	Truck Traffic	3.00	7.00	2.80
TRUCK23	Truck Traffic	3.00	7.00	2.80
TRUCK24	Truck Traffic	3.00	7.00	2.80
TRUCK25	Truck Traffic	3.00	7.00	2.80
TRUCK26	Truck Traffic	3.00	7.00	2.80
TRUCK27	Truck Traffic	3.00	7.00	2.80
TRUCK28	Truck Traffic	3.00	7.00	2.80
TRUCK29	Truck Traffic	3.00	7.00	2.80
TRUCK30	Truck Traffic	3.00	7.00	2.80
TRUCK31	Truck Traffic	3.00	7.00	2.80
TRUCK32	Truck Traffic	3.00	7.00	2.80
TRUCK33	Truck Traffic	3.00	7.00	2.80
TRUCK34	Truck Traffic	3.00	7.00	2.80
TRUCK35	Truck Traffic	3.00	7.00	2.80
TRUCK36	Truck Traffic	3.00	7.00	2.80
TRUCK37	Truck Traffic	3.00	7.00	2.80

TRUCK38	Truck Traffic	3.00	7.00	2.80
TRUCK39	Truck Traffic	3.00	7.00	2.80
TRUCK40	Truck Traffic	3.00	7.00	2.80
TRUCK41	Truck Traffic	3.00	7.00	2.80
TRUCK42	Truck Traffic	3.00	7.00	2.80
TRUCK43	Truck Traffic	3.00	7.00	2.80
TRUCK44	Truck Traffic	3.00	7.00	2.80
TRUCK45	Truck Traffic	3.00	7.00	2.80
TRUCK46	Truck Traffic	3.00	7.00	2.80
TRUCK47	Truck Traffic	3.00	7.00	2.80
TRUCK48	Truck Traffic	3.00	7.00	2.80
TRUCK49	Truck Traffic	3.00	7.00	2.80
TRUCK50	Truck Traffic	3.00	7.00	2.80
TRUCK51	Truck Traffic	3.00	7.00	2.80
TRUCK52	Truck Traffic	3.00	7.00	2.80
TRUCK53	Truck Traffic	3.00	7.00	2.80
TRUCK54	Truck Traffic	3.00	7.00	2.80
TRUCK55	Truck Traffic	3.00	7.00	2.80
TRUCK56	Truck Traffic	3.00	7.00	2.80
TRUCK57	Truck Traffic	3.00	7.00	2.80
TRUCK58	Truck Traffic	3.00	7.00	2.80
TRUCK59	Truck Traffic	3.00	7.00	2.80

E. Meteorological Data

ADEQ obtained meteorological data through the Automated Surface Observing System (ASOS) network. The ASOS station can utilize AERMINUTE to significantly reduce calm or missing hours, which is critical for modeling one-hour standards. As shown in Table 20, eight meteorological data sets were used to represent the meteorological conditions for PM_{10} attainment areas and three meteorological data sets for PM_{10} non-attainment areas, respectively. All meteorological data were processed by AERMET (version 16216) along with AERSURFACE and AERMINUTE. Based on EPA's recommendations, a minimum wind speed threshold of 0.5 m/s was used to treat winds below the threshold as calms.

On December 20, 2016, EPA finalized the revisions to the Guideline on Air Quality Models and released AERMOD and AERMET Models Version 16216, in which the ADJ_U* option when site-specific turbulence data (sigma-theta and/or sigma-w) are not included is no longer flagged as a beta option. As stated in the Final Rule, using the ADJ_U* option is appropriate when standard National Weather Service (NWS) airport meteorological data, site-specific meteorological data without turbulence parameters, or prognostic meteorological input data are used for the regulatory application. Since standard NWS airport meteorological data were used for this modeling analysis, ADEQ has incorporated the ADJ_U* option in the meteorological data processing.

Table 20: Meteorological Data Sets used for AERMOD Modeling Analysis

Data Name	Surface Data	Upper Air Data	Data Period	County	For PM_{10} attainment areas or non-attainment areas?
Flagstaff	Flagstaff Pulliam Airport	Flagstaff (KFGZ)	01/01/2009-12/31/2013	Coconino	Attainment
Kingman	Kingman Airport	Reno (KREV) /Las Vegas (KVEF)	01/01/2009-12/31/2013	Mohave	Attainment
Nogales	Nogales International Airport	Tucson (KTUS)	01/01/2009-12/31/2013	Santa Cruz	Non-attainment
Tucson	Tucson International Airport	Tucson (KTUS)	01/01/2009-12/31/2013	Pima	Attainment
Page	Page Municipal Airport	Flagstaff (KFGZ)	01/01/2009-12/31/2013	Coconino	Attainment
Phoenix	Phoenix Sky Harbor International Airport	Tucson(KTUS)	01/01/2009-12/31/2013	Maricopa	Non-attainment
Prescott	Prescott Municipal Airport	Flagstaff (KFGZ)	01/01/2009-12/31/2013	Yavapai	Attainment
Safford	Safford Regional Airport	Tucson (KTUS)	01/01/2009-12/31/2013	Graham	Attainment
St Johns	St. Johns Industrial Air Park	Albuquerque (KABQ)	01/01/2009-12/31/2013	Apache	Attainment
Winslow	Winslow–Lindbergh Regional Airport	Albuquerque (KABQ)	01/01/2009-12/31/2013	Navajo	Attainment
Yuma	Yuma Marine Corps Air Station	Tucson (KTUS)	01/01/2009-12/31/2013	Yuma	Non-attainment

F. Receptor Grid

Receptors were spaced 25 meters along ambient air boundary (AAB) and 50 meters from AAB to 500 meters. Since the emission sources modeled are mainly ground level sources, the receptor network beginning at AAB and extending outward to 500 m is sufficiently large to identify the maximum impacts.

G. Background Concentrations

1. Background Concentration for PM_{10}

ADEQ has historically estimated the background concertation for PM_{10} by calculating the average of the highest yearly values for most recent 3 years. This is a very conservative approach that ensures that the NAAQS for PM_{10} is protected. However, ADEQ has also considered less conservative approaches to more realistically define background concentrations for PM_{10}.

In the previous modeling for the C&S GP, ADEQ estimated the background concentrations for 24-hour average PM_{10} based on language in Paragraph 8.2.2(b) of 40 CFR Part 51 Appendix W (November 2005). Specifically, ADEQ determined the meteorological conditions accompanying the concentration of concern (wind over 15 miles per hour, sustained for 3 or more hours) and averaged all 24-hour average PM_{10} concentrations over the course of the last 3 years for days that were over that wind speed. Based on this approach, the background concentration that used for modeling in PM_{10} nonattainment areas was 58 micrograms per cubic meter ($\mu g/m^3$). For PM_{10}

attainment areas the concentration was 26 µg/m^3. Using these concentrations allowed facilities covered under the C&S GP to operate statewide, including in Maricopa County.

On January 17, 2017, EPA published a final rule that revises 40 CFR Part 51 Appendix W. The final rule removed the language of averaging concentrations for meteorological conditions of concern when determining the background concentrations for shorter averaging periods. Although the effective date of the final rule has been deferred to March 21, 2017, ADEQ reexamined the background concentrations for 24-hour PM_{10} to ensure that the background determinations for the C&S GP modeling are consistent with Federal regulation.

ADEQ selected a time period of 2011-2013 to estimate the PM_{10} background concentration for Maricopa County because the natural and exceptional events (NEE) during these three years in Arizona were well documented (http://legacy.azdeq.gov/environ/air/plan/nee.html). Due to the arid nature of the state, Arizona is susceptible to both windblown dust events and smoke events from forest fire, both of which may qualify as exceptional events. Air quality monitoring data due to the NEE must be excluded for the background determinations.

ADEQ calculated the 24-hour average monitoring concentration for each day by averaging the daily concentrations for all monitoring stations across Maricopa County (Phoenix-Mesa-Scottsdale CBSA). ADEQ then removed the 24-hour average concentrations for days associated with the NEE. Figure 3 shows the 24-hour average concentrations excluding the NEE air monitoring data. The highest 24-hour concentrations in 2011, 2012, and 2013 were determined as 84.5µg/m^3, 82.1µg/m^3, and 107.8µg/m^3, respectively. In general, the concentration of 58 µg/m^3 used in the previous GP modeling represented 95-98 percentile of the 24-hour concentrations for each year.

ADEQ further applied AERMOD to model a generic C&S by using the 2011-2013 NWS meteorological data collected from Phoenix Sky Harbor Airport. For 24-hour average PM_{10}, ADEQ calculated the maximum modeled concentration for each day and plotted these concentrations against their concurrent monitoring data (Figure 4). As demonstrated in Figure 4, it was very unlikely that highest monitoring concentrations and highest modeled concentrations would occur simultaneously. Indeed, for days with highest modeled concentrations, the corresponding monitored concentrations were relatively low.

ADEQ finally combined modeled concentrations with monitored background concentrations on a day-by-day basis. Figure 5 summaries the paired values. The second highest paired concentration for 2011, 2012, and 2013 was 107 µg/m^3, 115 µg/m^3 and 107 µg/m^3, respectively. Comparatively, when combining highest second highest (H2H) modeled concentration and a background concentration of 58 µg/m^3, the total concentration for 2011, 2012, and 2013 was 129 µg/m^3, 131 µg/m^3 and 125µg/m^3, respectively. It was apparent that using the background concentration of 58 µg/m^3 would provide a defensible approach to demonstrate the compliance with the 24-hour standard for PM_{10}.

For the reasons above, ADEQ retained the background concentration of 58 µg/m^3 for nonattainment areas and 26 µg/m^3 for attainment areas for this GP modeling.

Figure 3: 24-hour Average PM10 Concentrations in Phoenix-Mesa-Scottsdale CBSA for Years 2011, 2012 and 2013 (Excluding the Monitored Data due to Natural and Exceptional Events)

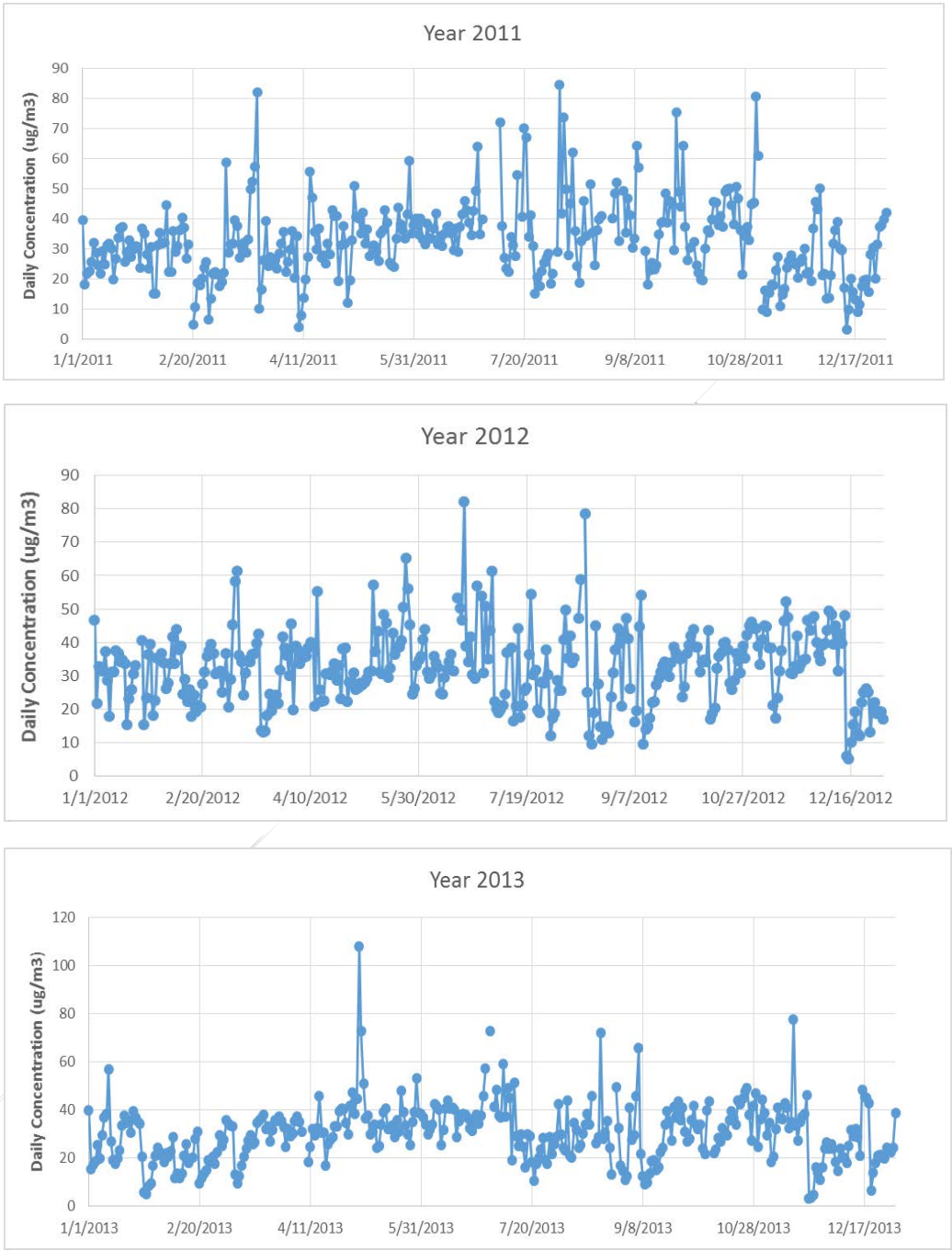


Figure 4: Modeled 24-hour Average PM_{10} Concentrations vs. Monitoring 24-hour Average PM_{10} Concentrations for Years 2011, 2012 and 2013

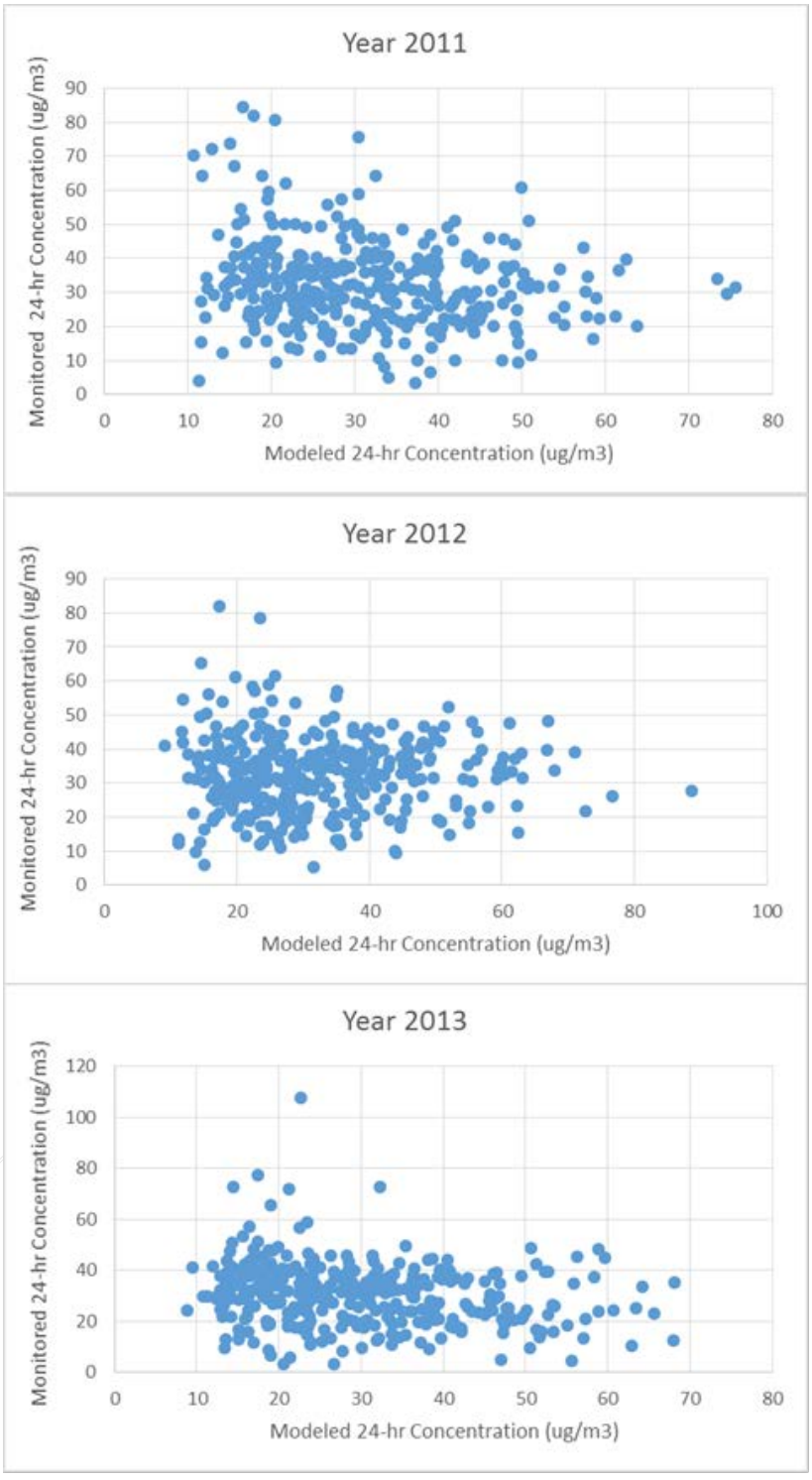
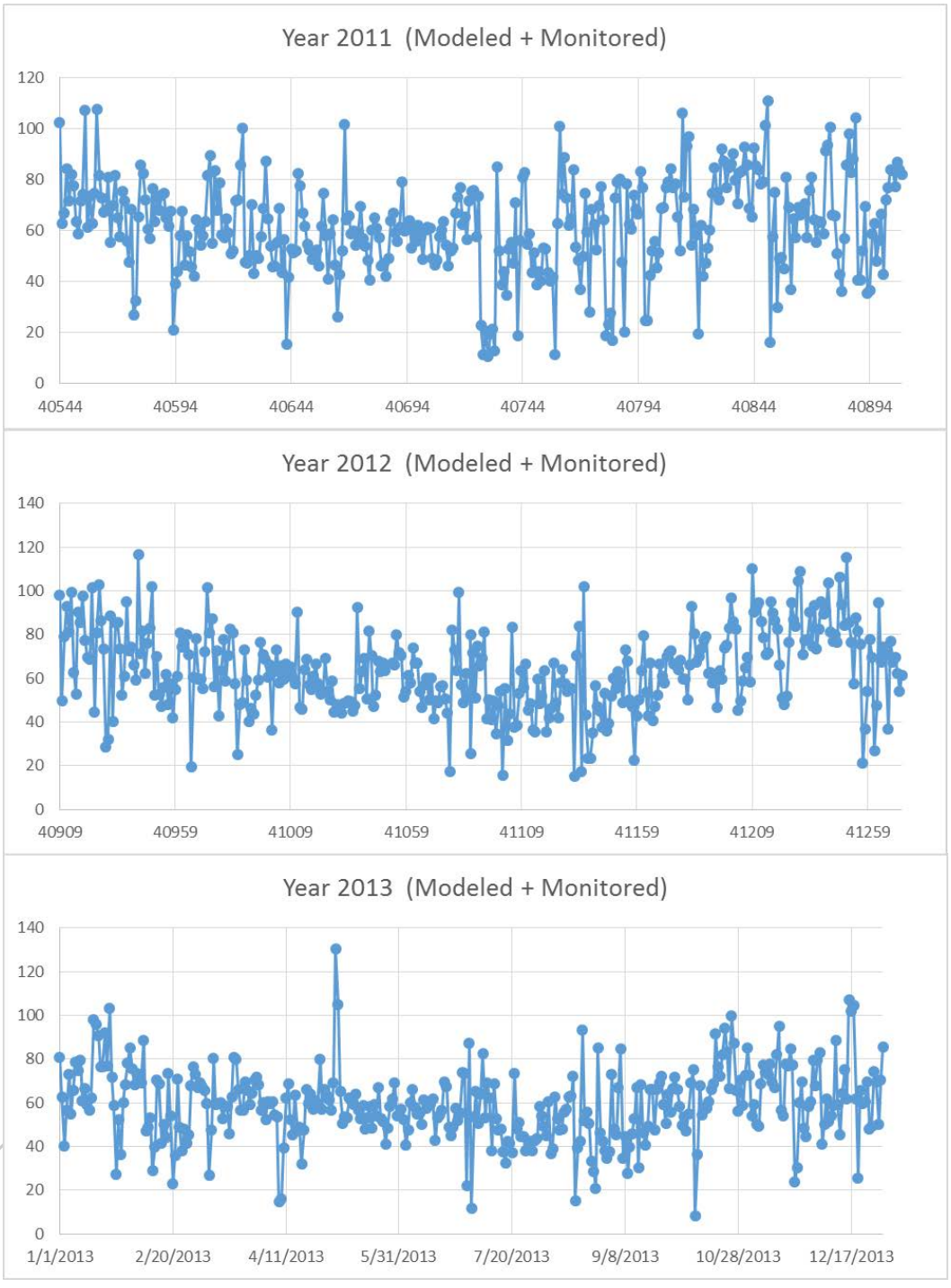


Figure 5: Daily Paired Sum Concentrations for 24-hour Average PM_{10} for Years 2011, 2012 and 2013



2. Background Concentration for $PM_{2.5}$

Based on the 2013-2015 monitoring data and attainment/non-attainment classification, ADEQ classified the state into three different zones.

a. West Central Pinal $PM_{2.5}$ non-attainment area (NAA)

Historically a portion of the West Central Pinal $PM_{2.5}$ NAA has been banned from the C&S GP because the monitoring data collected from the Cowtown monitor showed significant violation for $PM_{2.5}$ NAAQS, both annual and 24-hour standards. In 2016, Pinal County Air Quality Control District (PCAQCD) moved the Cowtown monitor to a new location at Stanfield, Arizona. Since the data collected from the new monitor were insufficient, ADEQ excluded this monitor for the background determination at this stage and will take this monitor into account when renewing the GP in the next permitting period. Although the Cowtown monitor is no longer exist, the ambient air quality data in the prohibition area in the previous GP are unlikely changed. Therefore, ADEQ decided to retain this prohibition area in this GP.

b. Maricopa County - Pinal County (excluding the West Central Pinal $PM_{2.5}$ NAA) - Santa Cruz County - Yuma County

Parts of the four counties are currently non-attainment areas for PM_{10}. While the 2013-2015 monitoring data in these areas show the compliance with the NAAQS for $PM_{2.5}$, the $PM_{2.5}$ concentrations in these areas are significantly higher than other areas in the state. ADEQ estimated the $PM_{2.5}$ background concentration for these areas by averaging the monitoring concentrations obtained from all monitors in Maricopa County, the Casa Grande monitor in Pinal County, the Nogales monitor in Santa Cruz, and the Yuma monitor in Yuma County.

c. Remaining areas

For the remaining areas, ADEQ estimated the background concentrations for $PM_{2.5}$ by averaging the monitoring concentrations obtained from the monitors in Tucson (Pima County), Flagstaff (Coconino County), Douglas (Cochise County), Wenden (La Paz County), and Prescott (Yavapai County).

Table 21 summarizes the $PM_{2.5}$ background concentrations used in the GP modeling analysis.

Table 21: Background Concentrations for $PM_{2.5}$

Areas	Averaging Period	Background Concentration ($\mu g/m^3$)	Source of Data	Note
West Central Pinal $PM_{2.5}$ NAA	--	--	--	Prohibited
Maricopa County – Pinal County (excluding the West Central Pinal $PM_{2.5}$ NAA)- Santa Cruz County- Yuma County	24-hour	21	https://www.epa.gov/outdoor-air-quality-data Monitors including: all monitors in Maricopa; Case Grande (Pinal County); Nogales monitor (Santa Cruz County); and Yuma Supersite Monitor (Yuma County)	Average of the 98th percentile 24-hour values over 2013-2015
	Annual	8.1		Average of the annual values over 2013-2015
Other Areas	24-hour	12	https://www.epa.gov/outdoor-air-quality-data Monitors including: all monitors in Tucson (Pima County); Flagstaff (Coconino County); Douglas (Cochise County); Wenden (La Paz County); and Prescott (Yavapai County)	Average of the 98th percentile 24-hour values over 2013-2015
	Annual	5.2		Average of the annual values over 2013-2015

3. Background Concentration for One-hour NO_2

There are very limited NO_2 monitoring sites in Arizona and nearly all monitoring sites are located in the Phoenix and Tucson metropolitan areas. To determine representative background concentrations for 1-hour NO_2, the modeling analysis has classified the state of Arizona into three areas: the Phoenix metropolitan area; the Tucson metropolitan area; and the remaining areas. Based on this classification, background concentrations were determined for the three areas separately. The monitoring data collected from Greenwood, Central Phoenix, JLG Supersite, West Phoenix and Buckeye during 2011-2013 were used to determine the background concentrations for the Phoenix metropolitan area. The monitoring data collected from Children's Park and 22nd and Craycroft were used to determine the background concentrations for the Tucson metropolitan area. The monitoring data collected from Deming, New Mexico were used for the background concentrations for the remaining areas, considering that the data should provide a representative or conservative estimate.

The modeling analysis used hour-of-day monitored background concentrations, which were determined as follows:

- For each of the three years (2011-2013) under review, compiled all of the NO_2 concentrations by hour of day (1AM, 2AM, 3AM, etc) and calculated the 98

percentile of NO_2 concentrations for each hour of the day;

- Calculated the background concentrations as the 3 year average of the 98 percentile of concentrations for each hour of the day.

Table 22 provides the background concentrations for modeling 1-hour NO_2.

Table 22: 1-Hour NO_2 Background Concentrations ($\mu g/m^3$)

	Phoenix Metropolitan Area	Tucson Metropolitan Area	Remaining Areas
HOUR 1	82.3	60.4	35.4
HOUR 2	77.6	53.7	31.8
HOUR 3	73.8	51.1	32.0
HOUR 4	70.6	50.0	32.0
HOUR 5	70.0	48.9	34.4
HOUR 6	71.4	52.6	36.3
HOUR 7	73.3	59.5	36.8
HOUR 8	78.5	62.9	35.1
HOUR 9	82.3	60.7	33.2
HOUR 10	79.6	56.5	25.1
HOUR 11	69.2	48.3	12.0
HOUR 12	62.3	39.6	7.6
HOUR 13	55.5	32.2	6.3
HOUR 14	49.3	25.1	5.0
HOUR 15	46.2	22.8	5.0
HOUR 16	48.0	26.6	4.5
HOUR 17	54.8	36.0	5.7
HOUR 18	76.5	59.4	15.7
HOUR 19	92.2	72.3	34.7
HOUR 20	94.8	76.0	46.9
HOUR 21	95.3	76.1	48.3
HOUR 22	94.1	76.2	47.6
HOUR 23	91.2	74.2	45.4
HOUR 24	87.1	66.5	40.0

4. Background Concentration for SO_2, CO and Annual NO_2

ADEQ selected the JLG Supersite Monitor in Maricopa County for determining the state-wide background concentrations for SO_2, CO and annual NO_2 (Table 23), considering that the data should provide a representative or conservative estimate.

Table 23: Background Concentrations for SO_2, CO and Annual NO_2

Pollutant	Averaging Period	Background Concentration ($\mu g/m^3$)	Source of Data	Note
SO_2	3-hour	20	https://www.epa.gov/outdoor-air-quality-data JLG Supersite Monitor	Highest concentration during 2013-2015
	1-hour	14		99th percentile of the annual distribution of daily maximum 1-hours values averaged across 2013-2015
NO_2	Annual	32	https://www.epa.gov/outdoor-air-quality-data JLG Supersite Monitor	Highest annual concentration during 2013-2015
CO	8-hour	2,500	https://www.epa.gov/outdoor-air-quality-data JLG Supersite Monitor	Highest concentration during 2013-2015
	1-hour	3,650		Highest concentration during 2013-2015

H. NO_2 Modeling Methodology

The recent EPA's guidance recommends three-tiered screening approach for modeling NO_2:

- Tier 1 Total Conversion – assuming full conversion of NO to NO_2 without any additional justification.
- Tier 2 Ambient Ratio Method (ARM) – multiply Tier 1 result by empirically-derived NO_2/NOx ratio, with 0.8 as default ambient ratio for the 1-hour NO_2 standard and 0.75 for annual NO_2 standard. The Ambient Ratio Method 2 (ARM2), which is based on an evaluation of the ratios of NO_2/NO_X from the EPA's Air Quality System (AQS) record of ambient air quality data, may also be used under certain circumstances.
- Tier 3 - Plume Volume Molar Ratio Method (PVMRM)/Ozone Limiting Method (OLM) – both methods account for ambient conversion of NO to NO_2 in the presence of ozone, namely the ozone titration mechanism. Two key model inputs are needed, namely in-stack ratios of NO_2/NO_X emissions and background ozone concentrations.

ADEQ employed the PVMRM approach for modeling NO_2:

- The in-stack ratios of NO_2/NOx for a generator and a boiler were assumed to be 10%.
- Hourly background ozone concentrations from the Central Phoenix monitor were used across the State, considering that the Phoenix ozone data should provide conservative estimate for areas other than the Phoenix metropolitan Area.
- The Urban Dispersion option was used for modeling the Phoenix metropolitan areas while the Rural Dispersion option for other areas. Considering part of the urban area that will contribute to the urban heat island plume affecting the sources, ADEQ determined a population of 3,000,000 for input to AERMOD.

NO_2 background concentrations as listed in Table 22 were directly input to the model with the HROFDY option.

I. MODELED RESULTS

1. Collocation of C&S and CBP

Tables 24-28 summarize the modeled results for the co-location of a C&S (6,500 tons per day for PM_{10} attainment areas and 4,095 tons per day for PM_{10} non-attainment areas) and a CBP (1275 yd^3 per day). Representative background concentrations were added to modeled impacts and the total concentrations were then compared to the NAAQS. As shown in the tables, emissions from a C&S co-located with a CBP will not cause or contribute to a violation of the NAAQS under the operation limits/conditions as proposed in Table 13.

The AERMOD modeling analysis also revealed that the modeled impacts from C&S plants were limited to near-field areas. All modeled maximum concentrations for all pollutants under varied meteorological conditions occurred in ambient area boundary.

Table 24: Modeled Results for $PM_{2.5}$ for Collocation of C&S and CBP

Meteorological data sets	Modeled concentration ($\mu g/m^3$)		Background concentration ($\mu g/m^3$)		Total concentration ($\mu g/m^3$)		NAAQS ($\mu g/m^3$)
	24-hour	Annual	24-hour	Annual	24-hour	Annual	
Flagstaff	4.2	2.7	12	5.2	16.2	7.9	24-hour: 35 Annual: 12
Kingman	7.2	3.1	12	5.2	19.2	8.3	
Page	8.9	3.6	12	5.2	20.9	8.8	
Prescott	8.6	3.9	12	5.2	20.6	9.1	
Safford	6.3	2.4	12	5.2	18.3	7.6	
St Johns	8.3	3.9	12	5.2	20.3	9.1	
Tucson	5.6	3.0	12	5.2	17.6	8.2	
Winslow	7.2	3.1	12	5.2	19.2	8.3	
Nogales	5.1	2.7	21	8.1	26.1	10.8	
Phoenix	5.8	2.4	21	8.1	26.8	10.5	
Yuma	5.4	2.3	21	8.1	26.4	10.4	

Table 25: Modeled Results for 24-hour PM_{10} for Collocation of C&S and CBP

Meteorological data sets	Modeled concentration (µg/m^3)	Background concentration (µg/m^3)	Total concentration (µg/m^3)	NAAQS (µg/m^3)
Flagstaff	47	26	73	150
Kingman	77	26	103	
Page	99	26	125	
Prescott	85	26	111	
Safford	64	26	90	
St Johns	85	26	111	
Tucson	57	26	83	
Winslow	83	26	109	
Nogales	56	58	114	
Phoenix	57	58	115	
Yuma	53	58	111	

Table 26: Modeled Results for NO_2 for Collocation of C&S and CBP

Meteorological data sets	Modeled concentration (µg/m^3)		Background concentration (µg/m^3)		Total concentration (µg/m^3)		NAAQS (µg/m^3)
	1-hour[3]	Annual	1-hour[4]	Annual	1-hour	Annual	
Flagstaff	133	9	-	32	133	41	1-hour: 189 Annual: 100
Kingman	162	12	-	32	162	44	
Page	138	3	-	32	138	35	
Prescott	139	7	-	32	139	39	
Safford	164	11	-	32	164	43	
St Johns	163	9	-	32	163	41	
Tucson	169	4	-	32	169	36	
Winslow	171	8	-	32	171	40	
Nogales	134	6		32	134	38	
Phoenix	178	4	-	32	178	36	
Yuma	153	5	-	32	153	37	

[3] Background concentrations have been included in the model runs. Therefore, the reported concentrations reflect the total concentrations of modeled concentrations plus background concentrations.
[4] See Table 22

Table 27: Modeled Results for SO_2 for Collocation of C&S and CBP

Meteorological data sets	Modeled concentration ($\mu g/m^3$)		Background concentration ($\mu g/m^3$)		Total concentration ($\mu g/m^3$)		NAAQS ($\mu g/m^3$)
	1-hour	3-hour	1-hour	3-hour	1-hour	3-hour	
Flagstaff	0.3	0.3	14	20	14.3	20.3	1-hour:196 3-hour: 1,300
Kingman	0.4	0.3	14	20	14.4	20.3	
Page	0.4	0.3	14	20	14.4	20.3	
Prescott	0.4	0.3	14	20	14.4	20.3	
Safford	0.4	0.3	14	20	14.4	20.3	
St Johns	0.4	0.3	14	20	14.4	20.3	
Tucson	0.4	0.3	14	20	14.4	20.3	
Winslow	0.4	0.3	14	20	14.4	20.3	
Nogales	0.4	0.3	14	20	14.4	20.3	
Phoenix	0.3	0.3	14	20	14.3	20.3	
Yuma	0.4	0.3	14	20	14.4	20.3	

Table 28: Modeled Results for CO for Collocation of C&S and CBP

Meteorological data sets	Modeled concentration ($\mu g/m^3$)		Background concentration ($\mu g/m^3$)		Total concentration ($\mu g/m^3$)		NAAQS ($\mu g/m^3$)
	1-hour	8-hour	1-hour	8-hour	1-hour	8-hour	
Flagstaff	74	45	3,650	2,500	3,724	2,545	1-hour: 40,000 8-hour: 10,000
Kingman	97	74	3,650	2,500	3,747	2,574	
Page	96	74	3,650	2,500	3,746	2,574	
Prescott	101	70	3,650	2,500	3,751	2,570	
Safford	97	78	3,650	2,500	3,747	2,578	
St Johns	94	79	3,650	2,500	3,744	2,579	
Tucson	94	76	3,650	2,500	3,744	2,576	
Winslow	97	70	3,650	2,500	3,747	2,570	
Nogales	89	72	3,650	2,500	3,739	2,572	
Phoenix	76	47	3,650	2,500	3,726	2,547	
Yuma	95	78	3,650	2,500	3,745	2,578	

2. C&S Alone

Tables 29-33 summarize the modeled results for a C&S (6,500 tons per day) located in a PM_{10} attainment areas and a C&S (4,410 tons per day) in a non-attainment area. As shown in the tables, emissions from a C&S will not cause or contribute to a violation of the NAAQS under the operation limits/conditions as proposed in Table 8.

The AERMOD modeling analysis also revealed that the modeled impacts from C&S plants were limited to near-field areas. All modeled maximum concentrations for all pollutants under varied meteorological conditions occurred in ambient area boundary.

Table 29: Modeled Results for $PM_{2.5}$ for a C&S Alone

Meteorological data sets	Modeled concentration (µg/m^3)		Background concentration (µg/m^3)		Total concentration (µg/m^3)		NAAQS (µg/m^3)
	24-hour	Annual	24-hour	Annual	24-hour	Annual	
Flagstaff	3.8	2.2	12	5.2	15.8	7.4	24-hour: 35 Annual: 12
Kingman	6.6	2.8	12	5.2	18.6	8.0	
Page	8.1	3.2	12	5.2	20.1	8.4	
Prescott	8.2	4.2	12	5.2	20.2	9.4	
Safford	5.9	2.3	12	5.2	17.9	7.5	
St Johns	7.9	4.1	12	5.2	19.9	9.3	
Tucson	5.3	2.6	12	5.2	17.3	7.8	
Winslow	6.2	2.8	12	5.2	18.2	8.0	
Nogales	4.4	1.9	21	8.1	25.4	10.0	
Phoenix	6.0	2.3	21	8.1	27.0	10.4	
Yuma	4.9	1.7	21	8.1	25.9	9.8	

Table 30: Modeled Results for 24-hour PM_{10} for a C&S Alone

Meteorological data sets	Modeled concentration (µg/m^3)	Background concentration (µg/m^3)	Total concentration (µg/m^3)	NAAQS (µg/m^3)
Flagstaff	46	26	72	150
Kingman	68	26	94	
Page	90	26	116	
Prescott	88	26	114	
Safford	61	26	87	
St Johns	79	26	105	
Tucson	49	26	75	
Winslow	79	26	105	
Nogales	50	58	108	
Phoenix	58	58	116	
Yuma	47	58	105	

Table 31: Modeled Results for NO_2 for a C&S Alone

Meteorological data sets	Modeled concentration (µg/m^3)		Background concentration (µg/m^3)		Total concentration (µg/m^3)		NAAQS (µg/m^3)
	1-hour[5]	Annual	1-hour[6]	Annual	1-hour	Annual	
Flagstaff	127	8	-	32	127	40	1-hour: 189 Annual: 100
Kingman	157	11	-	32	157	43	
Page	134	3	-	32	134	35	
Prescott	133	6	-	32	133	38	
Safford	159	11	-	32	159	43	
St Johns	159	9	-	32	159	41	
Tucson	165	4	-	32	165	36	
Winslow	167	8	-	32	167	40	
Nogales	129	6	-	32	129	38	
Phoenix	175	4	-	32	175	36	
Yuma	149	4	-	32	149	36	

Table 32: Modeled Results for SO_2 for a C&S Alone

Meteorological data sets	Modeled concentration (µg/m^3)		Background concentration (µg/m^3)		Total concentration (µg/m^3)		NAAQS (µg/m^3)
	1-hour	3-hour	1-hour	3-hour	1-hour	3-hour	
Flagstaff	0.2	0.1	14	20	14.2	20.1	1-hour:196 3-hour: 1,300
Kingman	0.2	0.2	14	20	14.2	20.2	
Page	0.2	0.2	14	20	14.2	20.2	
Prescott	0.2	0.2	14	20	14.2	20.2	
Safford	0.2	0.2	14	20	14.2	20.2	
St Johns	0.2	0.2	14	20	14.2	20.2	
Tucson	0.2	0.2	14	20	14.2	20.2	
Winslow	0.2	0.2	14	20	14.2	20.2	
Nogales	0.2	0.2	14	20	14.2	20.2	
Phoenix	0.2	0.1	14	20	14.2	20.1	
Yuma	0.2	0.2	14	20	14.2	20.2	

[5] Background concentrations have been included in the model runs. Therefore, the reported concentrations reflect the total concentrations of modeled concentrations plus background concentrations.
[6] See Table 22

Table 33: Modeled Results for CO for a C&S Alone

Meteorological data sets	Modeled concentration (µg/m^3)		Background concentration (µg/m^3)		Total concentration (µg/m^3)		NAAQS (µg/m^3)
	1-hour	8-hour	1-hour	8-hour	1-hour	8-hour	
Flagstaff	70	42	3,650	2,500	3,720	2,542	1-hour: 40,000 8-hour: 10,000
Kingman	94	71	3,650	2,500	3,744	2,571	
Page	93	71	3,650	2,500	3,743	2,571	
Prescott	98	67	3,650	2,500	3,748	2,567	
Safford	94	75	3,650	2,500	3,744	2,575	
St Johns	91	76	3,650	2,500	3,741	2,576	
Tucson	90	73	3,650	2,500	3,740	2,573	
Winslow	94	67	3,650	2,500	3,744	2,567	
Nogales	85	69	3,650	2,500	3,735	2,569	
Phoenix	74	45	3,650	2,500	3,724	2,545	
Yuma	91	75	3,650	2,500	3,741	2,575	

VIII. LIST OF ABBREVIATIONS

A.A.C. ..... Arizona Administrative Code
ADEQ ..... Arizona Department of Environmental Quality
ADGS ..... Aggregate Delivery to Ground Storage
AQD ..... Air Quality Division
ATC ..... Aggregate Transfer to Conveyor
ATEB ..... Aggregate Transfer to Elevation Bins
ATO ..... Authorization to Operate
AZ ..... Arizona
CFR ..... Code of Federal Regulations
CO ..... Carbon Monoxide
CSTS ..... Cement Supplement Transfer to Cement Silo
CTCS ..... Cement Transfer to Cement Silo
EPA ..... Environmental Protection Agency
g ..... Gram
GEN ..... Generator
HAP ..... Hazardous Air Pollutant
ID ..... Identification
K ..... Kelvin
lb/hr ..... Pound per Hour
LPG ..... Liquefied Petroleum Gas
m ..... Meter
Met ..... Meteorological Data
MMBtu/hr ..... Million British Thermal Units per Cubic Foot
NAAQS ..... National Ambient Air Quality Standards
NOV ..... Notice of Violation
NO_x ..... Nitrogen Oxides
NSPS ..... New Source Performance Standards
NWS ..... National Weather Service
PAB ..... Process Area Boundary

P.C.C. ..... Pima County Code
PM ..... Particulate Matter
PM_{10} ..... Particulate Matter Nominally less than 10 Micrometers
PTE ..... Permanent Total Enclosure
s ..... Second
SDGS ..... Sand Delivery to Ground Storage
SIP ..... State Implantation Plan
SO_2 ..... Sulfur Dioxide
STC ..... Sand Transfer to Conveyor
STEB ..... Sand Transfer to Elevated Bins
TML ..... Truck Mix Loading
tph ..... Ton per Hour
UR ..... Unpaved Road
UTM ..... Universal Transverse Mercator
VOC ..... Volatile Organic Compound
WEAS ..... Wind Erosion from Aggregate Storage Piles
WESS ..... Wind Erosion from Sand Storage Piles
WHL ..... Weigh Hopper Loading
yd^3 ..... Cubic Yards
µ ..... Micro
..... Number
% ..... Percentage