TECHNICAL REVIEW AND EVALUATION
OF APPLICATION FOR
AIR QUALITY PERMIT No. 106233

I. INTRODUCTION

This Class I permit is for the construction and operation of Aluminum Dynamics, Inc. (ADI), the Permittee, of its recycled aluminum ingot casting center.

A Class I permit is required because the facility's potential to emit (PTE) is greater than the major source thresholds identified in Arizona Administrative Code (A.A.C.) R18-2-101.75 for hazardous air pollutants (HAPs). Therefore, a Class I permit is required for this facility in accordance with A.A.C. R18-2-302.B.1.a.

A. Company Information

Facility Name: Aluminum Dynamics, Inc.

Mailing Address: 7575 West Jefferson Blvd
Fort Wayne, IN 46804

Facility Location: 31° 57' 33.8" N, 110° 16' 56.4" W

B. Attainment Classification

The facility is located in an area of Cochise County that is in attainment or unclassified for all criteria air pollutants.

II. PROCESS DESCRIPTION

A. Process Equipment

The facility performs the following operations/processes: scrap processing, melting and casting of aluminum, and auxiliary systems. These processes are explained in the following sections.

1. Scrap Processing System:

   This process removes contaminants and tramp ferrous materials from the scrap and shreds the scrap thus providing a homogenous stream of coated aluminum shreds. The shreds are then fed into the Decoater. The system that performs this process is referred to as the aluminum scrap shredder. The particulate matter emitted in this process are directed to the cold baghouse.

2. Melting and Casting:

   a. Decoating Kiln #1:

This unit removes lacquer, oils, paint, ink, plastic, and rubber from aluminum scrap, and sends it to the sidewell melting furnace. The decoating kiln has an integrated filter that partly removes ash, tramp materials, and other particulate matter. The decoating kiln uses an afterburner and lime injected baghouse to control emissions.

b. Sidewell Melting Furnaces #1 & #2:

These units perform solid reactive fluxing, processing, and melting the charge materials in the scrap such as paint, lubricants, and coatings, and eventually melts the processed aluminum scrap containing the charged materials. Chloride salt is used as the solid reactive flux. The melting furnaces use lime injected baghouses to control emissions.

c. Holding Furnace:

This unit receives molten metal from the melting furnaces, performs solid reactive fluxing, enables alloy composition correction, and removes inclusions by allowing the molten metal to settle for a fixed duration.

d. In-line Degasser:

This unit, referred to as in-line degasser, is in the transfer line from the furnace. It refines molten aluminum, removes dissolved hydrogen while the molten metal flows from the furnace to casting machine, and enables alkali removal from the molten metal. Argon gas is used as non-reactive fluxing agent.

e. Sow Dryer:

This unit is a supporting unit for the melting furnaces. It performs drying and preheating of aluminum sows and other forms of hard charge prior to feeding them into the melting furnaces. The primary function of this unit is to dry and remove water from sows, pigs, or ingots before charging.

f. Filter Box Preheater:

This unit is a supporting unit to maintain minimal temperature drop between the holding furnace and the casting machine. Filter Box Preheater is a source of uncaptured natural gas combustion byproduct emissions. The Filter Box Preheater burners do not have stacks and thus combustion by-product emissions are released into the production building.

g. Dross Press and Dross House:

The dross press unit removes the dross produced in the melting and casting process, collects it (dross) in dross pans, presses it to remove aluminum, and transports it to the dross house. The press head is designed to squeeze aluminum out of the dross to maximize in-house recovery while at the same time cooling the dross. The recovered metal is used as a charge for melting furnaces.

h. Casting Machines:

This unit performs casting of ingots through mold wall and direct water injection. The facility anticipates using vegetable oil-based lubricant to facilitate casting process. The resulting aluminum ingots are shipped offsite to rolling mill facilities, the customers of the product.

3. Auxiliary Systems:

The auxiliary system includes cooling towers, a lime silo to provide lime for 3 lime injected baghouses, an emergency generator engine, diesel and gasoline fuel storage and refueling stations, outside storage and processing of baled scrap and vehicle movement on paved and unpaved roads. ADI stores baled scrap in the outside storage yard, but these bales would not be broken up or processed in a manner that could be considered a dust generating activity in the outdoor storage yard. The bales are moved in an intact form from the storage yard to the infeed conveyor of the scrap processing system which enters the production building and feeds the bale breaker. The bale breaker will be the first location in the process where broken bales and any associated dust formation would occur. Bales would not be processed or broken into smaller forms in the outdoor storage yard. The only loose material that could be associated with outdoor baled scrap storage would be small pieces of scrap (i.e., individual used beverage cans) that unintentionally fall from the larger scrap bales. ADI does not store loose material outside. Any material that falls loose from transporting bales to the infeed conveyor is swept/scooped up and placed on the infeed conveyor supplying the scrap processing system. No emissions are considered from the outside storage and processing of baled scrap.

B. Control Devices

The facility uses baghouses to control particulate matter (PM) emissions from the scrap processing system, decoater, melting furnaces, holding furnace, and dross house. The lime silo and dross press use integral filters to control PM emissions. Lime injection is used to limit the amount of HCl and D/F emissions from the decoater, melting furnaces, and holding furnace.

C. Process Flow Diagram

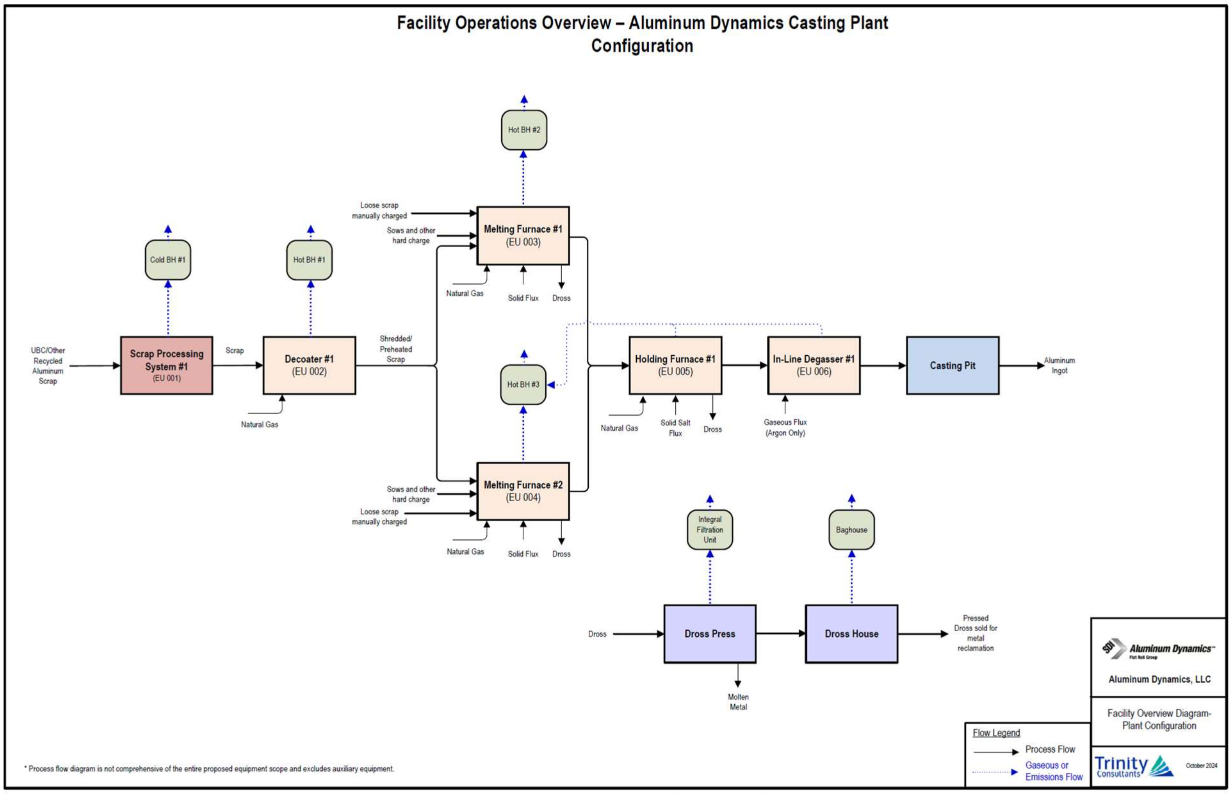

Figure 1: ADI Facility Process Flow Diagram

III. EMISSIONS

ADI is categorized as a Clean Air Act Section 302(j) source. Therefore, all emissions from fugitive and non-fugitive sources are included in the PTE provided in Table 1 below. Emissions were calculated using a combination of engineering design, manufacturer specifications, emissions limits, emission factors from EPA's WebFIRE database, and emission factors from Compilation of Air Pollutant Emissions Factors (AP-42).

The facility has a PTE greater than the Title V thresholds identified in Arizona Administrative Code (A.A.C.) R18-2-101.75 for hazardous air pollutants (HAPs) of total HAPs, 25 tons per year (tpy), and the single HAP, 10 tpy for hydrogen chloride (HCl). Therefore, a Class I permit is required for this facility in accordance with A.A.C. R18-2-302.B.1.a. The facility's PTE is provided in Table 1 below:

Table 1: Potential to Emit (tpy)

Pollutant	PTE	Permitting Exemption Threshold	Significant Thresholds	PSD Thresholds	Minor NSR Triggered?
NO_X	93.7	20	40	100	Yes
PM_{10}	61.7	7.5	15	100	Yes

Pollutant	PTE	Permitting Exemption Threshold	Significant Thresholds	PSD Thresholds	Minor NSR Triggered?
$PM_{2.5}$	52.2	5	10	100	Yes
CO	80.3	50	100	100	Yes
SO_2	0.3	20	40	100	No
VOCs	93.3	20	40	100	Yes
Pb	0.003	0.3	0.6	100	No
HAPs (Total)	100.7	N/A	N/A	N/A	N/A
Single Greatest HAP (HCl)	92.3	N/A	N/A	N/A	N/A
GHG* (CO_2e)	86,398.0	--	75,000	75,000	N/A

*Though the greenhouse gas (GHG) emission are above significant thresholds for PSD applicability, PSD review is not required for a source that emits or has the potential to emit GHGs above the PSD major source thresholds, unless the source also emits or has the potential to emit another regulated pollutant in quantities greater than the PSD major source threshold. No other PSD pollutants trigger PSD review, therefore GHGs are not subject to PSD review.

IV. MINOR NEW SOURCE REVIEW (NSR)

Minor new source review is required if the emissions of a new source have the potential to emit any regulated air pollutant at an amount greater than or equal to the permitting exemption threshold (PET) per R18-2-334.A Table 1 show the pollutants subject to minor NSR. The facility has the option to either implement reasonably available control technology (RACT) or conduct air dispersion modeling to satisfy the requirements of minor NSR.

The facility elected to undergo modeling to demonstrate compliance with minor NSR requirements. A detailed discussion of the screen modeling analysis can be found in Section X below.

V. VOLUNTARILY ACCEPTED EMISSION LIMITATIONS AND STANDARDS

The permit contains the following voluntarily accepted emission limitations and standards:

A. NOx

The facility has accepted voluntary emission limitations on NO_X to avoid triggering Prevention of Significant Deterioration (PSD) review. The voluntary emission limitations on NO_X include:

- 38.62 tons per year as calculated on a 12-month rolling basis from the Hot Baghouse #1;
- 25.89 tons per year as calculated on a 12-month rolling basis from the Hot Baghouse #2; and
- 28.20 tons per year as calculated on a 12-month rolling basis from the Hot Baghouse #3.

B. VOCs

The facility has accepted voluntary emission limitations on VOCs to avoid triggering PSD review. The voluntary emission limitations on VOCs include:

- 20.06 tons per year as calculated on a 12-month rolling basis from the Hot Baghouse #1;
- 20.89 tons per year as calculated on a 12-month rolling basis from the Hot Baghouse #2; and
- 52.21 tons per year as calculated on a 12-month rolling basis from the Hot Baghouse #3.

VI. APPLICABLE REGULATIONS

Table 2 identifies applicable regulations and verification as to why that standard applies. The table also contains a discussion of any regulations the emission unit is exempt from.

Table 2: Applicable Regulations

Unit	Control Device	Rule	Discussion
Scrap Processing System	Baghouse	A.A.C. R18-2-730	None of the affected facilities listed in A.A.C. R18-2-721 apply to the facility. Therefore, A.A.C. R18-2-730 standards are applicable to unclassified sources.
		NESHAP 40 CFR 63 Subpart RRR	National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 63 Subpart RRR for Secondary Aluminum Production are applicable to the aluminum scrap shredder.

Unit	Control Device	Rule	Discussion
Decoater Furnace #1 Melting Furnace #1 Melting Furnace #2 Holding Furnace #1 In-Line Degasser #1	Baghouse	A.A.C. R18-2-730 NESHAP 40 CFR 63 Subpart RRR	These sources are not subject to any listed source types listed in A.A.C. R18-2 Article 7. Therefore, A.A.C. R18-2-730 standards are applicable to unclassified sources. National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 63 Subpart RRR for Secondary Aluminum Production are applicable to these units.
Sow Dryer Filter Box Preheater Dross House Dross Press	Baghouse and filters	A.A.C. R18-2-730	These sources are not subject to any listed source types listed in A.A.C. R18-2 Article 7. Therefore, A.A.C. R18-2-730 standards are applicable to unclassified sources.
Cooling Tower 1 Cooling Tower 2	N/A	A.A.C. R18-2-730	These sources are not subject to any listed source types listed in A.A.C. R18-2 Article 7. Therefore, A.A.C. R18-2-730 standards are applicable to unclassified sources.
Emergency Generator	N/A	NSPS 40 CFR 60 Subpart JJJJ NESHAP 40 CFR 63 Subpart ZZZZ	NSPS Subpart JJJJ, Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, applies to any owner or operator of a stationary spark ignition (SI) internal combustion engine (ICE) for which construction commenced after June 12, 2006. Therefore, the facility is subject NSPS Subpart JJJJ. The facility is subject to NESHAP Subpart ZZZZ. However, the requirements of this subpart are fulfilled by complying with NSPS Subpart JJJJ.
Lime Silo	Filter	A.A.C. R18-2-730	These sources are not subject to any listed source types listed in A.A.C. R18-2 Article 7. Therefore, A.A.C. R18-2-730 standards are applicable to unclassified sources.
Gasoline Storage Tank and Dispensing Facility	N/A	A.A.C. R18-2-710	These requirements are applicable to petroleum liquid operations. Therefore, R18-2-710 is applicable.

Unit	Control Device	Rule	Discussion
Diesel Storage Tank and Dispensing Facility	N/A	A.A.C. R18-2-730	These requirements are applicable to unclassified sources. Diesel fuel is not a "petroleum liquid" as defined in A.A.C. R-18-2-701.29. Therefore, R18-2-710 is not applicable. Therefore, R18-2-730 is applicable as it would be considered an "Unclassified Source."
Fugitive dust sources	Water Trucks, Dust Suppressants	A.A.C. R18-2 Article 6 A.A.C. R18-2-702	These standards are applicable to all fugitive dust sources at the facility.
Abrasive Blasting	Wet blasting; Dust collecting equipment; Other approved methods	A.A.C. R-18-2-702 A.A.C. R-18-2-726	These standards are applicable to any abrasive blasting operation.
Spray Painting	Enclosures	A.A.C. R18-2-702 A.A.C. R-18-2-727	These standards are applicable to any spray painting operation.
Demolition/Renovation Operations	N/A	A.A.C. R18-2-1101.A.12	This standard is applicable to any asbestos related demolition or renovation operations.

VII. MONITORING, RECORDKEEPING, AND REPORTING REQUIREMENTS

Table 3 contains an inclusive but not an exhaustive list of the monitoring, recordkeeping and reporting requirements prescribed by the air quality permit. The table below is intended to provide insight to the public for how the facility is required to demonstrate compliance with the emission limits in the permit. Process weight rate emission limits are demonstrated to be in compliance through more stringent emission limits and monitoring requirements and/or PTE calculations demonstrating emissions will not exceed applicable process rate equation limits. Records are required be kept for a minimum of 5 years as outlined in Section XII of Attachment "A" of the permit.

Table 3: Permit No. 106233

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
Feed/Charge	Throughput	N/A	Measures and record or otherwise determine the weight of feed/charge (or throughput) for each operating cycle.	At the end of each calendar month, calculate and record the monthly weight of feed/charge of each process unit.	Report records of weight of feed/charge at the time the semiannual compliance certification is due.
Natural Gas	Usage	N/A	Record the monthly natural gas usage of each process unit.	N/A	Report records of natural gas usage at the time the semiannual compliance certification is due.
Cold Baghouse	PM	0.010 gr of PM per (dscf)	Perform performance testing every annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	PM_{10}	0.79 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	$PM_{2.5}$	0.23 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
	Opacity	10% or BLDS	Operate a bag leak detection system, conduct daily opacity observations in accordance with Method 9, or monitor with COMS.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
	Opacity	20%	Conduct periodic opacity monitoring on a weekly basis.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
Hot Baghouse #1	THC	0.10 kg of THC, as propane, per Mg of feed/charge	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	PM	0.15 kg of PM per Mg of feed/charge;	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	PM_{10}	5.07 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	$PM_{2.5}$	4.94 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	D/F	5.0 µg of D/F TEQ per Mg of feed/charge; and	Perform performance testing on a quarterly basis. If eight (8) consecutive performance tests respectively is less	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
			than or equal to 50% of the limit, then performance testing is required on a semi-annual basis.		
	HCl	0.75 kg of HCl per Mg of feed/charge.	Perform performance testing on a quarterly basis. If eight (8) consecutive performance tests respectively is less than or equal to 50% of the limit, then performance testing is required on a semi-annual basis.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	Opacity	10% or BLDS	Operate a bag leak detection system, conduct daily opacity observations in accordance with Method 9, monitor with COMS.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
	Opacity	20%	Conduct periodic opacity monitoring on a weekly basis.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
	Lime Injection	N/A	Verify that the lime injection rate in pounds per hour (lb/hr) is no less than 90 percent of the lime injection rate used to demonstrate compliance	Record the lime feeder setting once each day of operation.	Report test results. Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
			during the most recent performance test.		
	NO_X	8.82 lbs/hr	Perform performance testing semi-annually or annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	NO_X	38.62 tpy	Perform performance testing semi-annually or annually.	Calculate and record the monthly and 12-month rolling total of NO_X emissions.	Report 12-month rolling total. Report excess emissions and deviations if applicable.
	CO	7.20 lbs/hr	Perform performance testing at annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	VOC	20.06 tpy	Perform performance testing semi-annually or annually.	Calculate and record the monthly and 12-month rolling total of VOC emissions.	Report test results. Report 12-month rolling total. Report excess emissions and deviations if applicable.
Hot Baghouse #2	PM	0.20 kg of PM per Mg of feed/charge.	Perform performance testing at annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	PM_{10}	2.70 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	$PM_{2.5}$	2.28 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
	NO_X	7.29 lb/hr	Perform performance testing semi-annually or annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	NO_X	25.89 tpy	Perform performance testing semi-annually or annually.	Calculate and record the monthly and 12-month rolling total of NO_X emissions	Report 12-month rolling total. Report excess emissions and deviations if applicable.
	CO	6.16 lbs/hr	Perform performance testing annually	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	VOC	20.89 tpy	Perform performance testing semi-annually or annually.	Calculate and record the monthly and 12-month rolling total of VOC emissions.	Report test results. Report excess emissions and deviations if applicable.
	D/F	15 µg of D/F TEQ per Mg of feed/charge.	Perform performance testing on a quarterly basis. If eight (8) consecutive performance tests respectively is less than or equal to 50% of the limit, then performance testing is required on a semi-annual basis.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	HCl	0.20 kg of HCl per Mg of feed/charge	Perform performance testing on a quarterly basis. If eight (8) consecutive performance tests respectively is less	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
			than or equal to 50% of the limit, then performance testing is required on a semi-annual basis.		
	Opacity	10% or BLDS	Operate a bag leak detection system, conduct daily opacity observations in accordance with Method 9, or monitor with COMS.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
	Opacity	20%	Conduct periodic opacity monitoring on a weekly basis.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
	Lime Injection	N/A	Verify that the lime injection rate in pounds per hour (lb/hr) is no less than 90 percent of the lime injection rate used to demonstrate compliance during the most recent performance test.	Record the lime feeder setting once each day of operation.	Report test results. Report excess emissions and deviations if applicable.
Hot Baghouse #3	PM	0.20 kg of PM per Mg of feed/charge.	Perform performance testing at annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	PM_{10}	3.64 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
	$PM_{2.5}$	3.10 lbs/hr	Perform performance testing annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	NO_X	9.30 lbs/hr	Perform performance testing semi-annually or annually.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	NO_X	28.20 tpy	Perform performance testing semi-annually or annually.	Calculate and record the monthly and 12-month rolling of NO_X emissions.	Report test results. Report excess emissions and deviations if applicable.
	CO	8.38 lbs/hr	Perform performance testing annually	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	VOC	52.21 tpy	Perform performance testing semi-annually or annually.	Calculate and record the monthly and 12-month rolling of VOC emissions.	Report test results. Report excess emissions and deviations if applicable.
	D/F	15 µg of D/F TEQ per Mg of feed/charge.	Perform performance testing on a quarterly basis. If eight (8) consecutive performance tests respectively is less than or equal to 50% of the limit, then performance testing is required on a semi-annual basis.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	HCl	0.20 kg of HCl per Mg of feed/charge	Perform performance testing on a quarterly basis. If eight (8) consecutive performance	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
			tests respectively is less than or equal to 50% of the limit, then performance testing is required on a semi-annual basis.		
	Opacity	10% or BLDS	Operate a bag leak detection system, conduct daily opacity observations in accordance with Method 9, or monitor with COMS.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
	Opacity	20%	Conduct periodic opacity monitoring on a weekly basis.	Record the results of each test.	Report test results. Report excess emissions and deviations if applicable.
	Lime Injection	N/A	Verify that the lime injection rate in pounds per hour (lb/hr) is no less than 90 percent of the lime injection rate used to demonstrate compliance during the most recent performance test.	Record the lime feeder setting once each day of operation.	Report test results. Report excess emissions and deviations if applicable.
Emergency Engines	Hours	N/A	Monitor how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation.	Keep records of conducted maintenance to demonstrate compliance and also meet the requirements.	Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
Cooling Towers	Opacity	20%	Conduct periodic opacity monitoring on a monthly basis.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
Dross House Baghouse	PM_{10}	1.05 lbs/hr	Perform performance testing at least once per permit term.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	$PM_{2.5}$	0.87 lbs/hr	Perform performance testing at least once per permit term.	Keep data and test reports for continuous monitoring.	Report test results. Report excess emissions and deviations if applicable.
	Opacity	20%	Conduct periodic opacity monitoring on a monthly basis.	Record opacity monitoring.	Report excess emissions and deviations if applicable.
Gasoline Storage Tanks	Vapor Pressure	N/A	Monitor Reid vapor pressure.	Record the average monthly temperature, and true vapor pressure of gasoline stored at such temperature if over 470 mm Hg (9.1 psia) and not equipped with a vapor recovery system or equivalent. Record date the storage tank is empty.	Report deviations if applicable.
Diesel Storage Tanks	VOC	N/A	N/A	N/A	Report deviations if applicable.
Fugitive Dust	Opacity	40%	A Method 9 observer is required to conduct a	Record of the dates and types of dust control measures employed, and if applicable, the results of	Report excess emissions and deviations if applicable.

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
			monthly survey of visible emissions.	any Method 9 observations, and any corrective action taken to lower the opacity of any excess emissions.	
Abrasive Blasting	Opacity	20%	A Method 9 observer is required to conduct a survey of visible emissions each time an abrasive blasting project is conducted.	Record the date, duration and pollution control measures of any abrasive blasting project.	Report excess emissions and deviations if applicable.
Spray Painting	VOCs	Control 96% of the overspray	N/A	Maintain records of the date, duration, quantity of paint used, any applicable material safety data sheets, and pollution control measures of any spray painting project.	Report excess emissions and deviations if applicable.
	Opacity	20%	A Method 9 observer is required to conduct a survey of visible emissions each time a spray painting project is conducted.	Record the date, duration and pollution control measures of any abrasive blasting project.	Report excess emissions and deviations if applicable.
Demolition/ Renovation	Asbestos	N/A	N/A	Maintain records of all asbestos related demolition or renovation projects including the “NESHAP Notification for Renovation and Demolition Activities”	N/A

Emission Unit or Process	Pollutant or Process	Emission Limit	Monitoring Requirements	Recordkeeping Requirements	Reporting Requirements
				form and all supporting documents.	

VIII. COMPLIANCE ASSURANCE MONITORING (CAM)

The CAM rule, 40 CFR Part 64, applies to pollutant-specific emission units (PSEU) at a major Title V source if the unit meets all of the following criteria:

A. The unit is subject to an emission limit or standard for the applicable regulated air pollutant;

B. The unit uses a control device to achieve compliance with the emission limit or standard; and

C. The unit has "potential pre-control device emissions" of the applicable regulated air pollutant equal to or greater than 100% of the amount (tons/year) required for a source to be classified as a major source. "Potential pre-control device emissions" means potential to emit (PTE, as defined in Title V) except emissions reductions achieved by the applicable control device are not taken into account.

The general purpose of monitoring required by the CAM rule is to assure compliance with emission standards by ensuring that control devices meet and maintain the assumed control efficiencies. Compliance is ensured through requiring monitoring of the operation and maintenance of the control equipment and, if applicable, operating conditions of the pollutant-specific emissions unit. For the PSEUs that have post control potential to emit equal to or greater than 100 percent of the amount, in tons per year, required for a source to be classified as a major source, for each parameter monitored, the facility shall collect four or more data values equally spaced over each hour. Such units are defined as “large” PSEUs. For all other PSEUs (“small” PSEUs), the monitoring shall include some data collection at least once per 24-hour period.

ADI does not have any criteria pollutants above major source thresholds. ADI is a Title V major source for individual HAP due to HCl emissions which could make any PSEU at the facility potentially be subject to CAM requirements. All other HAP emissions generated at the ADI facility besides HCl emissions are not controlled by an add-on control device and are not subject to emission limitations or standards. Both hot baghouse #1 and hot baghouse #3 will have pre-control emissions of HCl above the single-largest HAP major source threshold and use lime injection to control HCl emissions. However, the HCl emission limitations for the ADI facility’s sources are derived from the Secondary Aluminum National Emissions Standards for Hazardous Air Pollutants (NESHAP) 40 CFR 63 Subpart RRR, which qualify as exempt emission limitations under 40 CFR 64.2(b)(i). Therefore, CAM requirements do not apply to ADI.

IX. LEARNING SITE EVALUTATION

In accordance with ADEQ’s Environmental Permits and Approvals near Learning Sites Policy, the Department is required to conduct an evaluation to determine if any nearby learning sites would be adversely impacted by the facility. Learning sites consist of all existing public schools, charter schools and private schools in the K-12 level, and all planned sites for schools approved by the Arizona School Facilities Board. The learning sites policy was established to ensure that the protection of children at learning sites is considered before a permit approval is issued by ADEQ.

ADI will emit criteria air pollutants in excess of permitting exemption thresholds. Since there are learning sites within 2 miles of the facility, a learning site evaluation was triggered for ADI. The facility conducted modeling for criteria air pollutants and HCl to demonstrate the surrounding community will have minimal impacts from the facility. A detailed discussion of the screen modeling analysis can be found in Section X below.

X. AMBIENT AIR IMPACT ANALYSIS

A. General

The Department reviewed the ambient air quality assessment submitted by ADI in support of its application for a Class I permit to the proposed satellite casting center near the city of Benson, Arizona. The assessment evaluated emissions of the criteria pollutants regulated under the applicable provisions of the Minor New Source Review (NSR) of the Arizona Administrative Code (AAC) R18-2-334. Under the minor NSR program, an ambient air quality assessment must demonstrate either of the following:

- The emissions from the source will have an ambient impact below the significant impact levels (SILs);
- The ambient concentrations resulting from the source combined with representative background concentrations of minor NSR pollutants will not interfere with attainment or maintenance of a National Ambient Air Quality Standards (NAAQS).

To meet with the minor NSR requirements, ADI conducted the ambient air quality assessment in two steps: a preliminary analysis (often referred to as a significant impact analysis), and if needed, a cumulative impact analysis:

- The significant impact analysis estimates ambient concentrations resulting from the proposed project for pollutants that trigger minor NSR review. If the ambient impacts from the project are greater than SILs, then a cumulative impact analysis is conducted.

- The cumulative impact analysis considers the emissions from the proposed project and the emissions from other nearby sources. The modeling results from these emission sources are added to representative regional ambient background concentrations and the total concentrations are compared to the NAAQS.

For the proposed project, the pollutants subject to the minor NSR program are particulate matter less than 10 µm nominal aerodynamic diameter (PM_{10}), particulate matter less than 2.5 µm nominal aerodynamic diameter ($PM_{2.5}$), nitrogen oxides (NOx), volatile organic compounds (VOCs), carbon monoxide (CO), and ozone (due to NOx and VOC emissions).

As discussed in Section IX, a learning site evaluation is also triggered for ADI as there are learning sites within 2 miles of the ADI facility. Therefore, ADI conducted modeling to demonstrate that the project's impacts on learning sites would be below Acute/Chronic Ambient Air Concentrations (AAAC and CAAC) for hazardous air pollutants (HAPs). Given that hydrogen chloride (HCl) is the primary HAP of concern, ADI also compared the modeled concentrations to relevant federal screening levels (RSLs) for human health. In addition to evaluating the learning sites, ADI conducted further modeling to evaluate the potential impacts on surrounding residential areas.

Guidance for performing air quality dispersion modeling analyses is set forth in the EPA's Guideline on Air Quality Models (40 CFR Part 51 Appendix W)[1] and the Air Dispersion Modeling Guidelines for Arizona Air Quality Permits, November 1, 2019 (ADEQ's Modeling Guidelines).[2]

B. Model Selection

The American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) model is the EPA-preferred model for estimating impacts at receptors located in simple terrain and complex terrain (within 50 km of a source) due to emissions from industrial sources. ADI used AERMOD for the ambient impact analysis.

The AERMOD modeling system consists of three major components: AERMAP, used to process terrain data and develop elevations for receptors; AERMET, used to process the meteorological data; and the AERMOD dispersion model, used to estimate the ambient pollutant concentrations. ADI used AERMAP version 18081; AERMET version 23132; and AERMOD version 24142.

As will be discussed later in Section X.D.5, the Department conducted supplemental modeling using the AERSCREEN model to assess short-term impacts of HAPs. AERSCREEN is the EPA's recommended screening model based on AERMOD. The model will produce estimates of "worst-case" 1-hour concentrations for a single source. When a project includes multiple sources, each source is modeled separately, and the maximum impacts from each model run are then combined to determine the cumulative impact. This methodology is considered conservative, as it sums the maximum impacts from each modeled source - regardless of their spatial and temporal differences - to calculate the total impact from the project.

C. Source Inputs

1. Project overview

ADI is proposing to construct a recycled aluminum ingot casting facility with a maximum potential production capacity of approximately 300,000 tons/year (tpy) (assuming continuous operation at the maximum short-term potential aluminum process rates). The main processes include scrape processing, decoating, melting, and casting. Key equipment includes a scrap processing system, a rotary kiln decoater, two conventional side well-type aluminum melt furnaces, a tilting-type aluminum holding furnace, and in-line fluxer/degassing unit. Additional ancillary equipment such as scrap storage and handling areas, casting equipment, a dross press, a dross house, a sow dryer, a lime silo for lime-injected baghouses, and cooling towers will be installed.

2. Sources of Emissions

1 US. EPA. 2017. Guidelines on Air Quality Models. https://www.epa.gov/sites/default/files/2020-09/documents/appw_17.pdf

2 Arizona Department of Environmental Quality. 2019. Air Quality Modeling Guidelines for Arizona Air Quality Permits. http://static.azdeq.gov/aqd/modeling_guidance.pdf

As shown in Figure 1 ("ADI Facility Process Flow Diagram"), the sources of emissions include: scrap processing system #1; decoater #1; melting furnaces #1 and #2; holding furnace #1; in-line degasser #1; dross press; and dross house.

Additional emission points are from cooling towers, storage yards, building vents/openings, bay door openings, and plant roads.

3. Modeled Emission Rates

ADI calculated the maximum potential short-term emission rates in pounds per hour (lb/hr) and pounds per day (lb/day) based on either the maximum equipment design rates or the highest short-term activity rates specified in the permit conditions. Generally, these maximum potential short-term emission rates were modeled to ensure compliance with short-term NAAQs. Specifically, the maximum hourly average emission rates were modeled to demonstrate compliance with 1-hour NO_2, 1-hour CO, and 8-hour CO standards, while the maximum 24-hour average emission rates were modeled to demonstrate compliance with 24-hour PM_{10} and $PM_{2.5}$ standards.

ADI calculated the maximum potential long-term average emission rates using the highest annual activity rates as stipulated in the permit conditions. The annual average emission rates were modeled to demonstrate compliance with the annual standards for NO_2 and $PM_{2.5}$.

4. Source Characterization

a. Point Sources

Baghouse stacks, the lime silo bin vent, and cooling towers were modeled as point sources. Release parameters (stack height, stack diameter, gas temperature, and volumetric flow rate) for these point sources were derived from a combination of testing data, vendor specifications, or engineering estimations.

b. Area Sources

Fugitive emissions from storage yards and roof-level building vents/openings were modeled as area sources. The geometry of an area source was characterized as a rectangle or irregularly shaped polygon. Release heights for area source characterization were based on the height at which fugitive emissions are expected to be released to the atmosphere.

c. Volume Sources

Fugitive emissions released from bay door openings were modeled as volume sources. Additionally, fugitive emissions from roadways were modeled as volume sources. The volume source parameters, including initial lateral dimension, initial vertical dimension and release height, were estimated based on the horizontal and vertical dimensions of the volume source, following the guidance from ADEQ and the AERMOD User's Guide.

5. Off-Site Sources

The Department provided ADI with an off-site emission inventory of permitted emission sources within 50 km of the proposed project. Nearby permitted emissions sources within the maximum significant impact area (SIA) for each pollutant were included in the cumulative impact analysis. Additionally, ADI used the "20D" screening approach to eliminate a majority of regional facilities from the cumulative impact analysis that would be expected to have a negligible impact on the analysis results. Under this approach, the Permittee may exclude sources that have potential allowable emissions (Q) in tpy that are less than 20 times the distance ("20D") between the two sources in kilometers. Those sources that were not eliminated using the "20D" approach were modeled in the cumulative impact analysis. The off-site sources included in the cumulative impact analysis were Apache Generating Station and Apache Nitrogen Products Inc for 1-hour NO_2 modeling. No off-site sources were included in the modeling for other pollutants.

D. Meteorological Data

1. Meteorological Data Selection

For regulatory dispersion modeling analyses, ADEQ's Air Quality Modeling Guidelines for Arizona Air Quality Permits specifies that five years of National Weather Station (NWS) meteorological data, or at least one year of site-specific meteorological data, or at least three years of prognostic meteorological data should be used.

The proposed project site is in the central part of the San Pedro Valley. No site-specific meteorological data is available for this area. The only nearby station identified by the Department is a Citizen Weather Observer Program (CWOP) station (EW2786). EPA's Guideline on Air Quality Models (Section 8.4.2.e and 8.4.4.2) establishes that meteorological data be subject to strict quality assurance procedures, including recommendations on siting, exposure of meteorological instruments and requirements on data recording, processing, completeness, reporting and archiving. However, the standards for siting, exposure of meteorological instruments, data recording, processing, reporting, and quality assurance and quality control (QA/QC) for the CWOP network are generally not well-defined. As a result, data from EW2786 cannot be used for regulatory modeling. Despite this, the EW2786 data provides useful insight into local wind patterns – indicating that drainage flow along the valley's orientation dominates at night, while west winds prevail during afternoon, consistent with southern Arizona regional flow.

The nearest NWS meteorological station, Sierra Vista Municipal Airport (KFHU), is approximately 41 kilometers south and adjacent to the Huachuca Mountains. Although west winds prevail at KFUH, the station does not adequately capture the drainage flow along the San Pedro Valley at night. Therefore, the Department has determined that the KFHU data are not representative of the transport and dispersion conditions at the project site.

Due to the lack of site-specific data and representative NWS data, ADI selected three years of prognostic meteorological data for modeling. The prognostic meteorological data was generated using Version 3.8 of the Weather Research and Forecasting (WRF) model by the University of North Carolina (UNC) Institute for the Environment in collaboration with the U.S. EPA. This dataset covers the continental United States (CONUS) at 12- kilometer horizontal grid resolution for the years 2013-2015 and was processed using the Mesoscale Model Interface Program (MMIF) (Version 3.3) to produce AERMOD-ready meteorological data files.

The 2013-2015 EPA's prognostic dataset has approximately 2,000 nodes within Arizona. The selected node, closest to the project site, is located at 31.968°N, 110.317°W. ADI conducted a qualitative wind rose analysis to evaluate how well the data capture terrain-driven and diurnal wind patterns. The results confirmed that the data accurately reflect both nighttime drainage flow and regional terrain-driven winds. The Department concurs with this assessment.

2. Meteorological Data Processing

Per EPA's Appendix W, when using MMIF to process prognostic data for regulatory applications, the data should be processed to generate AERMET inputs and the data subsequently processed through AERMET for input to AERMOD. Consistent with Appendix W, the following methods were used to prepare the AERMOD-ready meteorological data files:

- MMIF was used to extract AERMET-ready surface and upper air data files;
- AERMET was used to produce the AERMOD-ready meteorological data;
- The land use information used in AERMET was the MMIF-extracted land use data that reflects the land use generated in the WRF model;
- The Bulk Richardson Number (BULKRN) option in AERMET was used.

To address issues with model overprediction for certain sources due to underprediction of the surface friction velocity (u*) during light wind, stable conditions, EPA has integrated the ADJ_U* option into the AERMET meteorological processor for AERMOD. Based on the EPA's evaluations, using the ADJ_U* option is appropriate when prognostic data are used. Therefore, ADI incorporated the ADJ_U* option in AERMET processing for the 2013-2015 MMIF data.

MMIF Version 3.3 was used for the initial processing under the U.S. EPA contract. While MMIF version 4.1 is now available, the difference between the two versions are either not applicable to this modeling demonstration or would yield less conservative model-predicted results. Therefore, the MMIF v3.3 outputs were retained. ADI processed the MMIF outputs using AERMET version 23132.

3. Prognostic Model Evaluation

Since prognostic data are not actual measurements or observations, Appendix W requires a model performance evaluation that compares prognostic data to NWS observational data to ensure that the data replicates the observed meteorological conditions. Following the Department's recommendation, ADI compared 2013-2015 MMIF meteorological data against the concurrent NWS meteorological data from two nearest NWS stations - the Sierra Vista Municipal Airport (KFHU) and the Tucson International Airport (KTUS). The MMIF data were extracted for grid cells where the two NWS stations are located. ADI performed a statistical analysis following the methodology described in EPA's 2018 Evaluation of Prognostic Meteorological Data in AERMOD Applications.[3]

The statistical analysis for MMIF versus NWS data showed relatively good agreement for measured parameters including wind speed, temperature, station pressure, and relative humidity. Some derived boundary layer parameters such as sensible heat flux and surface friction velocity showed good agreement as well. Some derived parameters such as mixing heights and Monin-Obukhov length showed less agreement. This was likely partially due to the difference in process for deriving surface characteristics used in the AERMET processing. However, the fractional biases for all parameters are within ± 0.67 which indicates good performance. Fractional biases that exceed a factor-of-two underprediction or overprediction (i.e., ≥ ±0.67) are considered grounds for excluding a model for further evaluation.[4]

4. NAAQS Sensitivity Modeling Analysis

As the Department requested, ADI conducted a NAAQS sensitivity modeling analysis to demonstrate that the prognostic dataset is generally equivalent to observational data and does not underestimate design concentrations overall. Following the Department's recommendations, ADI used the methodology as shown below:

- **Hypothetical Sources**
  - A hot baghouse stack;
  - A cold baghouse stack;
  - Stacks are centered at the NWS stations with a unit emission rate of 1 g/s;
  - Stacks parameters align with ADI stack configurations, and each stack is modeled with its own source group.
- **Meteorological Data (2013-2015)**
  - Tucson Airport Data vs. Prognostic Data in the cell where Tucson Airport is located;
  - Sierra Vista Airport Data vs. Prognostic Data in the cell where Sierra Vista Airport is located.

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3 US. EPA. 2018. Evaluation of Prognostic Meteorological Data in AERMOD Applications, EPA-454/R-18-002. https://gaftp.epa.gov/Air/aqmg/SCRAM/models/related/mmif/MMIF_Evaluation_TSD.pdf

4 U.S. EPA, 1992: Protocol for Determining the Best Performing Model, EPA-454/R-92-025. https://www.epa.gov/sites/default/files/2020-10/documents/model_eval_protocol.pdf

- **Receptors**
    - 10 km by 10 km, centered on the NWS stations;
    - The buffer distance between the emission source and the ambient air is the shortest distance from the stacks to the facility's fenceline based on the ADI facility's footprint.
- **Average Periods for Modeling**
    - 1-hour;
    - 24-hour;
    - Annual.
- **Modeled Design Concentrations**
    - Using the highest, first-high (H1H) and the highest, 8th high (H8H) for 1-hour average period;
    - Using the highest, 4th high (H4H) and H8H for 24-hour average period;
    - H1H for annual average period.

Results showed no systematic underprediction of concentrations using MMIF data. Modeled design concentrations using MMIF data were generally conservative or comparable to those using NWS data, except for 1-hour H1H values, which were notably underpredicted (by 67.25% at Tucson and 21.38% at Sierra Vista). This greater disparity is expected because the 1-hour H1H concentrations are likely influenced by the few outlier hours with extreme meteorological conditions that do not represent a large portion of the overall dataset. In contrast, when comparing the 1-hour H8H concentrations, the differences are within 10%, as this metric excludes the most extreme values and better reflects typical conditions.

ADI also conducted a quantile-quantile (Q-Q) analysis to evaluate the performance of the two datasets. This statistical technique assesses whether two datasets are derived from the same underlying distribution. Q-Q plots were developed by ranking the modeled 1-hour and 24-hour H1H concentrations from both the NWS and MMIF data, and then plotting the resulting pairs regardless of time and space.

For the 1-hour H1H concentrations, the Q-Q analysis indicates that the prognostic data tend to underpredict concentrations compared to the NWS data in the upper quartile of the distribution. Conversely, for the 24-hour H1H concentrations, the prognostic data tend to overpredict in the upper quartile. Although some bias is evident in the upper ranges, the modeled concentrations from both datasets remain within a factor-of-two - an acceptable threshold per EPA guidance for model performance. This result demonstrates good agreement between modeled concentrations using NWS and MMIF data.

5. AERSCREEN Modeling Analysis

Given the potential underestimation of 1-hour H8H concentration with MMIF data, ADI applied scaling factors based on the sensitivity analysis results when modeling 1-hour NO_2. ADI assumed that the percentage differences seen in the Sierra Vista and Tucson meteorological data analysis (within 10% difference) were applied to the project site. These adjustments suggest that compliance with the NAAQS would still be maintained.

Given the potential underestimation of 1-hour H1H concentration with MMIF data and to further evaluate worst-case short-term impacts for HAPs, the Department conducted supplemental modeling using the EPA's AERSCREEN model. The MAKEMET program in AERSCREEN generates worst-case screening meteorology using representative minimum and maximum ambient air temperatures, minimum wind speed, and site-specific surface characteristics (albedo, Bowen ratio, and surface roughness). The Department determined the minimum and maximum ambient air temperatures based on the Sierra Vista and Tucson NWS data. The default minimum wind speed of 0.5 m/s was used. The site-specific surface characteristics were calculated using AERSURFACE tool. The results of the AERSCREN analysis are presented in Section X.K.4

E. Ambient Air Boundary and Receptor Network

Applicants are required to demonstrate compliance with NAAQS at receptors spaced along and outside the ambient air boundary (AAB). According to the EPA's revised policy on exclusion from "Ambient Air", "*the atmosphere over land owned or controlled by the stationary source may be excluded from ambient air where the source employs measures, which may include physical barriers, that are effective in precluding access to the land by the general public*".[5] ADI established the AAB, aligning it with the facility's fence line.

ADI set up a receptor network to determine areas of maximum predicted concentrations. The grid spacing utilized for the receptors are as follows:

- AAB set at 25-meter (m) intervals;
- A receptor grid of 100 m, extending from the center of the proposed project to 1 kilometer (km);
- A receptor grid of 350 m, extending from 1 km to 5 km;
- A receptor grid of 750 m, extending from 5 km to 20 km; and
- A receptor grid of 1,750 m, extending from 20 km to 50 km.

There is a section of Grapevine Lane, a public road, that runs through the proposed project. Because any public roads will be considered as ambient air, discrete receptors at 25 m intervals were placed along Grapevine Lane within the AAB. ADI used the AERMAP terrain processor (v18081) to process the USGS National Elevation Data (NED) to generate the receptor elevations and hill heights.

In the AERSCREEN modeling analysis, receptors were placed at a distance from 250 m to 10 km. The 250-m distance approximately represents the shortest distance from the main emission sources to the AAB. AERSCREEN interfaces with AERMAP to process the NED data to generate the receptor elevations and hill heights.

F. Downwash and Good Engineering Practice (GEP)

All the facility stacks are subject to downwash. All stacks are also below the minimum 65-meter allowable GEP height, therefore all stack heights are fully creditable for air quality

5 U.S. EPA. 2019. Revised Policy on Exclusion from "Ambient Air" https://www.epa.gov/sites/default/files/2019-12/documents/ambient_air2019.pdf

modeling. ADI evaluated building downwash effects based on building and stack location and dimensions, and the EPA's Building Profile Input Program Plume Rise Model Enhancements (BPIP-PRME).

G. Land Use Classification

The rural/urban classification of an area is determined by either the dominance of a specific land use or by population data in the study area. The land-use procedure specifies that the land-use within a three-kilometer radius of the source should be determined using the typing scheme developed by Auer.[6] ADI determined the project site area as "Rural" based on the land use method.

H. Background Concentrations

Background concentrations should be representative of regional air quality in the vicinity of a facility. Typically, background concentrations should be determined based on the air quality data collected in the vicinity of the proposed project site. However, if there are no monitors located in the vicinity of the project, a "regional site" may be used to determine background concentrations. Per Appendix W Section 8.3.2 b, a regional site is "*one that is located away from the area of interest but is impacted by similar or adequately representative sources*."

The proposed project is located approximately half a mile Southeast of the town center of Benson. It is also near Interstate Highway 10 (I-10), State Road 80 (SR-80) and rural farmland. Emissions from transportation, agricultural activities, and local urban sources may contribute to the background concentrations at the project site.

1. Background Concentration for PM_{10}

Considering the proximity of the proposed project to the City of Benson, I-10, and nearby farmland, ADI selected the Green Valley PM_{10} monitor to determine background PM_{10} concentrations. The Green Valley monitor is located approximately 0.4 miles from Interstate Highway 19 and 1 mile from agricultural land, making it the most representative PM_{10} monitor for background determination at the project site area.

Following ADEQ's guidance, ADI calculated the 24-hour PM_{10} background value based on the average of the 2nd highest yearly values from years 2021 through 2023. The resulting background value was 53 $\mu g/m^3$.

2. Background Concentration for $PM_{2.5}$

Spatial differences in $PM_{2.5}$ concentrations are generally less pronounced than those for PM_{10}, primarily due to the extended atmospheric residence period of fine particles. This extended duration enables fine particles to be transported over long distances, resulting in more uniform distribution of mass concentrations. ADI

6 Auer, A.H. 1978. Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology, 17:636-643.

selected the Children's Park NCore monitor in Tucson for background determination for $PM_{2.5}$.

In accordance with ADEQ's guidance, the annual $PM_{2.5}$ background concentration was calculated based on the average of the most recent three years (2021-2023), resulting in a value of 6.2 $\mu g/m^3$. This three-year period represented the most currently available data that had been quality assured at the time the permit application was submitted. The 24-hour background $PM_{2.5}$ concentration was calculated based on the average of the 98^{th} percentile 24-hour values measured over the same three-year period, resulting in a value of 12.5 $\mu g/m^3$.

3. Background Concentration for NO_2

The background concentration for NO_2 at the project site area may be impacted by emissions from large near-by industrial emission sources and vehicular traffic emissions from I-10. The large industrial emission sources (Apache Generating Station and Apache Nitrogen Products) have been explicitly included in the NAAQS modeling analysis for 1-hour NO_2.

ADI selected the Children's Park NCore monitor in Tucson for background determination for NO_2. The monitor is located adjacent to State Route 77 and East River Road, both of which are busy surface streets. Upon the Department's review, higher traffic volume counts were found in the vicinity of the ambient air monitor compared to those near the project site. Since NOx emissions from road transportation are a major contributor to ambient NO_2 concentrations, the Department has determined that the NO_2 monitoring data from the Children's Park monitor is adequately representative - and likely a conservative evaluation - of the current background concentrations for NO_2 near the project site.

Following ADEQ's guidance, the annual NO_2 background concentration was calculated based on the average of the most recent three years (2021-2023) of the annual average NO_2 concentrations, yielding in a value of 13.2 $\mu g/m^3$. This three-year period represented the most currently available data that had been quality assured at the time the permit application was submitted. The 1-hour NO_2 background concentration was calculated as the average of the 98^{th} percentile of the annual distribution of daily maximum 1-hour values from years 2021 through 2023, resulting in a value of 58.3 $\mu g/m^3$.

I. 1-hour NO_2 Modeling

Based on Appendix W Section 4.2.3.4-d, the following multi-tiered approach is recommended for 1-hour NO_2 modeling:

- Tier 1 Total Conversion: Assume full conversion of NO to NO_2 without any additional justification.
- Tier 2 Ambient Ratio Method (ARM2): Multiply Tier 1 result by representative equilibrium ratios of NO_2/ NO_X value that are based on ambient levels of NO_2 and

NO_X derived from national data obtained from the EPA's Air Quality System (AQS).

- Tier 3: Plume Volume Molar Ratio Method (PVMRM) or Ozone Limiting Method (OLM).

ADI used the Tier 2 approach, applying the ARM2 default option in 1-hour NO_2 modeling.

J. Methodology for Ozone and Secondary $PM_{2.5}$ Impacts Analysis

Per Appendix W Section 5.3.2 and Section 5.4.2, the EPA recommends a two-tiered demonstration approach for addressing single-source impacts on ozone and secondary $PM_{2.5}$. The first tier involves use of technically credible relationships between precursor emissions and a source's impacts that may be published in the peer-reviewed literature; developed from modeling that was previously conducted for an area by a source, a governmental agency, or some other entity and that is deemed sufficient; or generated by a peer-reviewed reduced form model. The second tier involves application of more sophisticated case-specific chemical transport models (e.g., photochemical grid models) to be determined in consultation with the EPA Regional Office and conducted consistent with new EPA single-source modeling guidance. It is anticipated that the case for using a full quantitative chemical transport model is rare.

One of the first-tier demonstration tools is Model Emissions Rates for Precursors (MERPs). The MERPs can be described as an emission rate of a precursor that is expected to result in a change in ambient O_3 or $PM_{2.5}$ that is less than a specific air quality concentration threshold, such as a SIL. In summary, if the emission rates of precursors for a proposed source are less than MERPs, it is concluded that the proposed source will not cause or contribute to a violation of the NAAQS for ozone or the secondary formation of $PM_{2.5}$ from the proposed source.

The EPA has established empirical relationships between individual sources and their impacts on O_3 and $PM_{2.5}$ for hundreds of hypothetical sources, including three sources in Arizona.[7] During their assessment, ADI examined the three hypothetical sources in Arizona and concluded that the hypothetical source in Gila County best represents the project site. The Department, in partial agreement with ADI's analysis, opted for a conservative approach. Specifically, the Department selected the most conservative values in the analysis, which are summarized in Table 4.

Table 4: Highest Modeled Concentrations for Three Hypothetical Sources in Arizona

Pollutants	Precursors	Stack Height (m)	Emissions (tpy)	Highest Modeled Concentrations in Arizona
Annual $PM_{2.5}$	SO_2	10	500	0.0032[a]
Annual $PM_{2.5}$	NOx	10	500	0.0009[a]
Daily $PM_{2.5}$	SO_2	10	500	0.3128[a]
Daily $PM_{2.5}$	NOx	10	500	0.0393[a]

7 U.S. EPA. MERPs View Qlik. https://www.epa.gov/scram/merps-view-qlik

O_3	VOCs	10	500	0.0263[b]
O_3	NOx	10	500	2.446[b]

[a] The unit for concentrations is $\mu g/m^3$;
[b] The unit for concentrations is ppb.

1. Ozone Impact Analysis

The contribution of each ozone precursor (VOCs and NO_X) is calculated by dividing the maximum impact of the hypothetical source by the hypothetical source's emissions, then multiplying that by the project emissions. The project emissions for VOCs and NO_X are 93.3 tpy and 93.7 tpy, respectively. The 8-hour O_3 impacts from the proposed Project are:

$= 0.0263/500\times93.3+2.446/500\times93.7$
$= 0.46$ ppb

Because the O_3 impacts are below the O_3 SIL of 1 ppb, it is concluded that the proposed project will not cause or contribute to a violation of the NAAQS for ozone.

2. Secondary $PM_{2.5}$ Impact Analysis

The project emission for SO_2 and NO_X are 0.3 tpy and 93.7 tpy, respectively. The secondary impact for 24-hour $PM_{2.5}$ and annual $PM_{2.5}$ are calculated as follows.

Secondary Impact for 24-hour $PM_{2.5}$:
$= 0.313/500\times0.3 + 0.039/500\times93.7$
$= 0.0075\ \mu g/m^3$

Secondary Impact for Annual $PM_{2.5}$:
$= 0.0032/500\times0.3+0.0009/500\times93.7$
$= 0.0002\ \mu g/m^3$

The secondary impacts above were incorporated with the primary impacts from the AERMOD NAAQS modeling and the background concentrations. The resulting total concentrations were subsequently assessed against the NAAQS.

K. Modeling Results

1. Significant Impact Analysis Model Results

As shown in Table 5, the modeled concentrations for 1-hour and 8-hour CO are below Class II SILs, exempting them from a cumulative impact compliance analysis under minor NSR. However, the proposed project results in significant impacts for PM_{10}, $PM_{2.5}$ and NO_2. Therefore, a cumulative impact analysis was conducted for the PM_{10}, $PM_{2.5}$ and NO_2 NAAQS.

Table 5: Significant Impact Analysis Results

Pollutant		**Design Value**	**Concentration ($\mu g/m^3$)**	

	Averaging Period		Modeled	Class II SIL	Exceeds SIL?
PM_{10}	24-hour	H1H[a]	19.91	5.0	Yes
$PM_{2.5}$	24-hour	H1H[a]	12.58[b]	1.2	Yes
	Annual	H1H[a]	1.9[b]	0.2	Yes
CO	1-hour	H1H[a]	58.70	2,000	No
	8-hour	H1H[a]	36.51	500	No
NO_2	1-hour	H1H[a]	57.23	7.5	Yes
	Annual	H1H[a]	1.66	1.0	Yes

[a]The highest modeled concentrations across all receptors.
[b]The modeled impacts for $PM_{2.5}$ included the primary modeled concentrations from AERMOD, and the secondary impacts as calculated in Section I.J.2.

2. Cumulative Impact Analysis Model Results

Table 6 summaries the NAAQS model results for PM_{10}, $PM_{2.5}$ and NO_2. Representative background concentrations were added to modeled concentrations, and the total concentrations were then compared to the NAAQS. As shown in the table, emissions from the proposed project will not cause or contribute to a violation of the NAAQS, provided the facility operates within the limitations and conditions specified in the permit.

Table 6: NAAQS Model Results

Pollutant	Averaging Period	Design Value	Modeled Concentration (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	NAAQS (µg/m³)	Exceeds NAAQS ?
PM_{10}	24-hour	H4H[a]	14.6	53	67.6	150	No
$PM_{2.5}$	Annual	H1H[b]	1.9[d]	6.2	8.1	9	No
	24-hour	H8H[c]	8.6[d]	12.5	21.1	35	No
NO_2	Annual	H1H[b]	1.7	13.2	14.9	100	No
NO_2	1-hour	H8H[c]	81.3	58.3	139.6	188	No

[a] Form of PM_{10} NAAQS standard evaluated as highest 4th high value based off using a representative 3-year prognostic meteorological dataset.
[b]The highest modeled concentration across all receptors.
[c]The highest of the 8th -highest (98th percentile) modeled concentrations across all receptors.
[d] The modeled impacts for $PM_{2.5}$ included the primary modeled concentrations from AERMOD, and the secondary impacts as calculated in Section I.J.2.

3. HAPs Model Results

a. Impacts on Learning Sites

Table 7 summaries the modeled impacts of HAPs at learning sites. The modeled maximum hourly concentrations are compared to the AAACs, while the modeled annual concentrations are compared to the CAACs, respectively. As shown in Table 7, the modeled impacts of HAPs at learning sites are well below the AAAC and CAAC thresholds. In addition, the modeled 1-hour concentration for HCl is well below the EPA Acute Exposure Level Guideline (AEGL-1) of 2.7 mg/m^3, and the modeled annual concentration is well below the EPA reference concentration for inhalation of 0.02 mg/m^3. These results indicate that the proposed project is not expected to pose any significant health risks to children at learning sites.

Table 7: Modeled Impacts of HAPs at Learning Sites

HAPs	Modeled Impacts		AAAC Threshold Concentration (mg/m^3)	CAAC Threshold Concentration (mg/m^3)	Exceeds AAAC?	Exceeds CAAC?
	1-hour Concentration (mg/m^3)	Annual Concentration (mg/m^3)				
Hydrogen Chloride[1]	2.79E-02	7.26E-04	16	2.09E-02	No	No
Antimony	2.41E-07	5.39E-09	13	1.46E-03	No	No
Arsenic	1.05E-07	1.82E-09	2.5	4.41E-07	No	No
Beryllium	2.19E-07	3.30E-09	0.013	7.90E-07	No	No
Cadmium	4.45E-07	8.40E-09	0.25	1.05E-06	No	No
Chromium VI	3.74E-07	6.36E-09	0.1	1.58E-07	No	No
Cobalt	1.96E-07	3.19E-09	10	6.86E-07	No	No
Manganese	3.43E-04	6.46E-06	2.5	5.21E-05	No	No
Mercury, elemental	6.77E-08	1.17E-09	1	3.13E-04	No	No
Nickel	2.77E-06	4.43E-08	5	7.90E-06	No	No
Selenium	1.09E-07	2.27E-09	0.5	1.83E-02	No	No
Benzene	4.13E-04	1.07E-05	1276	2.43E-04	No	No
Formaldehyde	1.88E-05	3.21E-07	17	1.46E-04	No	No
Naphthalene	3.40E-04	8.80E-06	75	5.58E-05	No	No
Toluene	3.76E-04	9.72E-06	1923	5.21	No	No
Acrylonitrile	1.18E-04	3.05E-06	38	2.79E-05	No	No
Carbon Disulfide	2.96E-04	7.67E-06	311	7.30E-01	No	No
Carbon Tetrachloride	1.59E-06	4.12E-08	201	1.26E-04	No	No
Chloroform	2.38E-05	6.16E-07	195	3.58E-04	No	No
Tetrachloroethene	4.10E-06	1.06E-07	814	3.20E-04	No	No
Trichloroethene	1.93E-06	5.01E-08	1450	1.68E-05	No	No
Total POM	6.99E-08	6.20E-10	5	2.02E-06	No	No

Total Dibenzo-furans	1.07E-09	2.38E-11	25	7.30E-03	No	No

[1] *Concentrations remain below the EPA Acute Exposure level guideline of 2.7 mg/m^3 for the 1-hour averaging period and below the EPA reference concentration for inhalation of 0.02 mg/m^3 for the annual averaging period values, respectively.*

b. Impacts on Residential Areas

The modeled impacts of HAPs at residential areas are summarized in Table 8. Although the concentrations at these locations are higher than those at learning sites due to the proximity of residences to the project site, the modeled concentrations still remain below the AAAC and CAAC thresholds. Furthermore, the modeled concentrations of HCl at residential areas are below both the EPA's Acute Exposure Level Guideline and the chronic reference concentration. These results indicate that the proposed project is not expected to pose any significant health risks to individuals at residential areas.

Table 8: Modeled Impacts of HAPs at Residential Areas

HAPs	Modeled Impacts		AAAC Threshold Concentration (mg/m^3)	CAAC Threshold Concentration (mg/m^3)	Exceeds AAAC?	Exceeds CAAC?
	1-hour Concentration (mg/m^3)	Annual Concentration (mg/m^3)				
Hydrogen Chloride[1]	6.05E-02	1.76E-03	16	2.09E-02	No	No
Antimony	5.03E-07	1.30E-08	13	1.46E-03	No	No
Arsenic	2.16E-07	4.01E-09	2.5	4.41E-07	No	No
Beryllium	3.18E-07	6.79E-09	0.013	7.90E-07	No	No
Cadmium	1.03E-06	1.91E-08	0.25	1.05E-06	No	No
Chromium VI	9.11E-07	1.39E-08	0.1	1.58E-07	No	No
Cobalt	3.23E-07	6.79E-09	10	6.86E-07	No	No
Manganese	5.36E-04	1.08E-05	2.5	5.21E-05	No	No
Mercury, elemental	1.68E-07	2.56E-09	1	3.13E-04	No	No
Nickel	4.69E-06	9.37E-08	5	7.90E-06	No	No
Selenium	2.20E-07	5.27E-09	0.5	1.83E-02	No	No

Benzene	1.03E-03	2.55E-05	1276	2.43E-04	No	No
Formaldehyde	4.69E-05	7.02E-07	17	1.46E-04	No	No
Naphthalene	8.52E-04	2.10E-05	75	5.58E-05	No	No
Toluene	9.42E-04	2.32E-05	1923	5.21	No	No
Acrylonitrile	2.95E-04	7.27E-06	38	2.79E-05	No	No
Carbon Disulfide	7.42E-04	1.83E-05	311	7.30E-01	No	No
Carbon Tetrachloride	3.98E-06	9.82E-08	201	1.26E-04	No	No
Chloroform	5.96E-05	1.47E-06	195	3.58E-04	No	No
Tetrachloroethene	1.03E-05	2.53E-07	814	3.20E-04	No	No
Trichloroethene	4.84E-06	1.19E-07	1450	1.68E-05	No	No
Total POM	2.19E-07	6.87E-10	5	2.02E-06	No	No
Total Dibenzo-furans	2.06E-09	5.92E-11	25	7.30E-03	No	No

[1] Concentrations remain below the EPA Acute Exposure level guideline of 2.7 mg/m^3 for the 1-hour averaging period and below the EPA reference concentration for inhalation of 0.02 mg/m^3 for the annual averaging period values, respectively.

4. AERSCREEN Model Results

Table 9 summarizes the modeled results of HAPs at ambient air using the AERSCREEN model. As expected, the modeled 1-hour concentrations predicted by AERSCREEN are higher than those generated by the refined AERMOD model, due to the conservative nature of AERSCREEN. Despite this conservatism, the concentrations remain below the AAAC thresholds. Additionally, the modeled concentration of HCl is below the EPA's Acute Exposure Level Guideline. These results further confirm that potential health impacts at residential areas are expected to be minimal, even under worst-case modeling assumptions.

Table 9: Modeled Impacts of HAPs at Residential Areas Using AERSCREEN

HAPs	Modeled 1-hour Concentration (mg/m^3)	AAAC Threshold Concentration (mg/m^3)	Exceeds AAAC?
Hydrogen Chloride[1]	0.13	16	No
Antimony	8.56E-07	13	No
Arsenic	2.93E-07	2.5	No
Beryllium	5.13E-07	0.013	No
Cadmium	1.36E-06	0.25	No
Chromium VI	1.03E-06	0.1	No

Cobalt	5.02E-07	10	No
Manganese	1.00E-03	2.5	No
Mercury, elemental	1.90E-07	1	No
Nickel	6.97E-06	5	No
Selenium	3.65E-07	0.5	No
Benzene	1.85E-03	1276	No
Formaldehyde	5.21E-05	17	No
Naphthalene	1.52E-03	75	No
Toluene	1.68E-03	1923	No
Acrylonitrile	5.28E-04	38	No
Carbon Disulfide	1.33E-03	311	No
Carbon Tetrachloride	7.14E-06	201	No
Chloroform	1.07E-04	195	No
Tetrachloroethene	1.84E-05	814	No
Trichloroethene	8.65E-06	1450	No
Total POM	7.81E-08	5	No
Total Dibenzo-furans	3.92E-09	25	No

[1] *Concentration remains below the EPA Acute Exposure level guideline of 2.7 mg/m^3 for the 1-hour averaging period.*

5. Ambient HCl monitoring

In addition to the modeling analysis for HCl, ADEQ will require the facility to install, operate and maintain a minimum of three ambient monitors in the area of concern. Monitoring sites will be selected based on modeled concentration "hot spots," proximity to sensitive populations, and equipment accessibility. While the modeling demonstrates that predicted HCl concentrations will be below applicable health-based standards, monitoring will provide real-world confirmation that actual ambient levels follow those projections under day-to-day operating and meteorological conditions.

To ensure timely response to elevated HCl levels, two action thresholds will be established. The first, an alert level at concentrations exceeding 2.0 mg/m³, triggers immediate notification to ADEQ, a root-cause investigation of any concentration spikes and corrective action as necessary to restore concentrations below 2.0 mg/m³. The second, a shutdown level at concentrations exceeding 2.5 mg/m³, mandates suspension of HCl-generating operations until concentrations fall below the alert level. This shutdown level is set based on the EPA's Acute Exposure Guideline Levels – Level 1 (AEGL-1), which identifies exposure concentrations that may cause notable, transient effects such as discomfort and irritation, but are not disabling and reversible upon cessation of exposure.[8] AEGL values represent threshold levels for the general public, including sensitive populations such as children, the elderly, persons with illnesses. The AEGL-1 is 2.7 mg/m³, and ADEQ set the shutdown level at 2.5 mg/m³ to ensure that HCl emissions are curtailed prior to reaching the threshold.

Additionally, ADEQ will require the facility to install, operate and maintain a meteorological monitoring station within the area of concern. Periodic data reports are required to be submitted to ADEQ and will be made accessible upon request. The meteorological data will allow ADEQ to interpret HCl plume trajectories, identify the origins of any concentration spikes, and distinguish between operational upsets and unusual meteorological conditions. Combined with continuous ambient air monitoring, this robust framework will enable effective corrective actions and ensure proactive protection of public health.

8 The threshold of 2.7 mg/m^3 for 1-hour exposure is based on the Acute Exposure Level Guideline (AEGL-1) for HCl: https://www.epa.gov/sites/default/files/2014-11/documents/tsd52.pdf

XII. LIST OF ABRIVIATIONS

A.A.C.	Arizona Administrative Code
A.R.S.	Arizona Revised Statutes
AAAC	Acute Ambient Air Concentrations
ADEQ	Arizona Department of Environmental Quality
ADJ_U*	Adjusted Surface Friction Velocity
AEGL-1	Acute Exposure Level Guideline
AERMAP	AERMOD Terrain Preprocessor
AERMET	AERMOD Meteorological Preprocessor
AERMOD	AMS/EPA Regulatory Model
AERSCREEN	Screening Model Based On AERMOD
AERSURFACE	Surface characteristics preprocessor for AERMOD
AMS	American Meteorological Society
AQD	Air Quality Division
AQRV	Air Quality Related Values
ARM	Ambient Ratio Method
ARM2	Updated Ambient Ratio Method
BACT	Best Available Control Technology
BPIP-PRME	Building Profile Input Program Plume Rise Model Enhancements
Btu/ft3	British Thermal Units per Cubic Foot
BULKRN	Bulk Richardson Number
CAAC	Chronic Ambient Air Concentrations
CAM	Compliance Assurance Monitoring
CEMS	Continuous Emissions Monitoring System
CFR	Code of Federal Regulations
CH4	Methane
CO	Carbon Monoxide
CO2e	CO2 equivalent basis
CONUS	Continental United States
CWOP	Citizen Weather Observer Program
EPA	Environmental Protection Agency
ft	Feet
g	Gram
GEP	Good Engineering Practice
GHG	Greenhouse Gases
HAP	Hazardous Air Pollutant
HCl	Hydrogen Chloride
hp	Horsepower
hr	Hour
IC	Internal Combustion
KFHU	Sierra Vista Municipal Airport
MERPs	Model Emissions Rates for Precursors
MMIF	Mesoscale Model Interface Program
NAAQS	National Ambient Air Quality Standard
NED	National Elevation Data
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	Minor New Source Review

NWS....................National Weather Station
O3 ....Ozone
OLM....................Ozone Limiting Method
Pb ....Lead
PM....................Particulate Matter
PM_{10} ....Particulate Matter less than 10 µm nominal aerodynamic diameter
$PM_{2.5}$ ....Particulate Matter less than 2.5 µm nominal aerodynamic diameter
PSD ....Prevention of Significant Deterioration
PTE ....Potential to Emit
PVMRM....................Plume Volume Molar Ratio Method
QA/QC ....Quality Assurance and Quality Control
RSLs....................Federal Screening Levels
SIA ....Significant Impact Area
SIL ....Significant Impact Level
SO2 ....Sulfur Dioxide Significant Impact Levels
TPY ....Tons per Year
u* ....Surface Friction Velocity
UNC ....University of North Carolina
USGS ....United States Geological Survey
VOCs ....Volatile Organic Compounds
WRF....................Weather Research and Forecasting Model
yr ....Year