ADEQ CLASS I APPLICATION – AIR DISPERSION MODELING REPORT

Aluminum Dynamics, Inc / Benson, AZ

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December 18, 2024

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1. INTRODUCTION

1.1 Background

Steel Dynamics, Inc.'s (SDI), doing business as Aluminum Dynamics, Inc. (ADI) is proposing to construct and operate a new recycled aluminum ingot casting center as a satellite ingot supply facility for its low-carbon, recycled aluminum flat rolling mill currently being constructed in Columbus, MS. The proposed satellite casting center will be located on a currently undeveloped property near the city of Benson, AZ (here in referred to as the Benson plant). The Benson plant will receive aluminum scrap from the post-consumer and post-industrial supplier network and will support the manufacturing of aluminum rolling ingots targeted downstream processing at rolling mill facilities serving the sustainable beverage packaging, automotive, and common alloy (e.g., building and construction materials) industrial sectors.

1.2 Purpose

As part of the minor New Source Review (mNSR) process under Arizona Administrative Code (A.A.C.) R18-2-334.C.2., an ambient air quality assessment was conducted via air dispersion modeling to demonstrate that potential impacts from the ADI Project will not interfere with attainment or maintenance of any National Ambient Air Quality Standard (NAAQS). The NAAQS are protective of the general public and "at risk" populations.

1.3 Pollutants

The following pollutants with NAAQS standards were evaluated in the air dispersion modeling analysis. The ADI Project has Potential-to-Emit (PTE) estimates for these pollutants included in the air permit application:

- Particulate matter less than 10 microns (PM_{10}).
- Particulate matter less than 2.5 microns ($PM_{2.5}$).
- Carbon Monoxide (CO);
- Nitrogen Oxides (NO_x); and
- Hazardous Air Pollutants (HAPs).

Corresponding averaging periods and standards are included in detail in **Section 4**.

2. PROJECT DESCRIPTION

ADI is planning to construct a new state-of-the art aluminum rolling ingot casting facility with a maximum potential production capacity of approximately 300,000 US ton/yr (assuming continuous operation at the maximum short-term potential aluminum process rates). Aluminum Dynamics will incorporate the newest aluminum scrap processing, decoating, melting, and casting technology available to produce low carbon aluminum from recycled material. The proposed casting project includes construction and installation of the following primary process equipment (each process is detailed in the Class I permit application):

- One (1) scrap processing system consisting of various shredding, separation, and storage operations for processing the incoming scrap streams.
- One (1) rotary kiln-type decoater for drying and delacquering/decoating the shredded scrap supplied from the shred lines.
- Two (2) conventional side well-type aluminum melt furnaces capable of receiving both hot shreds from the decoater and loose scrap and hard charge from other sources.
- One (1) tilting-type aluminum holding furnace operating via a batch operating cycle to feed a single casting pit; and
- One (1) in-line fluxer/degassing unit capable of using only non-reactive gaseous flux (argon gas) for final refining of the molten aluminum before feeding the metal to the casting pit.

Aluminum Dynamics also plans to install various ancillary equipment such as scrap storage and handling areas, a dross press, a dross house, a sow dryer, a lime silo for lime-injected baghouses, cooling towers, paved plant roads, and paved and unpaved storage yards.

Based on an analysis of the potential emissions from the proposed project, the Benson plant will be classified as a major source under the Class I operating permit program and synthetic minor source under the Prevention of Significant Deterioration (PSD) pre-construction permitting program for select regulated NSR pollutants. These proposed operations will be located in an area of Cochise County currently designated as attainment or unclassifiable for all National Ambient Air Quality Standards (NAAQS).[1]

As such, the proposed project is potentially subject to PSD requirements for all pollutants.

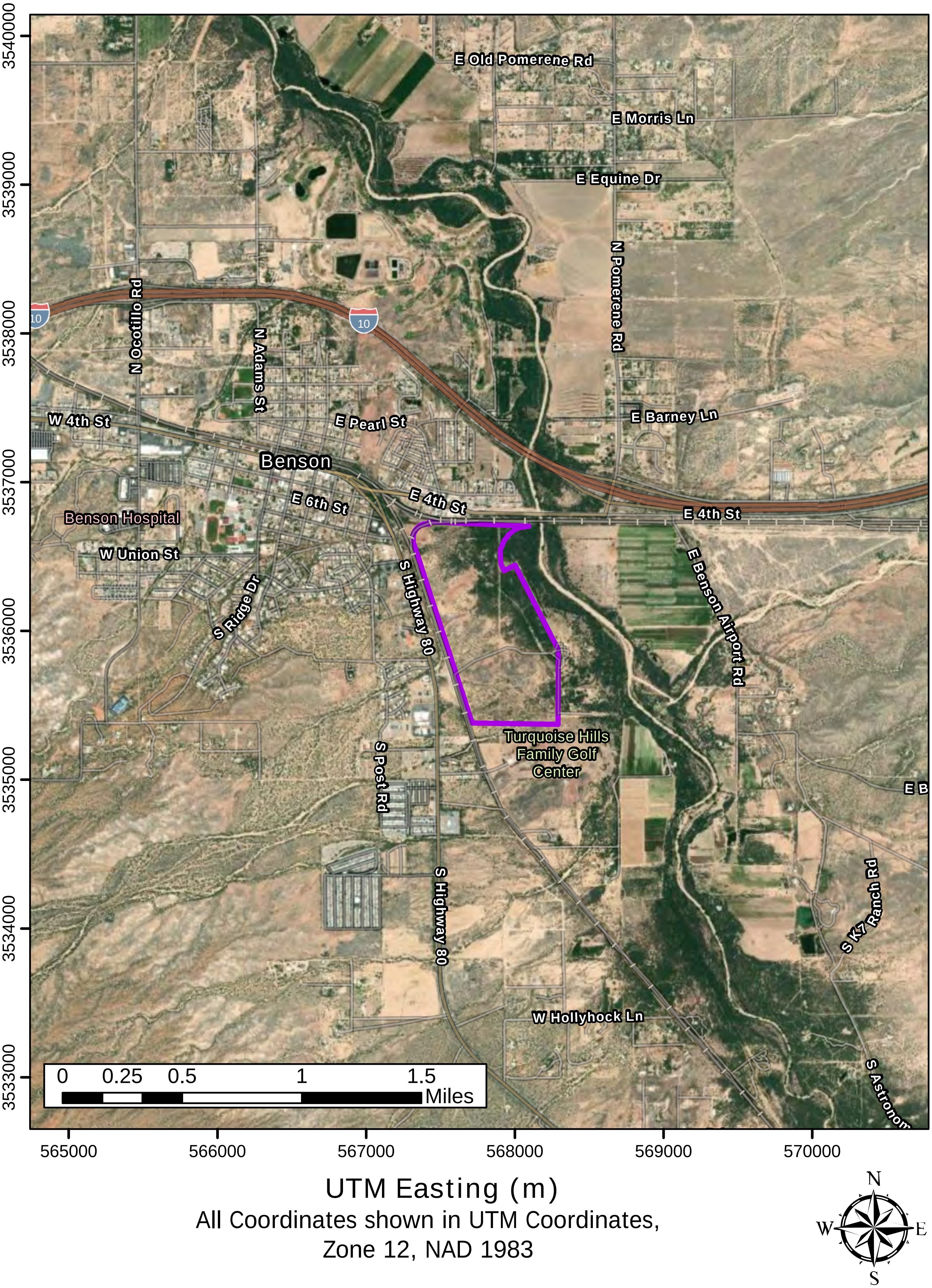
[1] Air Quality in My Community (arcgis.com)

3. EVALUATION AREA

ADI intends to build its aluminum casting facility at a greenfield site with an approximate land area of 218 acres. The Benson plant will be located approximately half a mile Southeast of the town center of Benson, AZ. The Benson property is bordered by Interstate Highway 10 (I-10) and State Road 80 (SR-80) to the North and West, and rural farmland to the South and East.

Figure 1 provides the general location of the site as well as surrounding cities and highways. The property boundary of the facility is also shown. As can be seen from **Figure 1**, the land use near the facility is generally rural with the small-town center of Benson, small groups of residential/commercial development, and fully undeveloped desert lands. The Universal Transverse Mercator (UTM) coordinates of the center of the facility's property are (approximately) 567,817 meters (m) East and 3,536,160 m North (UTM Zone 12, NAD83). **Figure 2** provides an overview of the proposed site plan, in addition to the surrounding public roads and properties.

Figure 1. ADI Proposed Project Area Map



UTM Northing (m)

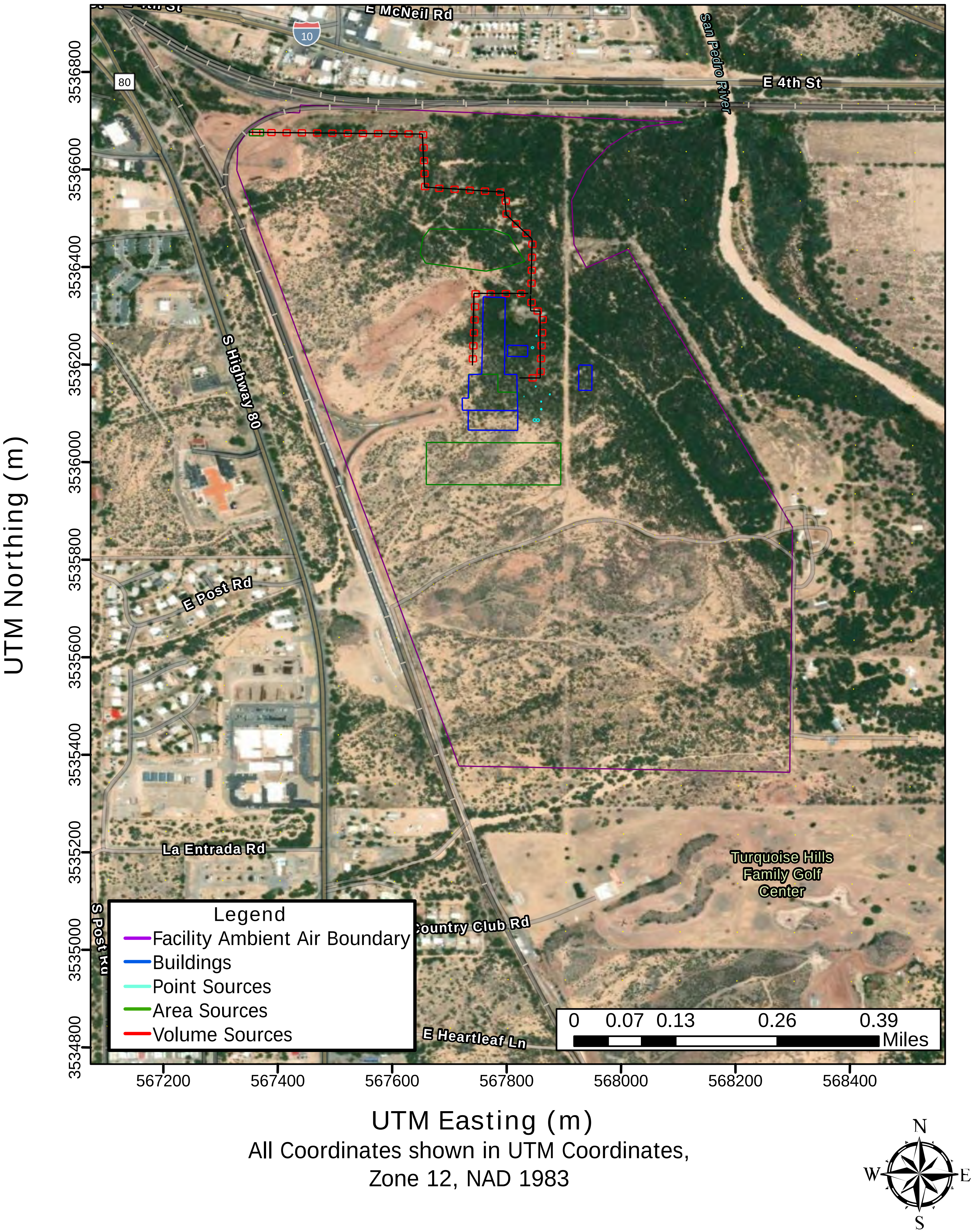
3540000 3539000 3538000 3537000 3536000 3535000 3534000 3533000

565000 566000 567000 568000 569000 570000

UTM Easting (m)

All Coordinates shown in UTM Coordinates, Zone 12, NAD 1983

Figure 2: ADI Proposed Site Map



4. MODELING APPROACH

As part of the mNSR process under A.A.C. R18-2-334, an air quality dispersion modeling analysis was completed to demonstrate that potential impacts from the Project will not cause or contribute to a violation of any applicable NAAQS. According to the ADEQ modeling guidelines[2], the modeling analysis was performed in the following two steps:

- Step 1 – A significant impact analysis and, if required.
- Step 2 – A full impact analysis

4.1 Significant Impact Analysis

In the Significant Impact Analysis, the proposed new emissions were modeled to determine if the proposed emissions have a significant impact on the surrounding areas. The maximum modeled concentrations from the significant impact analysis were compared to the applicable significant impact levels (SILs), for each pollutant and averaging period. **Table 4.1** contains the applicable Class II SILs for each pollutant modeled. If the maximum modeled concentration is less than the corresponding SIL, no further analysis will be required to demonstrate compliance with the NAAQS. If the maximum modeled concentration exceeds the applicable SIL, a full impact analysis will be performed to demonstrate compliance with the NAAQS.

Table 4.1. Class II Significant Impact Levels

Pollutant	Period	Class II SIL ($\mu g/m^3$)	Notes
PM_{10}	24-hour	5	
$PM_{2.5}$	24-hour	1.2	SILs may be used under some circumstances.
	Annual	0.13	
NO_2	1-hour	7.5	Interim 1-hour SIL
	Annual	1	
CO	1-hour	2,000	
	8-hour	500	

4.2 NAAQS Analysis

If the results of the significant impact analysis exceed the SIL, a full impact analysis is required. This section details the methodology of the NAAQS component of the full impact analysis. ADI performed the full NAAQS analysis within the significant impact area (SIA). Specifically, the SIA is defined by locations where the predicted impacts from the significant impact analysis exceed the SIL. The SIA is defined individually for each pollutant and averaging period combination.

The full NAAQS analysis expands on the significant impact analysis by accounting for additional emissions (nearby sources) outside of the Project, as well as ambient pollutant levels. The ambient background concentrations of pollutants were determined from ambient monitoring data.

[2] Air Quality Modeling Guidelines for Arizona Air Quality Permits, November 1, 2019.

Emissions from off-site sources with the potential to cause impacts within the SIA are also included in the full NAAQS model. ADI obtained data for off-site sources via public records requests to ADEQ. The process of off-site inventory compilation, and a summary of off-site source parameters is detailed in **Section 5.11**.

The results from direct modeling of ADI facility-wide emissions and off-site emissions are added to the ambient background concentration. This total concentration was compared to the NAAQS thresholds. The pollutants and averaging periods for which ADI performed a full NAAQS analysis, the corresponding NAAQS threshold, and the form of the model result used for comparison are summarized in **Table 4.2** below based on a five-year meteorological dataset.

Table 4.2. Class II NAAQS Thresholds

Pollutant	Averaging Period	Class II NAAQS (μg/m³)	Modeling Result[1,2,3]
PM_{10}	24-hour	150	H2H[1]
$PM_{2.5}$	Annual	9	H1H
	24-hour	35	H8H[2]
NO_2	Annual	100	H1H
	1-hour	188	H8H[3]
CO	1-hour	40,000	H2H[1]
	8-hour	10,000	H2H[1]

[1] Form of standard is threshold is not to be exceeded more than once per year on average over 3 years. Model result is based on maximum of individual year H2H results.

[2] Form of standard is 98th percentile averaged over 3 years. Model result is based on 5-year average of H8H results from each individual year.

[3] Form of standard is 98th percentile of 1-hour daily maximum concentrations, averaged over 3 years. Model result is based on 5-year average of H8H results from each individual year.

4.3 Hazardous Air Pollutants Analysis

Per ADEQ's "Learning Site Policy," if a facility is within 2 miles or less of a learning site, the facility should submit a modeling analysis to demonstrate compliance with the NAAQS, and Acute/Chronic Ambient Air Concentrations (AAAC and CAAC) for listed air toxics.[3]

The proposed Facility is located within 2 miles of a learning site, triggering ADEQ's learning site policy, which requires the modeling of HAPs. The modeled concentrations of HAPs were compared against the CAACs and AAACs to identify any potential exceedances of standards for air toxics. Because ADI is a major source of hydrogen chloride (HCl), chronic and acute (modeled as annual and hourly emissions) HCl was modeled based on PTE calculations. For all other HAPs, due to the large number of HAPs modeled and their relatively low PTE, a single model with a normalized emission rate of 1 g/s from each emission source was modeled. The maximum (H1H) impact from each individual source in the 1 g/s model was found and scaled by the emission rate of individual HAP emission sources in units of g/s. The resulting emission impacts were compared to AAACs and CAACs. Source groups were created for each modeled source to determine the maximum

[3] Per Arizona Department of Environmental Quality, Air Dispersion Modeling Guidelines for Arizona Air Quality Permits, Section 7.8, November 1, 2019. A "learning site" consists of all existing public schools, charter schools, and private schools at the K-12 level, and all planned sites for schools approved by the Arizona School Facilities Board.

concentration possible from each source. This analysis offers a conservative approach, by using the maximum impacts at different receptors on different days depending on the model source. All modeling for this analysis was conducted consistent with the NAAQS modeling compliance demonstration outlined in the sections above.

5. MODEL OVERVIEW

This section contains a description of the model setup and details that were used in the air dispersion modeling analysis.

5.1 Dispersion Model Selection

On November 9, 2005, the U.S. EPA promulgated the American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) for adoption into the Guideline on Air Quality Models (Guidelines).[4] AERMOD includes a state-of-the-science downwash algorithm and utilizes AERMET, a meteorological data preprocessor that utilizes current planetary boundary layer (PBL) theory to calculate the dispersion coefficients (σy and σz)[5]. The most current version of the AERMOD model (version 24142) was used in conducting the ADI Project modeling analysis. The modeling was performed using the regulatory default options.

5.2 Meteorological Data

EPA modeling guidance allows the use of five years of adequately representative National Weather Service (NWS) meteorological data, at least one year of site-specific meteorological data, or at least three years of prognostic meteorological data. The EPA *Guidelines* provide a detailed discussion related to the use of "representative" meteorological data for air dispersion modeling purposes. Site specific data is preferred in the *Guidelines* as stated in Section 8.4.2(e) but must be deemed "representative" and quality assured.

As a greenfield minor source, ADI did not have the opportunity to collect on-site meteorological data. The proposed site is in the central part of the San Pedro Valley, while the nearest NWS meteorological station, Sierra Vista Municipal Airport (KFHU), is approximately 41 kilometers south and adjacent to the Huachuca Mountains. As a result, meteorological data from nearby surface stations may not accurately represent conditions at the site. To obtain representative data, prognostic meteorological data was generated using Version 3.8 of the Weather Research and Forecasting (WRF) model, prepared by the University of North Carolina (UNC) Institute for the Environment[6,7,8] in collaboration with the U.S. EPA. The meteorological data were prepared for three years, 2013 through 2015, at 12-kilometer horizontal grid resolution for the continental United States (CONUS) and subsequently processed in the Mesoscale Model Interface Program (MMIF) (Version 3.3) under contract with U.S. EPA to prepare AERMOD-ready meteorological data files.

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[4] Code of Federal Regulations, Title 40-Protection of the Environment, Part 51, Appendix W.

[5] U.S. EPA, User's Guide for the AMS/EPA Regulatory Model-AERMOD, September 2004.

[6] UNC-Chapel Hill. (2016, September 23). *Weather Research and Forecasting Version 3.8: Meteorological Model Evaluation, Annual 2013 12-km CONUS*. Prepared for U.S. Environmental Protection Agency.

[7]UNC-Chapel Hill. (2016, September 7). *Weather Research and Forecasting Version 3.8: Meteorological Model Evaluation, Annual 2014 12-km CONUS*. Prepared for U.S. Environmental Protection Agency.

[8]UNC-Chapel Hill. (2016, September 16). *Weather Research and Forecasting Version 3.8: Meteorological Model Evaluation, Annual 2015 12-km CONUS*. Prepared for U.S. Environmental Protection Agency.

The use of WRF prognostic meteorological data for regulatory modeling was originally authorized by U.S. EPA in the 2017 revision to the *Guidelines*[9] for cases in which representative meteorological data is not available from a nearby surface observing site. As discussed in section 8.4.2(e) of the 2017 and 2024 EPA Guidelines, at least three years of meteorological data is required for a modeling analysis using prognostic data.

5.2.1 Preparation of Prognostic Data for Use with AERMOD

As previously discussed, preparation of the WRF data and subsequent AERMET preparation and execution using the Mesoscale Model Interface Program (MMIF) program was conducted under contract with U.S. EPA. The MMIF program is a utility developed and recommended by U.S. EPA for use in preparing prognostic meteorological data for use in AERMOD. MMIF Version 3.3 was used for processing the 2013-2015 data under the U.S. EPA contract.

In 2023, U.S. EPA released Version 4.1, which is the currently recommended version of the MMIF program and the fifth iteration of the program since Version 3.3 was released. **Table 5.1** summarizes the model change log for the MMIF model with AERMET related notations.

Table 5.1. MMIF Model Change Log Notes

Version	Release Date	Comment	AERMET-related Changes
MMIFv3.3	12/9/2016	Minor upgrade, two bug fixes, functionality fixes.	Changed AER_MIN_SPEED from 0.5 to 0.0 m/s: revised MMIF guidance. Turned on STABLEBL ADJ_U* by default. *(Trinity note: AD_U* was not included in the processing and will result in more conservative model-predicted concentrations.)*
MMIFv3.4	7/18/2018	Minor upgrade, bug fixes, functionality fixes.	Read WRF's CLDFRA output for use in cloud cover output. *(Trinity note: This was later changed in v3.4.1 due to older versions of WRF not having the CLDFRA parameter.)*
MMIFv3.4.1	3/11/2019	Minor upgrade, bug fixes, functionality fixes.	Added "UAWINDOW -6 6 " keyword for AERMOD mode. At high latitudes, the morning sounding falls outside the default "UAWINDOW -1 1" so no convective mixing heights were being calculated by AERMET. Only affects "aer_mixht AERMET" modes. *(Trinity note: this affects high latitudes and would not be pertinent to this modeling.)*
MMIFv3.4.2	6/30/2021	Minor upgrade, bug fixes, functionality improvements, add ability to use WRF's hybrid vertical coordinate.	Change Bowen ratio calculation to use day-time hours only. It was using all hours, which conflicts with the AERMET User Guide.
MMIFv4.0	9/30/2021	Major upgrade, for compatibility with AERMET 22112 and later.	Added capability to create inputs for AERMET 22112 and later, including additional variables required for overwater processing. *(Trinity note: AERMOD is compatible with older versions of AERMET.)*
MMIFv4.1	10/30/2023	Minor upgrade, bug fixes, added variables for overwater	Added additional variables for overwater processing in ONSITE file needed for COARE algorithms in AERMET. *(Trinity note: not applicable for this modeling.)*

[9] Ibid (4).

As seen in **Table 5.1**, Version 4.0 was the only "major upgrade" to the MMIF program which included changing the program's output to match the AERMET input file structure which was changed in 2022 starting with AERMET v22112. AERMOD remains compatible with older versions of AERMET, and the original data processing under the U.S. EPA contract was used in this analysis. The minor upgrades and fixes listed in the MMIF change log and noted in **Table 5.1** are either not applicable to this modeling demonstration or would result in less conservative model-predicted results.

Consistent with the key elements of the U.S. EPA recommendations for prognostic data processing, the following methods were used to prepare the AERMOD-ready meteorological data files in the EPA processing:

- MMIF was used to extract AERMET-ready surface and upper air data files.
- AERMET was used to produce the final 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 BULKRN option in AERMET was used.
- The NO_ADJ and NORAND options in AERMET were used (reflecting the fact that WRF-extracted data rather than ASOS or other surface observations are used).

U.S. EPA recommendations suggest that the ADJ_U* option in AERMET be used in the final stage of processing. This option was not implemented in the 2013-2015 AERMET meteorological data processing and added an extra layer of conservatism to the model output.

Based on the proximity to the proposed facility location, the node selected from the 2013-2015 CONUS prognostic AERMET meteorological data has a latitude and longitude of 31.968° North and 110.317° West with a file naming convention of (MMIF_31.968N_110.317W).

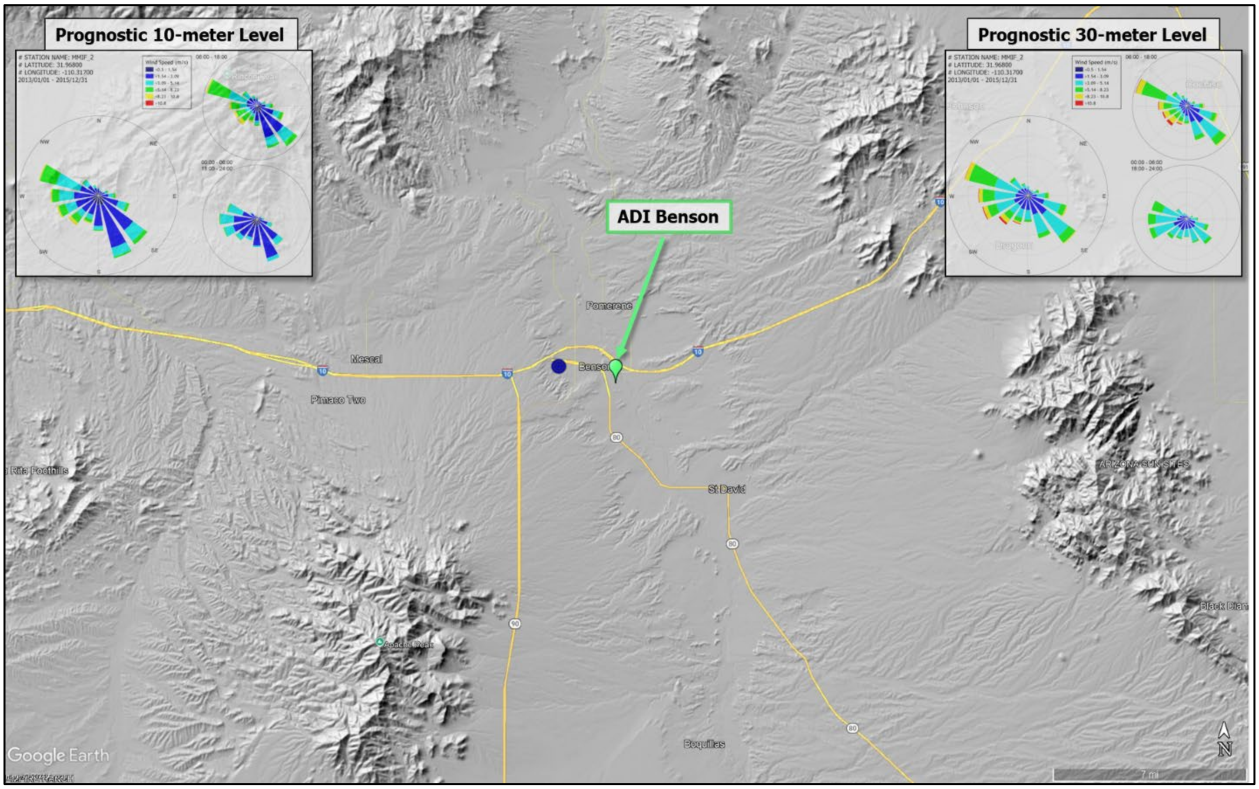
5.2.2 Qualitative Evaluation of Prognostic Data

A qualitative wind rose analysis was conducted to assess the prognostic data and determine whether the MMIF_31.968N_110.317W node accurately captures the terrain and diurnal wind patterns anticipated at the site. **Figure 3** presents a map centered on the ADI facility, highlighting the location of the prognostic meteorological data node, which is situated approximately 3.4 kilometers west-northwest of the facility. It also includes the 10-meter and 30-meter wind roses from the prognostic data for the years 2013-2015.

Like the ADI facility, the prognostic meteorological data node is located in the lower elevation of the river plain, which is expected to exhibit drainage flow at night along the valley's orientation. The 10-meter wind data effectively captures this flow, as illustrated in the nighttime wind rose chart (located in the bottom right of the Prognostic 10-meter level image on the map). In contrast, the 30-meter level is more representative of regional airflow and follows the terrain. Since this level corresponds to the height of the emission stacks at the ADI facility, having additional data at this elevation ensures that the wind directions influencing the plume are not disproportionately affected by low-elevation releases.

Overall, the wind roses indicate that the processed prognostic data successfully reflects the general terrain-driven wind patterns expected in the area surrounding the facility.

Figure 3. Map of ADI Benson, Terrain, and Prognostic Wind Roses (10-meter & 30-meter)



5.2.3 Performance Evaluation of WRF Modeling

In addition to the qualitative results presented above, which suggest that the WRF model effectively represents the local terrain, the evaluation of a WRF model run typically involves comparing its meteorological predictions at nearby airport or ambient monitoring stations with the actual measurements taken at those locations. As requested by ADEQ, a supplemental analysis comparing the WRF model to the nearest airport data will be submitted under separate cover. This analysis will compare WRF data to the nearest airports of Sierra Vista Municipal Airport (KFHU), Pioneer Airfield (KALK), and Tucson Internation Airport (KTUS) and provide further justification for the use of WRF data.

5.3 Terrain

The terrain elevation for each modeled receptor, building and source, was determined using the USGS National Elevation Dataset (NED). Specifically, the USGS NED 1/3 arc second (approximately 10-meter resolution) file was used.

The terrain height for each modeled receptor and elevation for on-site sources and buildings was calculated using the AERMOD terrain processor (AERMAP version 18018). A full civil engineering design package for the Benson plant has not been developed, so the existing terrain data from the NED file represents the best available information for identifying the elevation of modeled on-site sources and buildings. Regardless, the final plant grade elevation for point sources and buildings was expected to closely approximate the NED terrain data due to the very flat topography of the Benson plant.

For boundary and discrete receptors, in addition to terrain elevation, an additional parameter called the hill height scale was required for each receptor to execute AERMOD's terrain modeling algorithms. AERMOD computed the impact at a receptor as a weighted interpolation between horizontal and terrain-following states using a critical dividing streamline approach. This scheme assumes that part of the plume mass had enough energy to ascend and traverse over a terrain feature and the remainder would impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale was computed by the AERMAP terrain preprocessor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor.

The hill height scale does not represent the critical dividing streamline height itself but supplies the computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

The NED array boundary for AERMAP must include all terrain features that exceed a 10 percent elevation slope from any given receptor to properly calculate the hill height scale at each receptor. The domain for the hill height analysis was set to the minimum coverage required for proper handling of elevation slope.

5.4 Building Wake Effects (Downwash)

The emission sources considered in this analysis were evaluated in terms of their proximity to nearby structures. The purpose of this evaluation was to determine if stack discharge might become caught in the turbulent wakes of these structures. Wind blowing around a building creates zones of turbulence that are greater than if the building was absent. Plumes entrained in the zones of turbulence experience enhanced plume growth and restricted plume rise. AERMOD incorporates the Plume Rise Model Enhancements (PRIME) algorithms using dimensions from the EPA's Building Profile Input Program (BPIP) for estimating plumes affected by building wakes. The site layout was used to digitize buildings and structures to be included in the downwash analysis. The Building Profile Input Program for PRIME (BPIPPRM) Version 04274 was used to calculate the downwash values for each point source. All buildings and structures that will be constructed as part of the project are included in the evaluation of downwash. There are no nearby structures outside of the fence line that were expected to impact emissions.

5.5 Considerations for NO_2 Modeling

In the "Models for Nitrogen Dioxide" section of the Guideline (Section 4.2.3.4), the EPA recommends a tiered screening approach for estimating NO_2 impacts from point sources in modeling analyses. The approach used in each of the three tiers is described briefly below.

1) Under the initial Tier 1 screening level, all NO_X emitted is modeled as NO_2 which assumes total conversion of NO to NO_2.
2) For the Tier 2 screening level, the EPA recommends multiplying the Tier 1 results by the Ambient Ratio Method 2 (ARM2), which provides estimates of representative equilibrium ratios of NO_2/NO_X based on ambient levels of NO_2 and NO_X derived from national data from the EPA's Air Quality System (AQS). The ARM2 function, which is a default option within the latest

version of AERMOD, is used to complete this multiplication. The default minimum ambient NO_2/NO_X ratio of 0.5 and maximum ambient ratio of 0.9 is used for this methodology.

3) Because the impact of an individual NO_X source on ambient NO_2 depends on the chemical environment into which the source's plume is emitted, modeling techniques that account for this atmospheric chemistry such as the Ozone Limiting Method (OLM) or the Plume Volume Molar Ratio Method (PVMRM) can be considered under the most accurate and refined Tier 3 approach identified by the EPA. Additional model inputs required for the use of OLM or PVMRM could include source-specific in-stack NO_2/NO_X ratios, ambient equilibrium NO_2/NO_X ratios, and background ozone concentrations.

For purposes of this modeling demonstration, ADI chose to utilize a Tier 2 NO_2 modeling approach using the regulatory-approved EPA default settings.

5.6 Ambient Air Boundary

ADI has set forth an ambient air boundary (AAB) in purple in **Figure 1**. The boundary is based upon fencing that will effectively preclude entry by the general public. The rail line and areas of surrounding public access will be considered ambient air. There is a section of Grapevine Lane, a public roadway, that runs through the proposed Project and as such, receptors will be placed along this road with 25 meter spacing.

5.7 Receptor Grid

For the Class II air dispersion modeling analyses, ground-level concentrations were calculated from the fence line to 50 kilometers (km) using a series of nested receptor grids. These receptors were used in the significance analysis modeling. The following nested grids were used to determine the extent of significance:

- **Fence Line Grid**: "Fence line" grid consisting of evenly spaced receptors 25 meters apart placed along the main property boundary of the proposed Project,

- **Fine Cartesian Grid**: A "fine" grid containing 100-meter spaced receptors extending approximately 1 km from the center of the property and beyond the fence line,

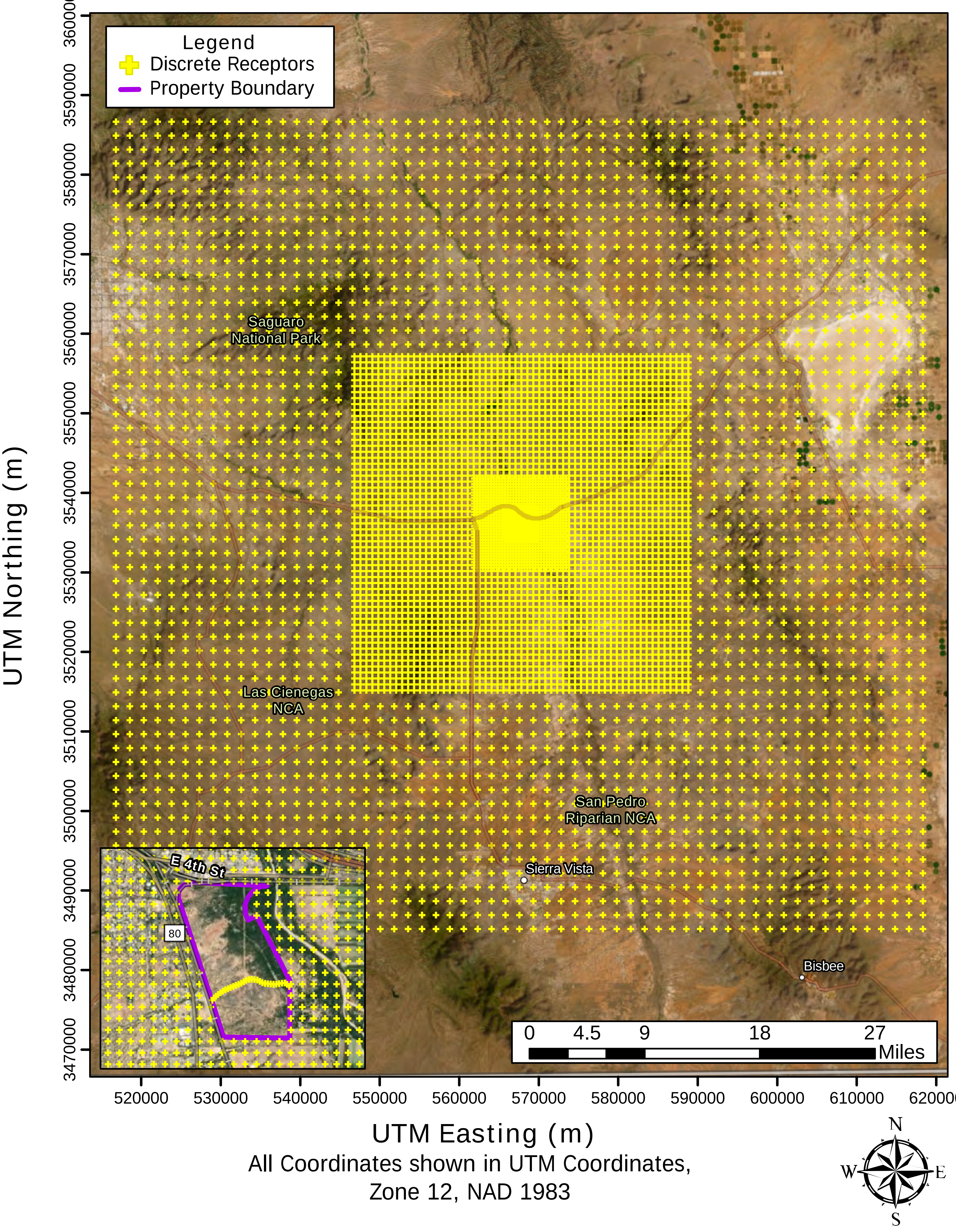
- **Medium Cartesian Grid**: A "medium" grid containing 350-meter spaced receptors extending from 1 km to 5 km from the center of the proposed Project, exclusive of receptors on the fine grid,

- **Coarse Cartesian Grid**: A "coarse grid" containing 750-meter spaced receptors extending from 5 km to 20 km from the center of the proposed Project, exclusive of receptors on the fine and medium grids, and.

- **Very Coarse Cartesian Grid**: A "very coarse grid" containing 1,750-meter spaced receptors extending from 20 km to 50 km from the center of the proposed Project, exclusive of receptors on the fine, medium, and coarse grids.

The full NAAQS analysis was conducted using only receptor locations at which impacts calculated for the proposed Project sources exceed the SIL for the respective pollutant and averaging time. As compliance with the NAAQS is only required in areas regulated as "ambient air," in developing the receptor grid for the modeling analysis, ADI excluded all company owned property to which general public access is restricted because it is fenced or access is otherwise restricted, and thus, was considered "ambient air." **Figure 4** depicts the receptor grid for the proposed Project.

Figure 4. ADI Benson Proposed Receptor Grid



All Coordinates shown in UTM Coordinates,
Zone 12, NAD 1983

5.8 Land Use Classification

As shown in **Figure 1**, the ADI Facility is located in an area with desert shrubland as the dominant land cover. According to EPA guidance, a land-use typing analysis was performed to determine the predominant land usage classification between urban and rural areas.

To determine the land usage surrounding the facility, the AERSURFACE application was used. The process that was used to determine the land use classification is discussed in Section 5.1 of the AERMOD Implementation Guide (also referring therein to Section 7.2.1.1.b.i. of the Guideline on Air Quality Models, Appendix W) and is called the "land use" procedure because it examines the various land use within 3 km of a source and quantifies the percentage of area in various land use categories.[10] If greater than 50% of the land use in the prescribed area is considered urban, then the urban option should be used in AERMOD. Version 20060 of the AERSURFACE program was used in conducting the ADI modeling analysis. The 2016 National Land Cover Data (NLCD) obtained from the U.S. Geological Survey for the state of Arizona was input into AERSURFACE. Results from the AERSURFACE analysis for the 3 km circle surrounding the site are displayed in **Table 5.2**.

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[10] EPA, AERMOD Implementation Guide, April 2021, available at https://www3.epa.gov/ttn/scram/models/aermod/aermod_implementation_guide.pdf

Table 5.2. Land Cover Analysis

Category No.	Category Description	Class	Counts	% of Total
0	Missing, Out-of-Bounds, or Unde:	Undefined	0	0.00%
11	Open Water:	Rural	54	0.17%
12	Perennial Ice/Snow:	Rural	0	0.00%
21	Developed, Open Space:	Rural	2986	9.50%
22	Developed, Low Intensity:	Urban	2834	9.02%
23	Developed, Medium Intensity:	Urban	845	2.69%
24	Developed, High Intensity:	Urban	146	0.46%
31	Barren Land (Rock/Sand/Clay):	Rural	126	0.40%
32	Unconsolidated Shore:	Rural	0	0.00%
41	Deciduous Forest:	Rural	10	0.03%
42	Evergreen Forest:	Rural	11	0.04%
43	Mixed Forest:	Rural	0	0.00%
51	Dwarf Scrub:	Rural	0	0.00%
52	Shrub/Scrub:	Rural	20597	65.56%
71	Grasslands/Herbaceous:	Rural	1976	6.29%
72	Sedge/Herbaceous:	Rural	0	0.00%
73	Lichens:	Rural	0	0.00%
74	Moss:	Rural	0	0.00%
81	Pasture/Hay:	Rural	44	0.14%
82	Cultivated Crops:	Rural	732	2.33%
90	Woody Wetlands:	Rural	930	2.96%
91	Palustrine Forested Wetland:	Rural	0	0.00%
92	Palustrine Scrub/Shrub Wetland:	Rural	0	0.00%
93	Estuarine Forested Wetland:	Rural	0	0.00%
94	Estuarine Scrub/Shrub Wetland:	Rural	0	0.00%
95	Emergent Herbaceous Wetland:	Rural	128	0.41%
96	Palustrine Emergent Wetland (Pe:	Rural	0	0.00%
97	Estuarine Emergent Wetland:	Rural	0	0.00%
98	Palustrine Aquatic Bed:	Rural	0	0.00%
99	Estuarine Aquatic Bed:	Rural	0	0.00%
		Total:	**31,419**	**100%**
		Percentage - Rural	**27,594**	**87.8%**
		Percentage - Urban	**3,825**	**12.2%**

The areas of urban land use classifications within the 3 km circle centered on the Benson plant would be associated with the strip of land comprised by Interstate Highway 10 and the developed areas comprising the small town of Benson. Since the majority of the land surrounding the proposed Benson plant is classified as rural, the Benson plant emission sources were not treated as urban sources in the AERMOD Model based on the land use classification procedure.

5.9 Background Concentrations

"Background concentrations" refer to the monitored existing concentrations of a regulated pollutant in an area. A "representative" background concentration is required for each modeled pollutant and averaging period to complete the Full Impact NAAQS modeling analysis. The background concentration accounts for sources of air pollution other than those explicitly modeled. These sources may include:

- Natural sources.
- Nearby, non-modeled sources; and,
- Unidentified sources of air pollution (e.g., long-range transport).

Typically, background concentrations are obtained from air quality data measured at a representative monitoring station. Section 8.3.2 of 40 CFR Part 51, Appendix W discusses the requirements for obtaining "representative" background concentrations for single isolated sources. Because background concentrations are influenced by surrounding man-made emissions (i.e., industrial impacts), the selection of the "representative" background concentrations for the project was performed as follows:

- Step 1 – Evaluate monitor distance from proposed Project.
- Step 2 – Evaluate data completeness at monitor.
- Step 3 – Identify monitors closest to ADI with the most complete data set.
- Step 4 – Compare and contrast chosen monitors to identify the most representative monitor.

Per ADEQ guidance for determining background concentrations, the quality and age of the data collected must be considered. Therefore, the analysis utilized the most recent three years of data, in which the background data is more than 75% complete[11], for each regional site.

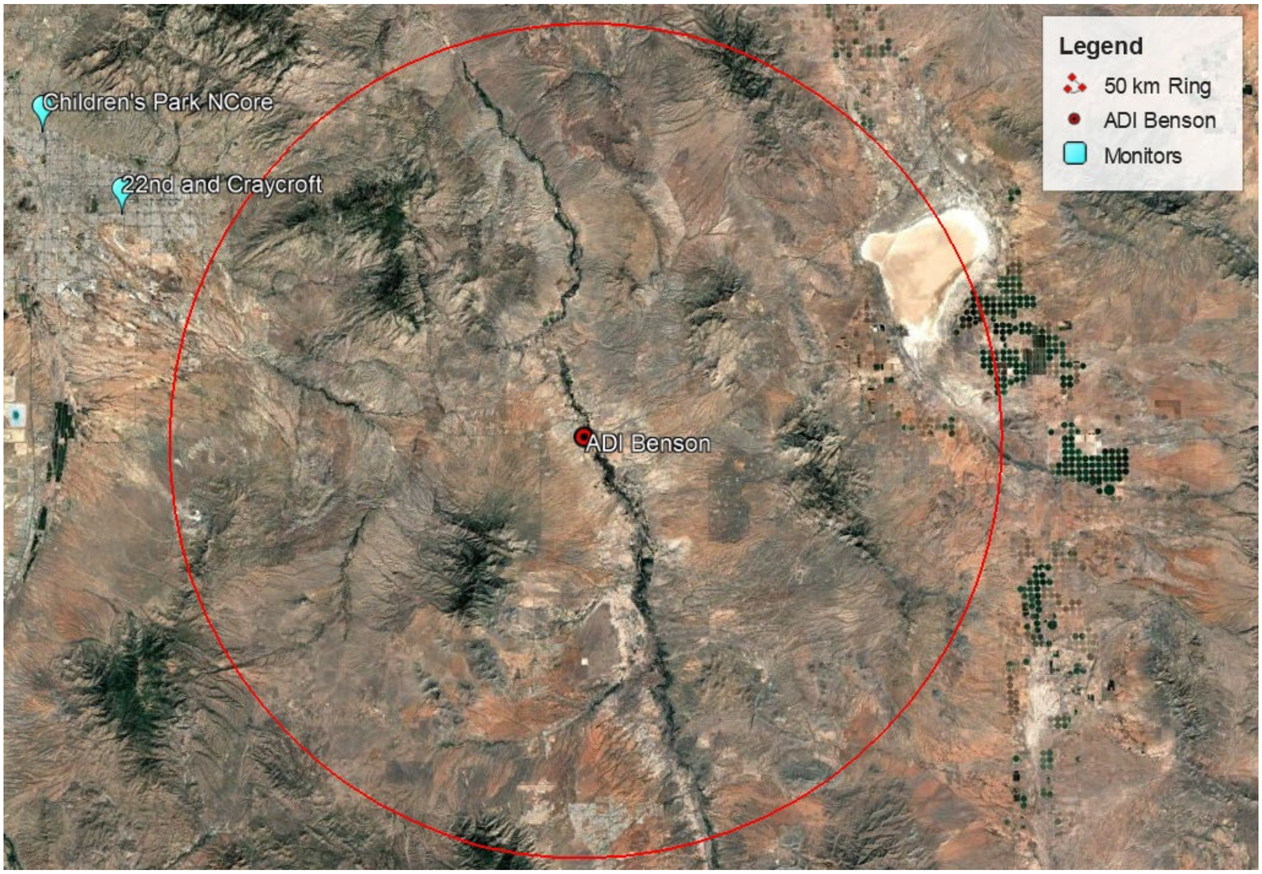
5.9.1 Nitrogen Dioxide

All active nitrogen dioxide monitors with complete data from 2021 to 2023 were located in urban areas and the closest monitor which met the completeness criteria was conservatively chosen. The two (2) monitors assessed are depicted in **Figure 5** below. The annual mean for the annual standard and the 98th percentile for the 1-hour standard within the last three years, in accordance with ADEQ's modeling guidance, were chosen as the background concentration. As such, the 22nd & Craycroft monitor in Tucson was chosen and the most representative NO_2 background concentration is equal to:

- 37 ppb (69.56 ug/m^3) for the 1-hour standard; and,
- 8 ppb (15.04 ug/m^3) for the annual standard.

[11] Data completeness per 40 CFR Part 50, Appendix K, Sections 2.3(a) and (b); 40 CFR Part 50, Appendix N, Section 3.0(c); 40 CFR Part 50, Appendix R, Section 4(b) and 4(c)(i); and 40 CFR Part 50, Appendix S, Section 3.1(b) and Section 3.2(b).

Figure 5. Nitrogen Dioxide Monitor Locations



5.9.2 Particulate Matter

There were a total of six (6) monitoring stations that were evaluated for PM_{10} and four (4) monitoring stations for $PM_{2.5}$. Other monitors were excluded from review either because of incomplete data or distance from the proposed Project.

The six (6) monitoring stations evaluated for PM_{10} were:

- Corona Del Tucson (AQS ID 04-019-0008) – currently active, approximate distance to proposed Project = 48 km
- Green Valley (AQS 04-019-1030) – currently active, approximate distance to proposed Project = 68 km
- Santa Clara (AQS 04-019-1026) – currently active, approximate distance to proposed Project = 69 km
- Geronimo (AQS ID 04-019-1113) – currently active, approximate distance to proposed Project = 72 km
- IMPROVE Saguaro Park (AQS ID 04-019-0021) – currently active, approximate distance to proposed Project = 49 km
- IMPROVE Chiricahua (AQS ID 04-003-8001) – currently active, approximate distance to proposed Project = 85 km

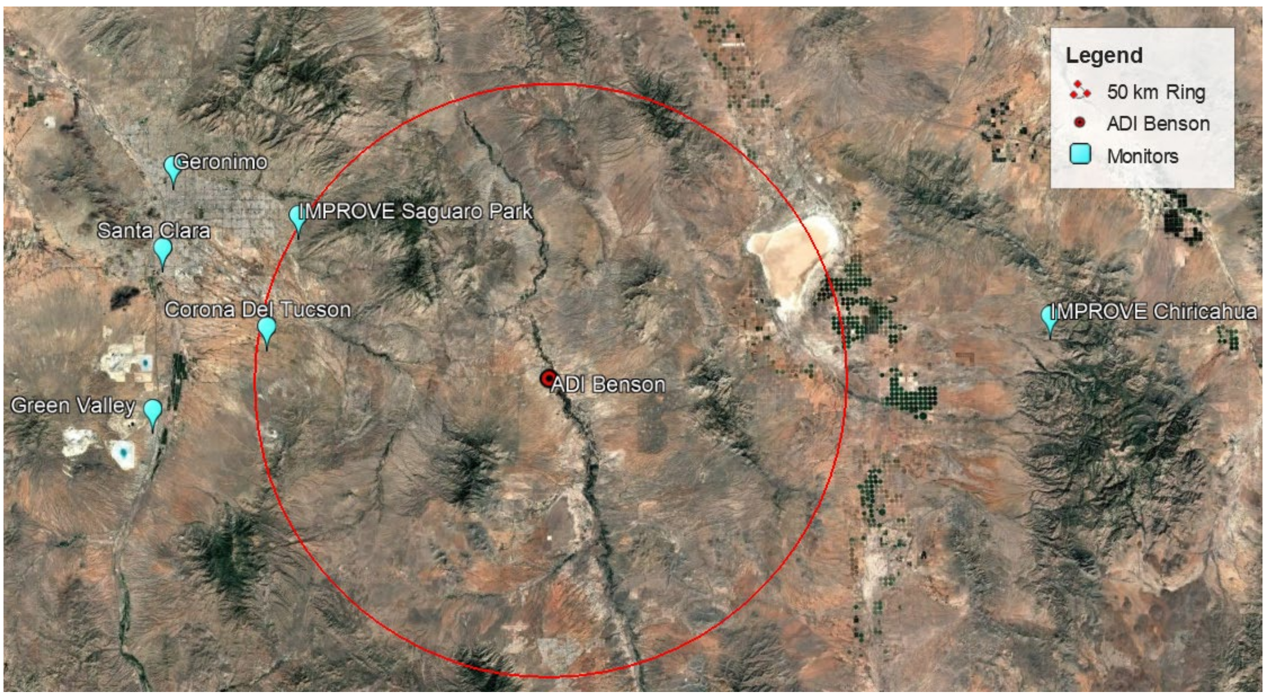
The four (4) monitoring stations evaluated for $PM_{2.5}$ are:

- Children's Park NCore (AQS ID 04-019-1028) – currently active, approximate distance to proposed Project = 76 km
- Orange Grove (AQS ID 04-019-0011) – currently active, approximate distance to proposed Project = 82 km
- IMPROVE Saguaro Park (AQS ID 04-019-0021) – currently active, approximate distance to proposed Project = 49 km
- IMPROVE Chiricahua (AQS ID 04-003-8001) – currently active, approximate distance to proposed Project = 85 km

5.9.2.1 PM_{10}

As depicted in **Figure 6** there were six (6) monitors that were compared to determine the most "representative". These monitors are all within 48 – 85 km of the proposed Project.

Figure 6. PM_{10} Background Monitor Locations



Of the 6 monitoring stations evaluated, two (2) are a part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. The IMPROVE program is used to track broad regional trends in visual impairment in Class I areas and uses non-regulatory methods for determining background concentrations. As such, ADEQ recommends excluding IMPROVE monitors from background considerations.

Of the non-IMPROVE monitors, the closest is Corona Del Tucson, which is 48 kilometers from the proposed Project location. The next closest is Green Valley, which is 68 kilometers from the proposed Project. The last two (2) monitors, Geronimo and Santa Clara, are both located in the city of Tucson, which has urban sources that will impact ambient PM concentrations. The proposed Project is located in the city of Benson which is a significantly smaller urban area than Tucson, as such, Geronimo and Santa Clara were not chosen as representative monitors.

Of the remaining two monitors, Corona Del Tucson is approximately six (6) km from Interstate-10 and Green Valley is less than one (1) kilometer from Interstate-19. These monitor locations are similar to the proposed Project location which is less than (1) kilometer from Interstate-19. However, the Green Valley monitor is separated from the proposed Project location by the Santa Rita Mountains and is 20 kilometers further from the proposed Project location. As such, Corona Del Tucson was selected as the most representative monitor. The average of the 2nd highest yearly values for the most recent 3 years, in accordance with ADEQ's modeling guidance, was chosen as the background concentration for the PM_{10} 24-hr background concentration.

- 65 μg/m^3 for the 24-hr PM_{10} standard.

5.9.2.2 $PM_{2.5}$

As depicted in **Figure 7**, there are four (4) monitors that were compared to determine the most "representative". These monitors are all within 48 – 85 km of the proposed Project.

Figure 7. $PM_{2.5}$ Background Monitor Locations

As recommended by ADEQ, the IMPROVE monitors have been removed from consideration. In addition, IMPROVE monitors do not collect $PM_{2.5}$ annual data. The two (2) remaining monitors, Children's Park NCore and Orange Grove, are both located in Northeast Tucson. Both monitors meet completeness requirements, and the closest monitor was conservatively chosen. As such, the Children's Park NCore monitor was chosen and the representative $PM_{2.5}$ background concentration is equal to the following:

- 6.2 μg/m^3 for the annual $PM_{2.5}$ standard;
- 12.5 μg/m^3 for the 24-hour $PM_{2.5}$ standard.

5.10 Secondary Pollutant Formation

Precursor pollutants for ozone (i.e., NO_X, and VOC) and $PM_{2.5}$ (i.e. NO_X, and SO_2) can undergo photochemical reactions with gases in the atmosphere, resulting in the formation of secondary ozone and $PM_{2.5}$ downwind of an emission source, which can add to concentrations resulting from direct (or primary) emissions. Two of the largest constituents of secondary $PM_{2.5}$ in the U.S. are sulphates (SO_4^{2-}) and nitrates (NO_3^-), both of which are formed from their respective precursor pollutants (i.e., SO_2 for SO_4^{2-}, NO_x for NO_3^-).

Secondary ozone and $PM_{2.5}$ formation resulting from project emissions of NO_X and VOC, and NO_X and SO_2, respectively, were evaluated using the methodology provided in EPA's Modeled Emission Rates for Precursors (MERPs) guidance[12] and guidance for ozone and fine particulate matter permit modeling. Secondary formation of ozone and $PM_{2.5}$ resulting from the project were calculated using the following equation from the 2024 MERPs Guidance, Equation 1:

$$\text{Project Impact}\left(\frac{\mu g}{m^3}\right) = \text{Project Emission Rate (tpy)} \times \frac{\text{Hypothetical Source Modeled Impact}\left(\frac{\mu g}{m^3}\right)}{\text{Hypothetical Source Emission Rate (tpy)}}$$

The MERPs from a hypothetical source were obtained from the EPA MERPs View Qlik website.[13] The MERPs View Qlik website provides illustrative hypothetical single source modeled impacts for annual maximum daily 8-hour ozone, and daily maximum and annual average $PM_{2.5}$ for source locations across the United States based on various levels of precursor emissions (VOC, NO_X, and SO_2, as applicable) and stack heights.

Trinity reviewed the available hypothetical sources in the Qlik database and found that the closest hypothetical source is in Gila County. The 2019 MERPs guidance states that the representativeness of a hypothetical source should be based on the chemical and physical environment (e.g., meteorology, background pollutant concentrations, and regional/local emissions). The Gila County hypothetical source is representative of the Benson site based on the following:

- **Proximity** – The hypothetical source 4007 is 176 km north of the proposed facility and is the closest hypothetical source to Facility.
- **Terrain and Land Use** – The Facility and hypothetical source 4007 are in the southern and eastern halves of Arizona and have similar nearby land use and elevation. Pinal Peak immediately to the south of source 4007 does come between the source and the Facility, but other taller mountains lie between the Facility and the other two hypothetical sources.
- **Climate** – Given relatively close proximity of the hypothetical source 4007 to the Facility, and the absence of any large bodies of water or other features that would influence the climate, characteristics such as temperature and humidity are very similar between the two locations.
- **Regional Sources of Pollutants** – The Facility is located approximately 65 km from Tucson, while the hypothetical source 4007 is approximately 85 km from the Valley. The hypothetical source is also located near some smelting and mining operations (e.g., Freeport McMoran Miami, Inc.).

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[12] Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program. Memorandum from Richard A. Weyland (Air Quality Assessment Division). April 30, 2019. Also including the April 30, 2024 EPA clarification memo to this guidance.

[13] https://www.epa.gov/scram/merps-view-qlik. Last visited on September 16, 2024.

- **Background Pollutant Concentrations** – For the reasons listed above, the ambient concentrations of direct $PM_{2.5}$ and precursors (NO_X and SO_2) are expected to be similar between the selected MERP site and the Benson plant.

Table 5.3 provides the output from the MERPs View Qlik database for the Gila County hypothetical source.

Table 5.3. MERP Qlik Hypothetical Sources

State	County	FIPS	Climate	Max Nearby[1] Terrain (m)	Max Nearby[1] Urban (%)	Latitude	Longitude	Distance from Facility (km)
AZ	Coconino	4005	Southwest	1786	7.4	35.428	-111.270	395
AZ	La Paz	4012	Southwest	413	0.9	33.400	-113.408	332
AZ	Gila	4007	Southwest	1592	4.3	33.469	-110.789	176

1. Nearby is defined as within 50 km based on "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program. Memorandum from Richard A. Weyland (Air Quality Assessment Division). April 30, 2019. Also including the April 30, 2024, EPA clarification memo to this guidance.

Table 5.4 provides the output from the MERPs View Qlik database for the Gila County hypothetical source.

Table 5.4. Gila County MERP Concentrations

Metric	Precursor	Emissions (tpy)	Stack Height (m)	Max Modeled Concentration ($\mu g/m^3$)
8-hr Ozone	NO_X	500	10	1.2258
8-hr Ozone	VOC	500	10	0.0248
Annual $PM_{2.5}$	NO_X	500	10	0.0009
Annual $PM_{2.5}$	SO_2	500	10	0.0020
Daily $PM_{2.5}$	NO_X	500	10	0.0112
Daily $PM_{2.5}$	SO_2	500	10	0.0351

The stack heights at the proposed Project range in heights from approximately 3 to 30 m; therefore, a stack height of 10 m at Source 4007 was conservatively chosen to be representative for the proposed project. Emissions of NO_X and SO_2 are both well under 500 tpy; therefore, an emission rate of 500 tons is representative for the secondary $PM_{2.5}$ assessment. Emissions of NO_X and VOC are both well under 500 tpy; therefore, an emission rate of 500 tons is representative for the ozone assessment.

5.10.1 Ozone

The contributions of secondarily formed ozone are calculated below using the equation described above and **Table 5.4** values. The secondary formation due to each precursor (i.e., NO_X and VOC for ozone) are summed in the calculations below.

$$Project\ Impact\ \left(\frac{\mu g}{m^3}\right) = \left(\frac{93.7\text{ tpy NO}_\text{x}\text{ Project } \times 1.226\ \left(\frac{\mu g}{m^3}\right)}{500\text{ tpy of NO}_\text{x}} + \frac{93.3\text{ tpy VOC Project } \times 0.0248\ \left(\frac{\mu g}{m^3}\right)}{500\text{ tpy of VOC}}\right)$$

$$= 0.234\ \left(\frac{\mu g}{m^3}\right) < 1.96\frac{\mu g}{m^3}\ \text{(i.e. 1 ppb)}$$

As shown, predicted ozone formation from the project emissions are below the SIL value of 1 ppb (1.96 µg/m^3) and as such, no further ozone analysis was conducted for this project.

5.10.2 $PM_{2.5}$

The contributions of secondarily formed $PM_{2.}$ are calculated below using the equation described above and **Table 5.4** values. The secondary formation due to each precursor (i.e., NO_X and SO_2 for $PM_{2.5}$) are summed in the calculations below.

Daily:

$$0.00213\left(\frac{\mu g}{m^3}\right) = \left(\frac{94.3\text{ tpy NO}_\text{x}\text{ Project } \times 0.0112\ \left(\frac{\mu g}{m^3}\right)}{500\text{ tpy of NO}_\text{x}} + \frac{0.3\text{ tpy SO}_2\text{ Project } \times 0.0351\ \left(\frac{\mu g}{m^3}\right)}{500\text{ tpy of VOC}}\right)$$

Annual:

$$0.0002\left(\frac{\mu g}{m^3}\right) = \left(\frac{94.3\text{ tpy NO}_\text{x}\text{ Project } \times 0.0009\ \left(\frac{\mu g}{m^3}\right)}{500\text{ tpy of NO}_\text{x}} + \frac{0.3\text{ tpy SO}_2\text{ Project } \times 0.002\ \left(\frac{\mu g}{m^3}\right)}{500\text{ tpy of VOC}}\right)$$

The concentrations for daily and annual $PM_{2.5}$ were added to the respective model results.

5.11 Regional Offsite Inventory

Dispersion modeling for the significance analysis was conducted using hourly or annual potential emission rates, where applicable, based on the averaging period of the underlying NAAQS standard. As per modeling requirements, for any off-site air concentration impact calculated that is greater than the SIL for a given pollutant, the radius of the significant impact area (SIA) was determined based on the extent to where the farthest receptor is located at which the SIL is exceeded. Under EPA's previous guidance in Section IV.C.1 of the draft New Source Review Manual applicable to "deterministic" NAAQS, all sources within the SIA or 50 km were evaluated for possible inclusion in the regional inventory. For the proposed Project, the agencies that may provide regional sources for inclusion in the evaluation are as follows:

- Arizona Department of Environmental Quality (ADEQ)
- Pima County Department of Environmental Quality (PDEQ)

For PDEQ jurisdiction, no Class I sources were located within the 50 km boundary, with only a few small, permitted facilities within the area. As these permitted facilities are not required to submit annual emission inventories, PDEQ does not have access to the actual emissions from these facilities and they were not evaluated to be included in the NAAQS modeling.[14]

For ADEQ jurisdiction, annual emission inventory data from the years 2020-2022 for permitted facilities within the 50 km boundary was requested.[15] Sources located within the SIA for each pollutant and averaging period were included into the model. All remaining sources within 50 km were screened based on the "20D" procedure. This methodology scales the mass of a source's emissions (Q) by its distance from the Project (d). Short- and long-term emissions for each pollutant were reviewed independently, and only those with a Q/d above 20 on a pollutant-by-pollutant basis were considered in the NAAQS analysis. This procedure screened out offsite sources on a pollutant-by-pollutant basis that have negligible potential to impact ambient air concentrations in the NAAQS modeling analysis area.

As noted in the details below, ADEQ and PDEQ are only able to provide actual emissions information for the sources in these states and do not track changes to allowable emissions for these sources. Pursuant to 40 CFR Part 51, Appendix W, Table 8-2, an applicant is allowed to consider actual emission levels for nearby sources for the most recent two years. Based on the considerations above, the following is a summary of the regional source inventory proposed for each air quality district:

- Pima County (PDEQ)
  - Agency Contact
    Mark Rogers
    Engineering Assistant
    33 N. Stone Ave. Suite 700
    Tucson, AZ 85701
    Mark.rogers@pima.gov
    520-724-7320
  - PDEQ communicated that no current major sources are located within the 50 km radius from the proposed Project in its jurisdiction; however, it was noted the proposed Copper World would soon begin operation as a major source
  - Trinity obtained potential to emit spreadsheets for the Copper World Project
  - The Q/d ratio was then determined for the proposed source and was screened out using the 20D analysis, as seen in **Table 5.5**.

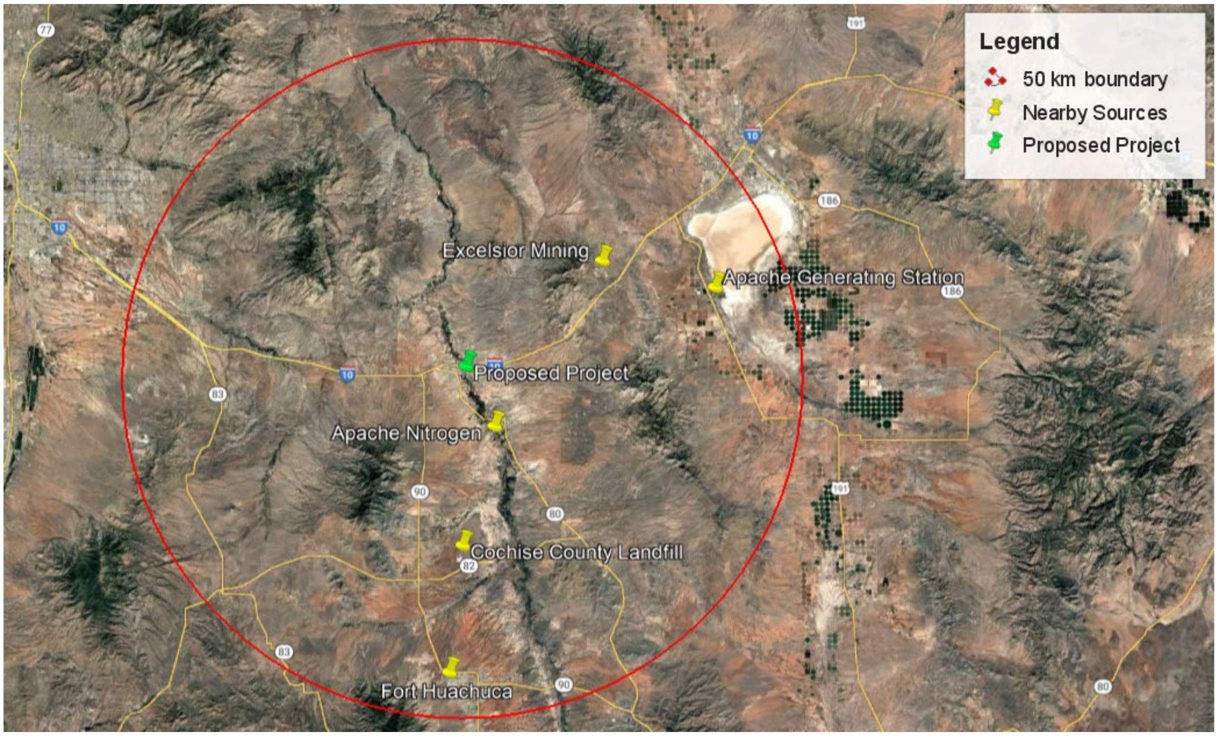
- Arizona Department of Environmental Quality
  - Agency Contact
    Feng Mao
    Environmental Engineer
    400 W. Congress St. #433
    Tucson, AZ 85701
    Mao.feng@azdeq.gov
    520-628-6719
  - ADEQ provided spreadsheets that contain actual 2022 emissions (for NO_x, PM_{10}, and $PM_{2.5}$) for all sources within 50 km of the proposed Project
  - The resulting regional inventory sources are as follows, which are also depicted in **Figure 8**

[14] Benson Facility Nearby Inventory Data Request – Pima County, Mark Rogers, 9/4/2024.

[15] Benson Facility Nearby Inventory Data Request, Feng Mao, 8/29/2024.

- Apache Generating Station
- Apache Nitrogen
- Fort Huachuca
- Cochise Western Landfill
- Johnson Camp Mine

Figure 8. Offsite Nearby Sources



- The Q/d ratio was then determined for each source and those with a Q/d above 20 were considered
- Based on the results in **Table 5.5** below, only Apache Generating Station NO_2 emissions were considered in the regional inventory.
- For the 1-hour NO_2 model, emissions from Apache Nitrogen Products were considered as the source resided within the SIA of the proposed Project
  Source parameters for Apache Generating Station and Apache Nitrogen can be seen below in **Table 5.6.**

Table 5.5 Offsite Regional Inventory Analysis

Facility	PM10 Q/d[1]	PM2.5 Q/d[1]	NO_x Q/d[1]	Distance from Project, d (km)
Rosemont Copper World	19.0	2.5	0.9	50.10
Apache Nitrogen Products INC	15.7	12.7	15.1	9.68
Johnson Camp Mine - Excelsior Mining	12.9	1.7	2.8	25.45
Cochise County Western Regional Landfill	0.4	0.0	0.0	26.33
Apache Generating Station	3.3	2.0	47.6	38.49
US Army - Fort Huachuca	0.0	0.0	0.4	45.16

Table 5.6 Modeled Offsite Source Parameters and Emission Rates

Model ID	Description	UTMx (m)	UTMy (m)	Elevation (m)	Emission Rate (g/s)	Stack Height (ft)	Temperature (K)	Stack Velocity (ft/s)	Stack Diameter (ft)
Apache Generating Station Sources (NO_2 1 hr and Annual Models)									
202	GAS TURBINE #2	604417.4	3547789.5	1276.89	7.64E-03	34	758.15	56.3	6.5
203	GAS TURBINE #3	604418.0	3547726.9	1276.79	2.82E+00	36	752.04	20.5	14.25
204	STEAM UNIT #1	604487.2	3547797.1	1276.54	2.64E-01	157	409.26	90.6	8
205	STEAM UNIT #2	604324.4	3547831.5	1276.65	5.99E+00	400	355.93	51.1	16.6
206	STEAM UNIT #3	604318.7	3547829.0	1276.57	4.33E+01	400	358.15	55	16.6
210	GAS TURBINE 4	604430.7	3547385.9	1277.89	3.29E-01	81	727.59	65	12.5
Apache Nitrogen Sources (NO_2 1 hr Model)									
ANPI1	AOP-4 TAIL GAS	571615.36	3527406.8	1130.18	2.67	53	422.04	89.1	2.43
ANPI2	POWERHOUSE NG BOILER 1	571615.36	3527406.8	1130.18	0.33	57	454.82	33.1	2.83
ANPI3	POWERHOUSE NG BOILER 2	571615.36	3527406.8	1130.18	0.33	57	454.82	33.1	2.83
ANPI4	AOP-4 NG SUPERHEATER	571615.36	3527406.8	1130.18	0.06	50	588.71	63.7	2
ANPI5	POWERHOUSE NG BOILER 3	571615.36	3527406.8	1130.18	0.21	57	454.82	33.1	2.83
ANPI6	AOP-3 TAIL GAS	571615.36	3527406.8	1130.18	0.59	52	544.82	121.32	1.67
ANPI7	DIESEL AIR COMPRESSOR	571615.36	3527406.8	1130.18	3.04E-03	8	323.15	31.8	1
ANPI8	NITRIC ACID STORAGE TANKS	571615.36	3527406.8	1130.18	2.81E-05	27	299.82	14.6	0.33

6. EMISSIONS MODELED & SOURCE CHARACTERIZATION

The following sections discuss the ADI emission sources that were included in the modeling demonstration. Details of the modeled emission rates and source parameters are contained in **Appendix A**.

6.1 Source Characterization

6.1.1 Point Sources – Baghouse, Cooling Tower, and Engine Stacks

Point source characterization was used to simulate emissions that are released from a stack-type source. Modeled stack heights were based on structural heights of the stack/discharge point. Modeled stack diameters were based on equipment specifications. Exit stack velocities and temperatures were based on engineering estimates for the typical operation of the specific source modeled. Selection between vertical unobstructed, horizontal, and capped point sources were made based on the specific release characteristics of the stack-type sources.

The following sources were modeled as vertical, unobstructed point sources with the appropriate stack parameters (i.e., stack height, diameter, exit velocity, and exit temperature) included in the modeling setup:

- Scrap Processing System #1- Cold Baghouse #1 Stack (SPS1)
- Decoater #1- Hot Baghouse #1 Stack (DCTR1)
- Melting Furnace #1- Hot Baghouse #3 Stack (MF1)
- Melting Furnace #2- Hot Baghouse #2 Stack (MF2)
- Holding Furnace #1- Hot Baghouse #3 Stack (HF1)
- In-Line Degasser #1- Hot Baghouse #3 Stack (ILD1)
- Dross House Baghouse Stack (DRSHSE)
- Cooling Tower #1 Stack- Cells 1 and 2 (CT1_1 and CT1_2)
- Cooling Tower #2 Stack (CT2)

6.1.2 Horizontal Sources – Silo Bin Vent Filter Discharge

Based on the angled downward discharge orientation contained in the preliminary engineering design basis, the following source was modeled as a horizontal point source with the appropriate stack parameters (i.e., stack height, diameter, exit velocity, and exit temperature):

- Hot Baghouses Lime Silo Integral Bin Vent Filter Discharge (HBHLMS)

6.1.3 Area Sources – Storage Yards and Roof-Level Building Vents/Openings

Area source characterization was used to simulate emissions that initially disperse in two dimensions with little or no plume rise, such as low-level emissions from widespread vehicle traffic and material movements across a storage yard. Parameters used to characterize area sources were location, geometry, release height, and initial vertical dimension. The dimensions for area source characterization were determined based on the geographical location where representative emissions have the potential to occur. 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. A non-zero initial vertical dimension parameter was specified to account for the mechanically generated fugitive emissions from storage yards. In the case of storage yards modeled as area sources, the emissions may be turbulently mixed near the source by the process that is generating the emissions (i.e., vehicle tires/skids and associated vehicle wakes), and therefore, the fugitive emissions released occupy some initial depth as specified by the non-zero initial vertical dimension.

The following sources were modeled as area sources with the appropriate parameters:

- Sow Dryer- Melting Building Fugitives (SOWDRY)
- Filter Box Preheater #1- Casting Building Fugitives (FBPH1)
- Plant Roads and Storage Yards- Unpaved Scrap Storage Yard (SCRAP)
- Plant Roads and Storage Yards- Unpaved Ingot Storage Yard (INGYD)

6.1.4 Volume Sources – Bay Door Openings and Paved Plant Roads

A volume source characterization was used to simulate emissions that initially disperse in three dimensions with little or no plume rise (e.g., fugitive emissions with a characteristic initial dimension and plant roads). Parameters used to characterize volume sources were location, height of release, and initial horizontal and vertical dimensions. The dimensions for volume source characterization were determined based on the geographical location where representative emissions have the potential to occur. The height of release was the center of the volume source above ground. The initial dimensions and calculation methods for assigning horizontal and vertical dimensions to each volume source type generally followed the procedures documented in Table 3-3 of the AERMOD User's Guide[16].

6.1.4.1 Volume Sources – Dross House Bay Door Opening

For fugitive emissions expected to be released from bay door openings, the following sources were modeled as volume sources with the appropriate input parameters:

- Dross House Fugitives- Dross House Bay Door (DRSHSEF)
- Dross Press- Dross House Bay Door (DRSPRS)

6.1.4.2 Volume Sources – Paved Plant Roads

The paved plant roads for scrap drop-offs, dross pickup, and various shipments/deliveries associated with supplies and maintenance activities were modeled as a series of alternating volume sources. As part of allocating the calculated emissions for the various trucks traveling on the plant roads to the appropriate locations, the roads were divided up into three (3) distinct segments.

Based on the number of volume sources needed to cover a specific road segment and the total emissions for the trucks traveling on the segment, the emissions were spread out across the segments. Source parameters were determined following the steps contained in ADEQ modeling guideline.[17]

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[16] User's Guide for the AMS/EPA Regulatory Model (AERMOD), October, 2023.

[17] ADEQ, *Air Quality Modeling Guidelines for Arizona Air Quality Permits*, Section 3.3.5, November 1, 2019.

- Step 1: Adjusted width of road = road width (variable) + 6 meters
- Step 2: Number of volume source N = road length / adjusted road width
- Step 3: Height of volume = 1.7 x average vehicle height
- Step 4: Initial horizontal sigma (σ_{yo}) = adjusted road width x 2 / 2.15
- Step 5: Initial vertical sigma (σ_{zo}) = volume height / 2.15
- Step 6: Release height = volume height / 2
- Step 7: Emission rate per volume source = total emission rate / number of volume source
- Step 8: Determine UTM coordinate for release point.

7. MODELING RESULTS

The sections below summarize the results of the modeling demonstration.

7.1 Significance Model Results

The results of the significant impact modeling analysis are summarized below. The results are compared to the corresponding SIL found in **Table 7.1**. The table summarizes the maximum model concentrations as well as the radius of the SIA for each pollutant and averaging period. As shown below, the modeled impacts for 1-hr and 8-hr CO are below the SILs and do not require a full NAAQS compliance analysis. However, 1-hr and annual NO_2, 24-hr and annual $PM_{2.5}$, and 24-hr PM_{10} modeling impacts are above the SILs, therefore, a full impact analysis is required for those pollutants.

Table 7.1 SIL Model Results

Pollutant	Averaging Period	Form of Standard	Modeled Results (µg/m^3)	SIL (µg/m^3)	Exceeding SIL?	Significant Impact Area (km)
CO	1 hr	H1H	58.70	2,000	No	-
	8 hr	H1H	36.51	500	No	-
NO_2	1 hr	H1H	57.23	7.5	Yes	18.2
	Annual	H1H	1.66	1	Yes	0.86
PM_{10}	24 hr	H1H	19.91	5	Yes	1.9
$PM_{2.5}$	24 hr	H1H	12.58	1.2	Yes	6.0
	Annual	H1H	1.90	0.13	Yes	3.8

7.2 NAAQS Model Results

For receptors within the SIA (i.e. receptors that show significant concentrations) for the analyses, cumulative impacts for compliance with the NAAQS are assessed. Results of the NAAQS full impact analyses are presented in **Table 7.2**. As shown, there are no NAAQS exceedances. Therefore, the compliance demonstration is complete for all pollutants.

Table 7.2 NAAQS Cumulative Impact Analysis Results

Pollutant	Averaging Period	Form of Standard	Modeled Results (μg/m³)[1]	Background Concentration (μg/m³)[2]	Total Concentration	NAAQS (μg/m³)	Greater than NAAQS?	Form of the Standard[4,5,6]
NO_2	1 hr	H8H	81.32	69.56	150.88	188	No	98th percentile of daily 1-hour maximum concentrations, average over 5 years
	Annual	H1H	1.67	15.04	16.71	100	No	Annual Mean
PM_{10}	24 hr	H6H	13.86	64.70	78.56	150	No	Not to be exceeded more than once per year on average over modeled years
$PM_{2.5}$	24 hr	H8H	8.57	12.50	21.07	35.0	No	98th percentile, average over 5 years
	Annual	H1H	1.90	6.20	8.10	9	No	Average of annual arithmetic mean

[1] Modeled concentration includes emission sources at the proposed project and off-site inventory. The concentration is reported as the highest receptor in the form of the standard.

[2] Refer to **Section 5.9** for a detailed analysis concerning the background concentration.

[3] The total concentration for comparison to the NAAQS is the modeled concentration (which includes emission sources at the proposed project and off-site inventory) plus the background concentration.

[4] Guideline on Air Quality Models; Final Rule, 40 CFR Part 51, Appendix W, January 17, 2017.
[5] EPA Memo, Applicability of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, June 28, 2010.
[6] EPA Memo, Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS, March 23, 2010.

7.3 HAP Model Results

7.3.1 Modeled HAP Concentrations

The following tables display the modeled concentrations for the HCl and normalized HAP model for the learning sites. As discussed in **Section 4.3**, the normalized HAP model used an emission rate of 1 g/s for each source, and this value was scaled to an approximate concentration using the actual emission rate of each HAP.

Table 7.3 Learning Site - HCl Modeled Concentration

Modeled Pollutant		Averaging Period	Year	Modeled Concentration (ug/m^3)
HCl	Hydrogen Chloride	1 hr	All	27.95
		Annual	2013	0.63
			2014	0.73
			2015	0.63

Table 7.4 Learning Site - Normalized HAP Concentration

Point and Volume Source Unit Rate Impacts ($\mu g/m^3$)/(g/s)					
Model Group	**1hr**	**2013**	**2014**	**2015**	**Annual Max**
ALL	1501.22	24.95	27.12	25.42	27.12
SPS1	29.53	0.79	0.90	0.79	0.90
DCTR1	11.00	0.25	0.28	0.25	0.28
MF1	12.19	0.28	0.33	0.28	0.33
DRSHSE	42.59	0.78	0.92	0.80	0.92
DRSHSEF	750.60	9.89	10.63	10.07	10.63
DRSPRS	750.60	9.89	10.63	10.07	10.63
MF2	12.24	0.19	0.22	0.19	0.22
HF1	12.24	0.19	0.22	0.19	0.22
ILD1	12.24	0.19	0.22	0.19	0.22
Area Source Unit Rate Impacts ($\mu g/m^3$)/(g/s)					
Model Group	**1hr**	**2013**	**2014**	**2015**	**Annual Max**
FBPH1	212.53	1.48	1.69	1.68	1.69
SOWDRY	161.86	1.25	1.44	1.44	1.44

7.3.2 Scaled HAP Concentrations

Scaled results were found for each HAP using emission rates derived from the facility PTE and the normalized HAP model concentrations. The PTE submitted with the Class I permit application on November 18th was used to determine HAP emission rates was. The following equation was used to find the scaled concentration.

$$Scaled\ Concetration\ \left(\frac{mg}{m^3}\right) = Emission\ Rate\ \left(\frac{g}{s}\right)\ x\ Normalized\ Model\ Concetration\,\frac{\frac{\mu g}{m^3}}{\frac{g}{s}}$$

The modeled concentration for each source was added to find the total impact from HAP emissions and compared against the AAAC and CAAC thresholds. Modeled HAP results for the learning site receptors can be found in **Table 7.5**.

Table 7.5 Learning Sites – HAP Model results

Modeled Pollutant	Scaled Concentration		AAAC Threshold	CAAC Threshold	Exceeds AAAC?	Exceeds CAAC?
	1 hr	Annual				
	Concentration (mg/m^3)	Concentration (mg/m^3)	Concentration (mg/m^3)	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 EPA Acute Exposure level guideline of 2.7mg/m^3 and EPA reference concentration for inhalation of 0.02 mg/m^3 for hourly and annual values respectively.

8. ELECTRONIC FILES

The electronic files provided as part of this submittal in **Appendix C** contain all of the air dispersion modeling analyses electronic input, output, and other files used to generate the results presented in this report. The following is a list of files provided:

- All AERMOD input and output files;
- AERMOD meteorological data files;
- AERMOD terrain data files;
- AERMAP files; and
- All BPIP/BPIPP input and output files

APPENDIX A. MODELED EMISSION RATES AND SOURCE PARAMETERS

A-1. Modeled Source ID Index

Table A-1.1. Complete List of Modeled Aluminum Dynamics Benson Site Sources

Model ID	Emission Unit ID	Emission Unit Description	Emission Point Description
SPS1	001	Scrap Processing System #1	Cold Baghouse #1 Stack
DCTR1	002	Decoater #1	Hot Baghouse #1 Stack
MF1	003	Melting Furnace #1	Hot Baghouse #3 Stack
MF2	004	Melting Furnace #2	Hot Baghouse #2 Stack
HF1	005	Holding Furnace #1	Hot Baghouse #3 Stack
ILD1	006	In-Line Degasser #1	Hot Baghouse #3 Stack
SOWDRY	007	Sow Dryer	Melting Building Fugitives
DRSHSE	008	Dross House	Dross House Baghouse Stack
DRSHSEF	008	Dross House Fugitives	Dross House Bay Door
DRSPRS	009	Dross Press	Dross House Bay Door
FBPH1	010	Filter Box Preheater #1	Casting Building Fugitives
CT1_1	011	Cooling Tower #1	Cooling Tower #1 Stack- Cell 1
CT1_2	011	Cooling Tower #1	Cooling Tower #1 Stack- Cell 2
CT2	012	Cooling Tower #2	Cooling Tower #2 Stack
HBHLMS	013	Hot Baghouses Lime Silo	Hot Baghouses Lime Silo Integral Bin Vent Filter Discharge
R01V001-R03V009	017	Haul Roads and Storage Yards- Paved Roads	Paved Haul Road Fugitives
SCRAP	017	Haul Roads and Storage Yards-Unpaved Scrap Storage Yard	Unpaved Storage Yard Fugitives
INGYD	017	Haul Roads and Storage Yards-Unpaved Ingot Storage Yard	Unpaved Storage Yard Fugitives

A-2. Modeled Source Parameters - AERMOD Modeling

Table A-2.1. List of Point Source Stack Parameters for AERMOD Modeling

Stack ID	Description	UTM East[1] (m)	UTM North[1] (m)	Elevation[2] (m)	Stack Orientation[3]	Stack Height[3] (ft)	Stack Temp.[3] (°F)	Flow Rate[3] (acfm)	Exit Velocity[3] (ft/s)	Stack Diameter[3] (ft)
SPS1	Scrap Processing System #1- Cold Baghouse #1 Stack	567,842.00	3,536,264.10	1079.27	V	100.0	150.0	105,000	65.5	5.83
DCTR1	Decoater #1- Hot Baghouse #1 Stack	567,866.30	3,536,144.30	1080.76	V	100.0	300.0	110,000	68.6	5.83
MF1	Melting Furnace #1- Hot Baghouse #3 Stack	567,851.50	3,536,113.70	1081.75	V	100.0	300.0	100,000	62.4	5.83
MF2	Melting Furnace #2- Hot Baghouse #2 Stack	567,851.20	3,536,129.40	1081.39	V	100.0	300.0	150,000	61.9	7.17
HF1	Holding Furnace #1- Hot Baghouse #3 Stack	567,851.50	3,536,113.70	1081.75	V	100.0	300.0	150,000	62.0	7.17
ILD1	In-Line Degasser #1- Hot Baghouse #3 Stack	567,851.50	3,536,113.70	1081.75	V	100.0	300.0	150,000	62.0	7.17
DRSHSE	Dross House- Dross House Baghouse Stack	567,841.40	3,536,160.30	1081.47	V	100.0	150.0	75,000	59.6	5.17
CT1_1	Cooling Tower #1 Stack- Cell 1	567,845.80	3,536,091.40	1082.46	V	30.0	Amb.+10	850,000	55.7	18.00
CT1_2	Cooling Tower #1 Stack- Cell 2	567,840.10	3,536,091.40	1082.61	V	30.0	Amb.+10	850,000	55.7	18.00
CT2	Cooling Tower #2- Cooling Tower #2 Stack	567,835.50	3,536,239.90	1079.72	V	40.0	Amb.+10	400,000	43.3	14.00
HBHLMS	Hot Baghouses Lime Silo- Hot Baghouses Lime Silo Integral Bin Vent Filter Discharge	567,821.00	3,536,139.70	1082.20	H	47.5	Amb.	1,500	45.8	0.83

[1] Coordinates taken from a to-scale site plan projected in the UTM NAD83 Zone 12 coordinate system.

[2] Elevation of the plant grade.

[3] Stack parameters based on a combination of design information and operating data for similar equipment.

A-2. Modeled Source Parameters - AERMOD Modeling

Table A-2.2. List of Area Source Parameters for AERMOD Modeling

Stack ID	Description	UTM East[1] (m)	UTM North[1] (m)	Elevation[2] (m)	Area (ft^2)	Release Height[3] (ft)	Initial Vertical Dimension[4] (ft)
SOWDRY	Sow Dryer- Melting Building Fugitives	567,775	3,536,185	1082.3	57,395	86.3	0.0
FBPH1	Filter Box Preheater #1- Casting Building Fugitives	567,724	3,536,111	1084.7	37,479	74.5	0.0
SCRAP	Haul Roads and Storage Yards- Unpaved Scrap Storage Yard	567,654	3,536,482	1079.3	134,689	5.7	5.3
INGYD	Haul Roads and Storage Yards- Unpaved Ingot Storage Yard	567,886	3,536,045	1082.1	218,045	14.0	13.0
RD1	Access Road Area 1	567,339	3,536,684	1082.5	3,583	11.5	10.7

[1] Coordinates taken from a to-scale site plan projected in the UTM NAD83 Zone 12 coordinate system.

[2] Elevation of the plant grade.

[3] Release height set to building height based on expectation of fugitive discharges occurring predominantly at roof level for SOWDRY and FBPH1. Release height for unpaved scrap and ingot storage yards (SCRAP and INGYD) set to 1.7 times height of mobile equipment divided by 2 per Section 3.3.5 Steps 3 and 6 of Air Quality Modeling Guidelines for Arizona Air Quality Permits published by the Arizona Department of Environmental Quality (ADEQ Modeling Guidelines).

[4] Initial vertical dimension (IVD) for SOWDRY and FBPH1 conservatively set to zero because anticipated dimension of roof level discharge points could be at the release height/roof line as opposed to at another above roof level. IVD for storage yards (SCRAP and INGYD) set to mobile equipment height multiplied by 1.7 and divided by 2.15 per Step 5 of Section 3.3.5 of the ADEQ Modeling Guidelines.

A-2. Modeled Source Parameters - AERMOD Modeling

Table A-2.3. List of Volume Source Parameters for AERMOD Modeling

Stack ID	Description	UTM East[1] (m)	UTM North[1] (m)	Elevation[2] (m)	Release Height[3] (ft)	Initial Lateral Dimension[4] (ft)	Initial Vertical Dimension[5] (ft)
DRSHSEF	Dross House Fugitives- Dross House Bay Door	567,809	3,536,179	1,081.7	7.00	2.54	40.16
DRSPRS	Dross Press- Dross House Bay Door	567,809	3,536,179	1,081.7	7.00	2.54	40.16
R01V001	Access Road (Road 1)	567,350	3,536,678	1,082.5	11.48	40.64	10.67
R01V002	Access Road (Road 1)	567,376	3,536,678	1,081.8	11.48	40.64	10.67
R01V003	Access Road (Road 1)	567,403	3,536,678	1,081.3	11.48	40.64	10.67
R01V004	Access Road (Road 1)	567,430	3,536,678	1,081.1	11.48	40.64	10.67
R01V005	Access Road (Road 1)	567,456	3,536,677	1,080.6	11.48	40.64	10.67
R01V006	Access Road (Road 1)	567,483	3,536,677	1,080.1	11.48	40.64	10.67
R01V007	Access Road (Road 1)	567,510	3,536,677	1,080.0	11.48	40.64	10.67
R01V008	Access Road (Road 1)	567,536	3,536,677	1,079.6	11.48	40.64	10.67
R01V009	Access Road (Road 1)	567,563	3,536,677	1,079.4	11.48	40.64	10.67
R01V010	Access Road (Road 1)	567,589	3,536,677	1,079.5	11.48	40.64	10.67
R01V011	Access Road (Road 1)	567,616	3,536,677	1,079.1	11.48	40.64	10.67
R01V012	Access Road (Road 1)	567,641	3,536,675	1,078.6	11.48	40.64	10.67
R01V013	Access Road (Road 1)	567,642	3,536,649	1,078.9	11.48	40.64	10.67
R01V014	Access Road (Road 1)	567,643	3,536,622	1,079.0	11.48	40.64	10.67
R01V015	Access Road (Road 1)	567,645	3,536,595	1,079.1	11.48	40.64	10.67
R01V016	Access Road (Road 1)	567,646	3,536,569	1,079.0	11.48	40.64	10.67
R01V017	Access Road (Road 1)	567,671	3,536,566	1,078.7	11.48	40.64	10.67
R01V018	Access Road (Road 1)	567,697	3,536,564	1,078.5	11.48	40.64	10.67
R01V019	Access Road (Road 1)	567,724	3,536,562	1,078.2	11.48	40.64	10.67
R01V020	Access Road (Road 1)	567,750	3,536,560	1,078.0	11.48	40.64	10.67
R01V021	Access Road (Road 1)	567,777	3,536,559	1,077.5	11.48	40.64	10.67
R01V022	Access Road (Road 1)	567,787	3,536,540	1,077.4	11.48	40.64	10.67
R01V023	Access Road (Road 1)	567,788	3,536,514	1,077.5	11.48	40.64	10.67
R01V024	Access Road (Road 1)	567,805	3,536,494	1,077.4	11.48	40.64	10.67
R01V025	Access Road (Road 1)	567,824	3,536,474	1,077.3	11.48	40.64	10.67
R01V026	Access Road (Road 1)	567,834	3,536,452	1,077.5	11.48	40.64	10.67
R01V027	Access Road (Road 1)	567,834	3,536,425	1,077.8	11.48	40.64	10.67
R01V028	Access Road (Road 1)	567,833	3,536,399	1,078.0	11.48	40.64	10.67
R01V029	Access Road (Road 1)	567,833	3,536,372	1,078.1	11.48	40.64	10.67
R02V001	Road 2	567,833	3,536,333	1,078.4	11.48	40.64	10.67
R02V002	Road 2	567,844	3,536,315	1,078.6	11.48	40.64	10.67
R02V003	Road 2	567,853	3,536,297	1,078.8	11.48	40.64	10.67
R02V004	Road 2	567,852	3,536,271	1,079.1	11.48	40.64	10.67
R02V005	Road 2	567,851	3,536,244	1,079.3	11.48	40.64	10.67
R02V006	Road 2	567,851	3,536,218	1,079.8	11.48	40.64	10.67
R02V007	Road 2	567,850	3,536,191	1,080.5	11.48	40.64	10.67
R02V008	Road 2	567,836	3,536,178	1,081.0	11.48	40.64	10.67
R03V001	Road 3	567,815	3,536,351	1,078.7	11.48	40.64	10.67
R03V002	Road 3	567,788	3,536,350	1,079.3	11.48	40.64	10.67
R03V003	Road 3	567,762	3,536,350	1,080.0	11.48	40.64	10.67
R03V004	Road 3	567,735	3,536,350	1,080.2	11.48	40.64	10.67
R03V005	Road 3	567,734	3,536,323	1,080.5	11.48	40.64	10.67
R03V006	Road 3	567,734	3,536,296	1,081.0	11.48	40.64	10.67
R03V007	Road 3	567,733	3,536,270	1,081.7	11.48	40.64	10.67
R03V008	Road 3	567,732	3,536,243	1,082.0	11.48	40.64	10.67
R03V009	Road 3	567,731	3,536,216	1,082.2	11.48	40.64	10.67

[1] Coordinates taken from a to-scale site plan projected in the UTM NAD83 Zone 12 coordinate system.

[2] Elevations for haul road volume sources were determined by AERMAP (v18081) based on 1-arc second National Elevation Data (NED).

[3] The release height for fugitive emissions released from building bay door openings (DRSHSEF and DRSPRS) was set equal to the half of the height of the corresponding door opening. The release height used for the haul road emission sources was determined by first multiplying the vehicle height by 1.7 to acquire the height of the top of the plume. The release height was then set to half the height of the top of the plume. This approach is consistent with the recommendations outlined in EPA's Haul Road Workgroup Recommendations, November 2011 and Section 3.3.5 of the ADEQ Modeling Guideline.

[4] The initial lateral dimension for fugitive emissions released from buildings (DRSHSEF and DRSPRS) was calculated as the equivalent square dimension of the building opening as the "length of side" (assumed to be a 14' long x 8.5' wide bay door opening) divided by 4.3 per the "Single Volume Source" characterization in Table 3-2 of the AERMOD User's Guide (EPA-454/B-22-007, June 2022). The initial lateral dimension used for the haul road emission sources was determined by first adding 6 meters to the anticipated road width (12 ft per lane x 2 lanes = 24 ft) to find the adjusted road width. The initial lateral dimension was then set to the adjusted road width divided by 2.15. Additionally, since the alternating source configuration was used, the initial lateral dimension was doubled consistent with the AERMOD User's Manual, December 2016, EPA-454/B-16-011. This approach is also consistent with Volume Step 4 in Section 3.3.5 of the ADEQ Modeling Guidelines.

[5] The initial vertical dimension for fugitive emissions released from buildings (DRSHSEF and DRSPRS) was set equal to the height of the corresponding building divided by 2.15. The initial vertical dimension used for the haul road emission sources was determined by taking the top of the plume height and dividing by 2.15 (refer to Volume Step 5 in Section 3.3.5 of ADEQ Modeling Guidelines).

A-3. Summary of Modeled Emission Rates - AERMOD Modeling

Table A-3.1. Modeled Emission Rates for AERMOD Modeling - Point Sources[1]

		NOX (lb/hr)			CO (lb/hr)			PM10 (lb/hr)		PM2.5 (lb/hr)			HCl (lb/hr)		
Model ID	**Emission Point Description**	[1-hr]	[Ann.]	Basis	[1-hr]	[8-hr]	Basis	[24-hr]	Basis	[24-hr]	[Ann.]	Basis	[1-hr]	[Ann.]	Basis
SPS1	Scrap Processing System #1- Cold Baghouse #1 Stack	--	--	--	--	--	--	0.79	--	0.23	0.23	--	--	--	--
DCTR1	Decoater #1- Hot Baghouse #1 Stack	8.82	8.82	--	7.20	7.20	--	5.07	--	4.94	4.94	--	17.02	17.02	--
MF1	Melting Furnace #1- Hot Baghouse #3 Stack	7.29	5.91	A	6.16	6.16	--	2.62	--	2.24	2.24	--	0.42	0.42	--
MF2	Melting Furnace #2- Hot Baghouse #2 Stack	7.29	5.91	A	6.16	6.16	--	2.70	--	2.28	2.28	--	0.42	0.42	--
HF1	Holding Furnace #1- Hot Baghouse #3 Stack	2.00	0.53	B	2.22	2.22	--	0.84	--	0.79	0.79	--	3.21	3.21	--
ILD1	In-Line Degasser #1- Hot Baghouse #3 Stack	--	--	--	--	--	--	0.18	--	0.068	0.068	--	--	--	--
DRSHSE	Dross House- Dross House Baghouse Stack	--	--	--	--	--	--	1.05	--	0.87	0.87	--	--	--	--
CT1_1	Cooling Tower #1- Cooling Tower #1 Stack- Cell 1	--	--	--	--	--	--	1.83E-03	--	2.68E-05	2.68E-05	--	--	--	--
CT1_2	Cooling Tower #1- Cooling Tower #1 Stack- Cell 2	--	--	--	--	--	--	1.83E-03	--	2.68E-05	2.68E-05	--	--	--	--
CT2	Cooling Tower #2- Cooling Tower #2 Stack	--	--	--	--	--	--	1.57E-03	--	2.30E-05	2.30E-05	--	--	--	--
HBHLMS	Hot Baghouses Lime Silo- Hot Baghouses Lime Silo Integral Bin Vent Filter Discharge	--	--	--	--	--	--	7.63E-04	--	7.63E-04	7.63E-04	--	--	--	--

[1] Modeled hourly emission rates shown are based on the relevant averaging periods in brackets, and any clarifying notes to describe the basis of the modeled emission rates are provided below. For modeled emission rates based on maximum hourly or annual potential emissions, no clarifying notes are provided as this information is included within the potential emission calculations provided in the application.

Basis for Modeled Emission Rates

A = Annual NO2 analysis modeled emission rate falls below maximum hourly potential emission rate for Melting Furnaces #1 and #2 due to use of a cycle average NOX emission factor in place of a peak emission factor and use of an annual natural gas usage rate that is based on continuous annual operations at cycle average conditions in place of continuous operations at the maximum hourly burner rating/natural gas usage rate.

B = Annual NO2 analysis modeled emission rate falls below maximum hourly potential emission rate for Holding Furnace #1 due to use of an annual natural gas usage rate that is based on continuous annual operations at cycle average conditions in place of continuous operations at the maximum hourly burner rating/natural gas usage rate.

C = Per guidance indicated in Section 7.1.6 of the Air Quality Modeling Guidelines for Arizona Air Quality Permits published by the Arizona Department of Environmental Quality (ADEQ) and dated November 1, 2019, Aluminum Dynamics has conservatively chosen to include the emergency generator engine in both the 1-hr NO2 Significance and NAAQS analyses, even though it could otherwise be excluded under EPA's intermittent source guidance. Weekly maintenance and readiness testing and limited non-emergency operation up to 100 hr/yr to remain under the emergency stationary internal combustion engine definition in NSPS Subpart IIII at 40 CFR 60.4219 and 60.4211(f) is the only operating scenario for the emergency engine that is considered for the modeling analyses. Because the specific maintenance and readiness testing schedule has not been defined for this greenfield Benson facility, Aluminum Dynamics has assumed continuous operation for the 1-hr NO2 analysis and has model impacts based on an annualized hourly emission rate rather than the maximum hourly emission rate (i.e., the maximum hourly rate times 100 hr/yr limited operation for emergency status/8760 hr/yr for annual modeling timeframe).

D = Annual averaging period modeled emission rate for PM10 and PM2.5 emissions from EGEN1 is the annualized emission rate reflective of the emergency engine classifcation and associated annual operating hours limitation of 100 hr/yr.

A-3. Summary of Modeled Emission Rates - AERMOD Modeling

Table A-3.2. Modeled Emission Rates for AERMOD Modeling - Area Sources[1]

Model ID	Emission Point Description	NOX (lb/hr)			CO (lb/hr)			PM10 (lb/hr)		PM2.5 (lb/hr)		
		[1-hr]	[Ann.]	Basis	[1-hr]	[8-hr]	Basis	[24-hr]	Basis	[24-hr]	[Ann.]	Basis
SOWDRY	Sow Dryer- Melting Building Fugitives	0.20	0.20	--	0.18	0.18	--	0.017	--	0.017	0.017	--
FBPH1	Filter Box Preheater #1- Casting Building Fugitives	0.018	0.018	--	0.015	0.015	--	6.13E-04	--	6.13E-04	6.13E-04	--
SCRAP	Haul Roads and Storage Yards- Unpaved Scrap Storage Yard- Unpaved Storage Yard Fugitives	--	--	--	--	--	--	0.17	--	0.017	0.015	--
INGYD	Haul Roads and Storage Yards- Unpaved Ingot Storage Yard- Unpaved Storage Yard Fugitives	--	--	--	--	--	--	0.084	--	8.37E-03	7.60E-03	--
RD1	Access Road Area 1	--	--	--	--	--	--	0.001	--	2.13E-04	2.13E-04	

[1] Modeled emission rates based on maximum hourly or annual potential emissions.

A-3. Summary of Modeled Emission Rates - AERMOD Modeling

Table A-3.3. Modeled Emission Rates for AERMOD Modeling - Volume Sources[1]

Model ID	Emission Point Description	PM10 (lb/hr) [24-hr]	PM10 (lb/hr) [Ann.]	PM10 Basis	PM2.5 (lb/hr) [24-hr]	PM2.5 Basis
DRSHSEF	Dross House Fugitives- Dross House Bay Door	0.53	0.53	--	0.44	--
DRSPRS	Dross Press- Dross House Bay Door	0.024	0.024	--	0.020	--
R01V001	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V002	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V003	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V004	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V005	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V006	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V007	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V008	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V009	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V010	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V011	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V012	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V013	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V014	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V015	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V016	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V017	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V018	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V019	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V020	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V021	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V022	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V023	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V024	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V025	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V026	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V027	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V028	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R01V029	Access Road (Road 1)	8.68E-04	8.68E-04	--	2.13E-04	--
R02V001	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R02V002	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R02V003	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R02V004	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R02V005	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R02V006	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R02V007	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R02V008	Road 2	4.19E-05	4.19E-05	--	1.03E-05	--
R03V001	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V002	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V003	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V004	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V005	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V006	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V007	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V008	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--
R03V009	Road 3	5.77E-05	5.77E-05	--	1.42E-05	--

APPENDIX B. BACKGROUND CONCENTRATION DETERMINATION

Table B-1a. PM 2.5 Representative Background Concentrations - Data Completeness

Monitor Stations [1]	Distance from ADI (mi)	Pollutant	Averaging Period	Observations Type [2]	Number of Observations [1, 3]						Data Completeness [1, 3]						Can we use this monitor for Background Concentration Estimation?
					2018	2019	2020	2021	2022	2023	2018	2019	2020	2021	2022	2023	
Nogales Post Office	58	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	--	354	358	354	351	354	--	97%	98%	97%	96%	97%	Yes
Children's Park	47	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	--	351	360	170	353	350	--	96%	98%	47%	97%	96%	No
Orange Grove	51	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	--	344	356	353	364	357	--	94%	97%	97%	100%	98%	Yes
Yuma Supersite	109.8	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	--	365	352	354	356	348	--	100%	96%	97%	98%	95%	Yes
IMPROVE Saguaro West	58.3	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	--	109	122	117	122	119	--	90%	100%	96%	100%	98%	Yes
IMPROVE Saguaro	30.4	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	119	109	122	117	122	119	98%	90%	100%	96%	100%	98%	Yes
IMPROVE Chiricahua	52.6	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	116	107	108	111	121	116	95%	88%	89%	91%	99%	96%	Yes
Alamo Lake	246.6	$PM_{2.5}$	Annual 24-hr	Mean 98th Percentile	--	350	366	351	329	351	--	96%	100%	96%	90%	96%	Yes

[1] Data per EPA Air Data (https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors)
[2] Background Concentration type per Table 6 of ADEQ "Air Dispersion Modeling Guidelines for Arizona Air Quality Permits," December 1, 2015.
[3] Data completeness criteria of 75% per 40 CFR Part 50, Appendix K, Section 2.3(a) and 2.3(b)

Table B-1b. PM 10 Representative Background Concentrations - Data Completeness

Monitor Stations [1]	Distance from ADI (mi)	Pollutant	Averaging Period	Observations Type [2]	Number of Observations [1, 3]						Data Completeness [1, 3]						Can we use this monitor for Background Concentration Estimation?
					2018	2019	2020	2021	2022	2023	2018	2019	2020	2021	2022	2023	
Nogales Post Office	58	PM_{10}	24-hr	Maximum	--	353	353	357	353	346	--	97%	96%	98%	97%	95%	Yes
Green Valley	42	PM_{10}	24-hr	Maximum	--	347	353	354	359	358	--	95%	96%	97%	98%	98%	Yes
Corona De Tucson	30	PM_{10}	24-hr	Maximum	--	61	60	61	341	361	--	100%	98%	100%	93%	99%	Yes
Santa Clara	43	PM_{10}	24-hr	Maximum	--	56	55	59	31	30	--	92%	90%	97%	100%	97%	Yes
South Tucson	43	PM_{10}	24-hr	Maximum	--	345	362	360	356	354	--	95%	99%	99%	98%	97%	Yes
Geronimo	45	PM_{10}	24-hr	Maximum	--	346	360	360	360	356	--	95%	98%	99%	99%	98%	Yes
Paul Spur Chemical	52	PM_{10}	24-hr	Maximum	--	355	362	358	352	354	--	97%	99%	98%	96%	97%	Yes
Orange Grove	51	PM_{10}	24-hr	Maximum	--	338	360	357	365	361	--	93%	98%	98%	100%	99%	Yes
Tangerine	56	PM_{10}	24-hr	Maximum	--	61	61	61	361	350	--	100%	100%	100%	99%	96%	Yes
Douglas Red Cross	61	PM_{10}	24-hr	Maximum	--	361	362	361	361	354	--	99%	99%	99%	99%	97%	Yes
Rillito	59.8	PM_{10}	24-hr	Maximum	--	364	358	359	365	361	--	100%	98%	98%	100%	99%	Yes
Pinal Air Park	70.8	PM_{10}	24-hr	Maximum	--	364	356	361	356	360	--	100%	97%	99%	98%	99%	Yes
Ajo	153.6	PM_{10}	24-hr	Maximum	--	362	356	349	353	361	--	99%	97%	96%	97%	99%	Yes
Yuma Supersite	109.8	PM_{10}	24-hr	Maximum	--	365	352	355	356	357	--	100%	96%	97%	98%	98%	Yes
Alamo Lake	246.6	PM_{10}	24-hr	Maximum	--	356	356	311	346	349	--	98%	97%	85%	95%	96%	Yes
IMPROVE Saguaro West	58.3	PM_{10}	24-hr	Maximum	107	100	99	120	114	115	88%	83%	81%	98%	93%	95%	Yes
IMPROVE Saguaro	30.4	PM_{10}	24-hr	Maximum	117	112	121	113	120	119	96%	93%	99%	93%	98%	98%	Yes
IMPROVE Chiricahua	52.6	PM_{10}	24-hr	Maximum	115	107	107	112	121	117	94%	88%	88%	92%	99%	97%	Yes

[1] Data per EPA Air Data (https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors)
[2] Background Concentration type per Table 6 of ADEQ "Air Dispersion Modeling Guidelines for Arizona Air Quality Permits," December 1, 2015.
[3] Data completeness criteria of 75% per 40 CFR Part 50, Appendix N, Section 3.0(c)

Table A-1c. NO_2 Representative Background Concentrations - Data Completeness

Monitor Stations [1]	Distance from ADI (mi)	Pollutant	Averaging Period	Observations Type [2]	Number of Observations [1, 3]					Data Completeness [1, 3]					Can we use this monitor for Background Concentration Estimation?
					2019	2020	2021	2022	2023	2019	2020	2021	2022	2023	
22nd & Craycroft	52	NO_2	1-hr	97th Percentile	341	365	364	359	360	93%	100%	100%	98%	99%	Yes
			Annual	Annual Mean	341	365	364	359	360	93%	100%	100%	98%	99%	Yes
Children's Park	59	NO_2	1-hr	98th Percentile	359	363	358	342	346	98%	99%	98%	94%	95%	Yes
			Annual	Annual Mean	359	363	358	342	346	98%	99%	98%	94%	95%	Yes
Eastwood	153	NO_2	1-hr	98th Percentile	--	--	287	356	355	--	--	79%	98%	97%	Yes
			Annual	Annual Mean	--	--	287	356	355	--	--	79%	98%	97%	Yes
Buckeye	172	NO_2	1-hr	98th Percentile	--	--	365	365	325	--	--	100%	100%	89%	Yes
			Annual Mean	Annual Mean	--	--	365	365	325	--	--	100%	100%	89%	Yes

[1] Data per EPA Air Data (https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors)
[2] Background Concentration type per 40 CFR 50, Appendix S, Section 1(c)(1) and (2) (Interpretation of the Primary National Ambient Air Quality Standards for Oxides of Nitrogen (Nitrogen Dioxide))
[3] Data completeness criteria of 75% per 40 CFR Part 50, Appendix S, Section 3.1(b) and Section 3.2(b) (Interpretation of the Primary National Ambient Air Quality Standards for Oxides of Nitrogen (Nitrogen Dioxide))

Table A-2a. PM $_{2.5}$ Representative Background Concentrations - Concentrations

Monitor Stations [1]	Distance from ADI (mi)	Pollutant	County	Averaging Period	Background Concentrations Excluding Exceptional Events (µg/m³) [1, 3]								NAAQS Value [3]	Difference Between NAAQS and Background	Can we use this monitor for Background Concentration Estimation?	Does this monitor have a data completeness of 75% for the last 3 years?
					Observations Type [2]	2018	2019	2020	2021	2022	2023	Average of Most Recent 3 Years	(µg/m³)	(µg/m³)		
Nogales Post Office	58	$PM_{2.5}$	Santa Cruz	Annual	Mean	--	8.8	10.2	10.9	9.5	7.6	9.3	9	-0.3	No	97%
				24-hr	98th Percentile	--	23.4	23.6	30.3	28.2	15.4	24.6	35	10.4	Yes	
Children's Park	47	$PM_{2.5}$	Pima	Annual	Mean	--	3.0	5.9	6.0	6.3	6.3	6.2	9	2.8	Yes	80%
				24-hr	98th Percentile	--	8.2	14.2	10.7	12.7	14.2	12.5	35	22.5	Yes	
Orange Grove	51	$PM_{2.5}$	Pima	Annual	Mean	--	3.8	4.1	6.6	5.5	5.1	5.7	9	3.3	Yes	98%
				24-hr	98th Percentile	--	8.5	11.8	13.9	13.1	12.0	13.0	35	22.0	Yes	
Yuma Supersite	109.8	$PM_{2.5}$	Yuma	Annual	Mean	--	7.9	9.1	9.2	8.3	8.0	8.5	9	0.5	Yes	97%
				24-hr	98th Percentile	--	15.9	22.6	19.0	23.0	21.7	21.2	35	13.8	Yes	
IMPROVE Saguaro West	58.3	$PM_{2.5}$	Pima	Annual	Mean											98%
				24-hr	98th Percentile	9.5	7.8	9.5	12.0	8.9	8.3	9.7	35	25.3	Yes	
IMPROVE Saguaro	30.4	$PM_{2.5}$	Pima	Annual	Mean											98%
				24-hr	98th Percentile	8.5	5.6	11.6	9.9	9.3	7.4	8.9	35	26.1	Yes	
IMPROVE Chiricahua	52.6	$PM_{2.5}$	Cochise	Annual	Mean											95%
				24-hr	98th Percentile	7.1	5.5	10.3	11.2	6.7	6.9	8.3	35	26.7	Yes	
Alamo Lake	246.6	$PM_{2.5}$	La Paz	Annual	Mean	--	3.3	4.2	3.9	4.0	2.3	3.4	9	5.6	Yes	94%
				24-hr	98th Percentile	--	7.0	10.9	10.5	12.2	9.7	10.8	35	24.2	Yes	

[1] Data per EPA Air Data (https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors)

[2] Background Concentration type per Table 6 of ADEQ "Air Dispersion Modeling Guidelines for Arizona Air Quality Permits," December 1, 2015.

[3] Background Concentration averaging per Table 6 of ADEQ "Air Dispersion Modeling Guidelines for Arizona Air Quality Permits," December 1, 2015.

Table A-2b. PM $_{10}$ Representative Background Concentrations - Concentrations

Monitor Stations [1]	Distance from ADI (mi)	Pollutant	County	Averaging Period	Background Concentrations Excluding Exceptional Events (µg/m³) [1, 3]								NAAQS Value [3]	Difference Between NAAQS and Background	Can we use this monitor for Background Concentration Estimation?	Does this monitor have a data completeness of 75% for the last 3 years?
					Observations Type [2]	2018	2019	2020	2021	2022	2023	Average of Most Recent 3 Years	(µg/m³)	(µg/m³)		
Nogales Post Office	58	PM_{10}	Santa Cruz	24-hr	Second highest	--	108	128	149	104	126	126	150	24	Yes	96%
Green Valley	42	PM_{10}	Pima	24-hr	Second highest	--	29	55	59	69	32	53	150	97	Yes	98%
Corona De Tucson	30	PM_{10}	Pima	24-hr	Second highest	--	56	61	60	68	66	65	150	85	Yes	97%
Santa Clara	43	PM_{10}	Pima	24-hr	Second highest	--	28	43	38	30	38	35	150	115	Yes	98%
South Tucson	43	PM_{10}	Pima	24-hr	Second highest	--	51	70	105	72	59	79	150	71	Yes	98%
Geronimo	45	PM_{10}	Pima	24-hr	Second highest	--	55	87	75	82	62	73	150	77	Yes	98%
Paul Spur Chemical	52	PM_{10}	Cochise	24-hr	Second highest	--	56	136	132	87	80	100	150	50	Yes	97%
Orange Grove	51	PM_{10}	Pima	24-hr	Second highest	--	44	73	111	90	50	84	150	66	Yes	99%
Tangerine	56	PM_{10}	Pima	24-hr	Second highest	--	38	62	110	54	46	70	150	80	Yes	98%
Douglas Red Cross	61	PM_{10}	Cochise	24-hr	Second highest	--	97	108	107	124	78	103	150	47	Yes	98%
Rillito	59.8	PM_{10}	Pima	24-hr	Second highest	--	139	211	249	198	201	216	150	-66	No	99%
Pinal Air Park	70.8	PM_{10}	Pinal	24-hr	Second highest	--	61	101	113	178	107	133	150	17	Yes	98%
Ajo	153.6	PM_{10}	Cochise	24-hr	Second highest	--	65	93	97	114	114	108	150	42	Yes	97%
Yuma Supersite	109.8	PM_{10}	Pima	24-hr	Second highest	--	174	179	199	234	350	261	150	-111	No	98%
Alamo Lake	246.6	PM_{10}	La Paz	24-hr	Second highest	--	40	148	111	104	145	120	150	30	Yes	92%
IMPROVE Saguaro West	58.3	PM_{10}	Pima	24-hr	Second highest	48	24	31	47	30	55	44	150	106	Yes	96%
IMPROVE Saguaro	30.4	PM_{10}	Pima	24-hr	Second highest	33	20	32	34	31	22	29	150	121	Yes	96%
IMPROVE Chiricahua	52.6	PM_{10}	Cochise	24-hr	Second highest	54	22	31	35	26	26	29	150	121	Yes	96%

[1] Data per EPA Air Data (https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors)

[2] Background Concentration type per Table 6 of ADEQ "Air Dispersion Modeling Guidelines for Arizona Air Quality Permits," December 1, 2015.

[3] Background Concentration averaging per Table 6 of ADEQ "Air Dispersion Modeling Guidelines for Arizona Air Quality Permits," December 1, 2015.

Table B-2c. NO_2 Representative Background Concentrations - Concentrations

Monitor Stations [1]	Distance from ADI (mi)	Pollutant	Averaging Period	Data Completeness					Background Concentrations (ppb) [1, 3]							NAAQS Value [4]	Difference Between NAAQS and Background	Can we use this monitor for Background Concentration Estimation?
				2019	2020	2021	2022	2023	Observations Type [2]	2019	2020	2021	2022	2023	Mean or Percentile	(ppb)	(ppb)	
22nd & Craycroft	52	NO_2	1-hr	93%	100%	100%	98%	99%	98th Percentile	35.8	36.5	38.3	36.9	37.0	37.0	100	63	Yes
			Annual	93%	100%	100%	98%	99%	Annual Mean	7.5	7.7	7.7	7.4	7.5	8.0	53	45	Yes
Children's Park	59	NO_2	1-hr	98%	99%	98%	94%	95%	98th Percentile	30.1	27.9	31.3	31.5	31.0	31.0	100	69	Yes
			Annual	98%	99%	98%	94%	95%	Annual Mean	7.3	6.7	6.9	7.3	6.9	7.0	53	46	Yes
Eastwood	153	NO_2	1-hr	--	--	79%	98%	97%	98th Percentile	--	--	52.0	47.0	47.0	49.0	100	51	Yes
			Annual	--	--	79%	98%	97%	Annual Mean	--	--	16.3	15.2	14.4	16.0	53	37	Yes
Buckeye	172	NO_2	1-hr	--	--	100%	100%	89%	98th Percentile	--	--	33.0	33.0	33.0	33.0	100	67	Yes
			Annual	--	--	100%	100%	89%	Annual Mean	--	--	8.0	8.0	7.9	8.0	53	45	Yes

[1] Data per EPA Air Data (https://www.epa.gov/outdoor-air-quality-data/interactive-map-air-quality-monitors)

[2] Background Concentration type per 40 CFR 50, Appendix S, Section 1(c)(1) and (2) (Interpretation of the Primary National Ambient Air Quality Standards for Oxides of Nitrogen (Nitrogen Dioxide))

[3] Background Concentration averaging per 40 CFR 50, Appendix S, Section 5.1(b) and 5.2(b) (Interpretation of the Primary National Ambient Air Quality Standards for Oxides of Nitrogen (Nitrogen Dioxide))

[4] NAAQS value per 40 CFR 50, Appendix S, Section 3.1(a) and 3.2(a) (Interpretation of the Primary National Ambient Air Quality Standards for Oxides of Nitrogen (Nitrogen Dioxide))

APPENDIX C. AERMOD, AERMET & AERSURFACE PROGRAM FILES