Technical Support Document:

Chapter 24
Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for the Navajo Nation

1. Summary

Pursuant to section 107(d) of the Clean Air Act (CAA), the U.S. Environmental Protection Agency (the EPA, we, or us) must designate areas as either "nonattainment," "attainment," or "unclassifiable" for the 2010 1-hour sulfur dioxide (SO_2) primary national ambient air quality standard (NAAQS) (2010 SO_2 NAAQS). The CAA defines a nonattainment area as an area that does not meet the NAAQS or that contributes to a nearby area that does not meet the NAAQS. An attainment area is defined by the CAA as any area that meets the NAAQS and does not contribute to a nearby area that does not meet the NAAQS. Unclassifiable areas are defined by the CAA as those that cannot be classified on the basis of available information as meeting or not meeting the NAAQS. In this action, the EPA has defined a nonattainment area as an area that the EPA has determined violates the 2010 SO_2 NAAQS or contributes to a violation in a nearby area, based on the most recent 3 years of air quality monitoring data, appropriate dispersion modeling analysis, and any other relevant information. An unclassifiable/attainment area is defined by the EPA as an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS[1]. An unclassifiable area is defined by EPA as an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may

[1] The term "designated attainment area" is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA's approval of a state-submitted maintenance plan.

(i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

This technical support document (TSD) addresses designations for all areas on the Navajo Nation for the 2010 SO_2 NAAQS. In previous final actions, the EPA has issued designations for the 2010 SO_2 NAAQS for selected areas of the country.[2] The EPA did not designate any areas of the Navajo Nation in previous designations. The EPA is under a deadline of December 31, 2017, to designate the areas addressed in this TSD as required by the U.S. District Court for the Northern District of California.[3] We are referring to the set of designations being finalized by this deadline as "Round 3" of the designations process for the 2010 SO_2 NAAQS. After the Round 3 designations are completed, the only remaining undesignated areas will be those where a state has installed and begun timely operation of a new SO_2 monitoring network meeting EPA specifications referenced in the EPA's SO_2 Data Requirements Rule (DRR) (80 FR 51052). The EPA is required to designate those remaining undesignated areas by December 31, 2020.

The Navajo Nation did not submit a recommendation regarding designations for the 2010 SO_2 NAAQS in 2011. The Nation submitted a list of sources emitting SO_2 in excess of 2,000 tons per year (tpy) on January 14, 2016.[4] On June 6, 2016, the Nation submitted a draft modeling protocol to the EPA, and on June 29, 2016, the Nation notified the EPA that it would characterize air quality around the Four Corners Power Plant (Four Corners or FCPP) and the Navajo Generating Station (NGS) using air quality modeling.[5] On January 12, 2017, the Nation submitted reports and associated documentation for the modeling conducted for the two sources located on the Navajo Nation.[6] The letter concludes that the modeling analyses support designations of attainment for the areas around Four Corners and NGS. The Navajo Nation did not provide any boundary recommendations for the designated areas, or request that the Navajo Nation be designated as a separate area from the surrounding areas. In our intended designations, we have considered all the submissions from the Navajo Nation.

Table 1 identifies the EPA's intended designations for the Navajo Nation and the areas to which they would apply. It also lists the Navajo Nation's current recommendations. The EPA's final designation for the Navajo Nation will be based on an assessment and characterization of air quality through ambient air quality data, air dispersion modeling, other evidence and supporting information, or a combination of the above.

[2] A total of 94 areas throughout the U.S. were previously designated in actions published on August 5, 2013 (78 FR 47191), July 12, 2016 (81 FR 45039), and December 13, 2016 (81 FR 89870).
[3] *Sierra Club v. McCarthy*, No. 3-13-cv-3953 (SI) (N.D. Cal. Mar. 2, 2015).
[4] *See* letter dated January 13, 2016, from Dr. Donald Benn, Navajo Nation Environmental Protection Agency, to Jared Blumenfeld, EPA Region IX.
[5] *See* letter dated June 29, 2016, from Dr. Donald Benn, Navajo Nation Environmental Protection Agency, to Alexis Strauss, EPA Region IX.
[6] *See* separate letters for NGS and FCPP dated January 12, 2017, from Dr. Donald Benn, Navajo Nation Environmental Protection Agency, to Elizabeth Adams, EPA Region IX.

Table 1. Summary of the EPA's Intended Designations and the Designation Recommendations by the Navajo Nation*

Area	Navajo Nation's Recommended Area Definition	Navajo Nation's Recommended Designation	EPA's Intended Area Definition	EPA's Intended Designation
Navajo Nation portion of San Juan County, New Mexico	Area around Four Corners	Attainment	Navajo Nation portion of San Juan County, New Mexico	Unclassifiable / Attainment
Navajo Nation portion of Coconino County, Arizona	Area around NGS	Attainment	Navajo Nation portion of Coconino County, Arizona located within 50-km of NGS	Unclassifiable
Rest of Navajo Nation	No specific recommendation	No specific recommendation	Rest of Navajo Nation	Unclassifiable/ Attainment

* EPA is not determining the boundaries of any area of Indian country in this document, including any area of Indian country located in the larger designation area. This document is not a determination related to regulatory authority under the Clean Air Act for such area of Indian country.

For states or tribes that elect to install and begin timely operation of a new, approved SO_2 monitoring network, the EPA is required to designate these areas, pursuant to a court ordered schedule, by December 31, 2020. The Navajo Nation did not elect to install a new SO_2 monitoring network.

Areas that the EPA previously designated unclassifiable in Round 1 (*see* 78 FR 47191) and Round 2 (*see* 81 FR 45039 and 81 FR 89870) are not affected by the designations in Round 3 unless otherwise noted. No areas within the Navajo Nation were designated in Rounds 1 or 2.

2. General Approach and Schedule

Updated designations guidance documents were issued by the EPA through a memorandum dated July 22, 2016, and a memorandum dated March 20, 2015, from Stephen D. Page, Director, U.S. EPA, Office of Air Quality Planning and Standards, to Air Division Directors, U.S. EPA Regions I-X. These memoranda supersede earlier designation guidance for the 2010 SO_2 NAAQS, issued on March 24, 2011, and identify factors that the EPA intends to evaluate in determining whether areas are in violation of the 2010 SO_2 NAAQS. The documents also contain the factors that the EPA intends to evaluate in determining the boundaries for designated areas. These factors include: 1) air quality characterization via ambient monitoring or dispersion modeling results; 2) emissions-related data; 3) meteorology; 4) geography and topography; and 5) jurisdictional boundaries.

To assist states, tribes, and other interested parties in their efforts to characterize air quality through air dispersion modeling for sources that emit SO_2, the EPA released its most recent version of a draft document titled, "SO_2 NAAQS Designations Modeling Technical Assistance Document" (Modeling TAD) in August 2016.[7]

Readers of this chapter of this TSD should refer to the additional general information for the EPA's Round 3 area designations in Chapter 1 (Background and History of the Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard) and Chapter 2 (Intended Round 3 Area Designations for the 2010 1-Hour SO_2 Primary National Ambient Air Quality Standard for States with Sources Not Required to be Characterized).

As specified by the court order dated March 2, 2015, the EPA is required to designate by December 31, 2017, all "remaining undesignated areas in which, by January 1, 2017, states and tribes have not installed and begun operating a new SO_2 monitoring network meeting EPA specifications referenced in EPA's" SO_2 DRR. The EPA will therefore designate by December 31, 2017, areas of the country that are not, pursuant to the DRR, timely operating EPA-approved and valid monitoring networks. The areas to be designated by December 31, 2017, include the areas associated with two sources on the Navajo Nation meeting DRR emissions criteria that the Navajo Nation has chosen to be characterized using air dispersion modeling, and other portions of the Navajo Nation not specifically required to be characterized by the tribe under the DRR.

Because many of the intended designations have been informed by available modeling analyses, this preliminary TSD is structured based on the availability of such modeling information. There is a section for each area for which modeling information is available.

The EPA does not plan to revise this TSD after consideration of state, tribal, and public comment on our intended designation. A separate TSD will be prepared as necessary to document how we have addressed such comments in the final designations.

The following are definitions of important terms used in this document:

1) 2010 SO_2 NAAQS – The primary NAAQS for SO_2 promulgated in 2010. This NAAQS is 75 ppb, based on the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. *See* 40 CFR 50.17.
2) Design Value - a statistic computed according to the data handling procedures of the NAAQS (in 40 CFR part 50 Appendix T) that, by comparison to the level of the NAAQS, indicates whether the area is violating the NAAQS.

[2] https://www.epa.gov/sites/production/files/2016-06/documents/so2modelingtad.pdf. In addition to this TAD on modeling, the EPA also has released a technical assistance document addressing SO_2 monitoring network design, to advise states that have elected to install and begin operation of a new SO_2 monitoring network. *See* Draft SO_2 NAAQS Designations Source-Oriented Monitoring Technical Assistance Document, February 2016, https://www.epa.gov/sites/production/files/2016-06/documents/so2monitoringtad.pdf.

3) Designated Nonattainment Area – an area that, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined either: (1) does not meet the 2010 SO2 NAAQS, or (2) contributes to ambient air quality in a nearby area that does not meet the NAAQS.
4) Designated Unclassifiable/Attainment Area – an area that either: (1) based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.[8]
5) Designated Unclassifiable Area – an area that either: (1) was required to be characterized by the state under 40 CFR 51.1203(c) or (d), has not been previously designated, and on the basis of available information cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does not meet the NAAQS; or (2) was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.
6) Modeled violation – a violation of the SO_2 NAAQS demonstrated by air dispersion modeling.
7) Recommended attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as attainment.
8) Recommended nonattainment area – an area that a state, territory, or tribe has recommended that the EPA designate as nonattainment.
9) Recommended unclassifiable area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable.
10) Recommended unclassifiable/attainment area – an area that a state, territory, or tribe has recommended that the EPA designate as unclassifiable/attainment.
11) Violating monitor – an ambient air monitor meeting 40 CFR parts 50, 53, and 58 requirements whose valid design value exceeds 75 ppb, based on data analysis conducted in accordance with Appendix T of 40 CFR part 50.
12) We, our, and us – these refer to the EPA.

[8] The term "designated attainment area" is not used in this document because the EPA uses that term only to refer to a previous nonattainment area that has been redesignated to attainment as a result of the EPA's approval of a state-submitted maintenance plan.

3. Technical Analysis for the Navajo Nation portion of San Juan County, New Mexico

3.1. Introduction

The EPA must designate the Navajo Nation portion of San Juan County, New Mexico, by December 31, 2017, because this portion of the Navajo Nation has not been previously designated and the Navajo Nation has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in the Navajo Nation portion of San Juan County. There is one source of SO_2 emissions located in the Navajo Nation portion of San Juan County that emits SO_2 in excess of 2,000 tpy, the Four Corners Power Plant (Four Corners or FCPP).

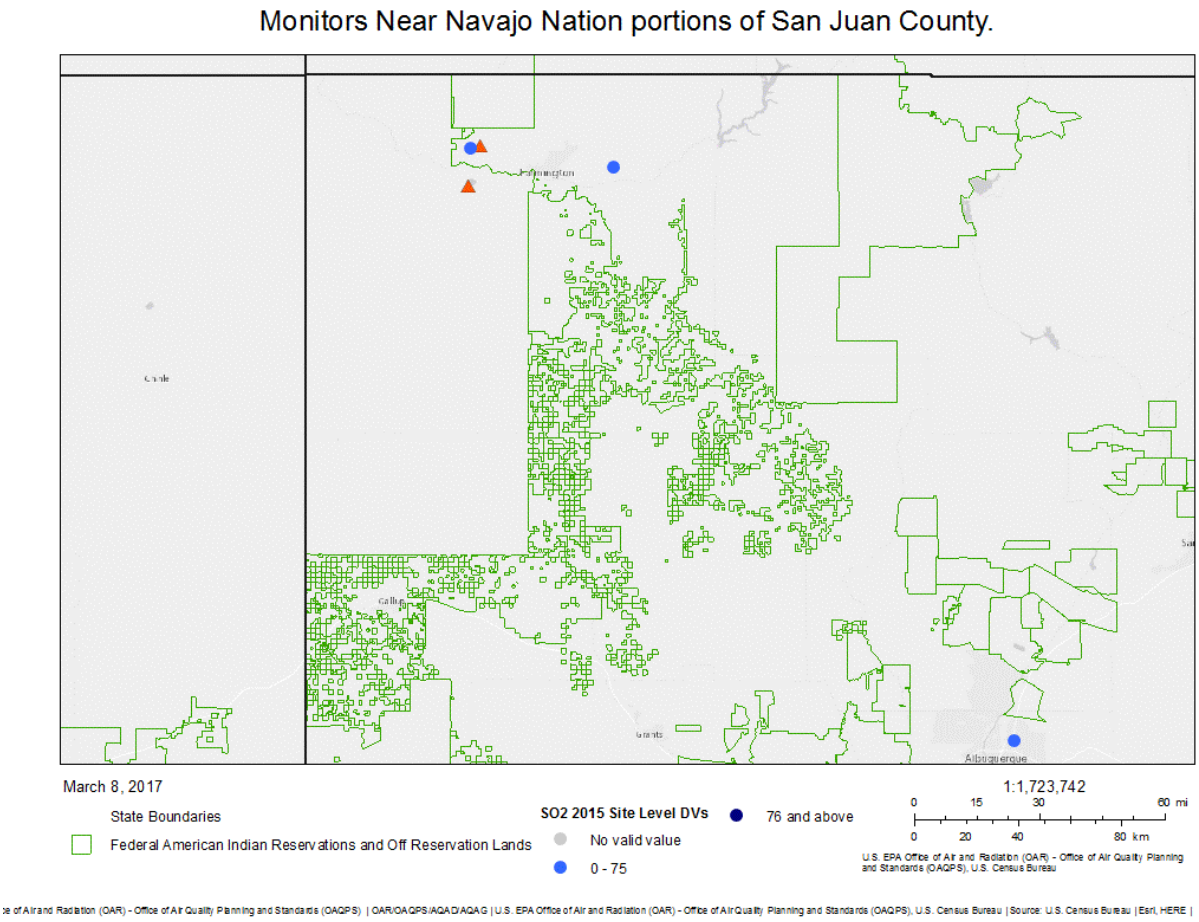
Four Corners is located on reservation lands of the Navajo Nation, geographically located in San Juan County, New Mexico. San Juan County, New Mexico, is located in the northwest corner of New Mexico. Located within the New Mexico portion of San Juan County, approximately 13 kilometers (km) from Four Corners, is another coal-fired power plant that emits SO_2 in excess of 2,000 tpy, the San Juan Generating Station (SJGS). New Mexico has characterized air quality in the vicinity of SJGS using air quality modeling. Because of the close proximity of Four Corners to SJGS, the modeling domains for these two facilities overlap significantly and modeling for each facility included emissions from the other facility. Additional information on SJGS, including air quality modeling results and the EPA's intended designations for San Juan County, New Mexico, are addressed in the New Mexico Chapter 28 of the TSD.

3.2. Air Quality Monitoring Data for the Navajo Nation portion of San Juan County

This factor considers the SO_2 air quality monitoring data near the Navajo Nation portion of San Juan County. There is no approved SO_2 monitoring network located on the Navajo Nation portion of San Juan County. There are two SO_2 monitors located in San Juan County, New Mexico, within 50 km of Four Corners. The locations of these monitors are shown in Figure 1. The orange triangles shown in Figure 1 represent the sources in the area subject to the DRR, *i.e.,* FCPP and SJGS. Data collected between 2013 and 2015 for these monitors, available in the EPA's Air Quality System (AQS), is certified, and meets completeness requirements outlined in 40 CFR 50 Appendix T.

- AQS monitor 35-045-1005 is located at USBR Shiprock Substation (Farmington) in San Juan County, New Mexico, and is approximately 12 km north of Four Corners. This monitor has a 2013-2015 design value of 13 parts per billion (ppb).
- AQS monitor 35-045-0009 is located at 162 Highway 544, Bloomfield, New Mexico, in San Juan County. It is approximately 45 kilometers east of Four Corners, and has a 2013-2015 design value of 5 ppb.

Figure 1. Monitors near the Navajo Nation portion of San Juan County



These data were available to the EPA for consideration in the designations process, however, since it is unclear if these monitors are located in areas of maximum concentration, it is unclear if the data are representative of the area's actual air quality.

3.3. Air Quality Modeling Analysis for the Navajo Nation portion of San Juan County Addressing the Four Corners Power Plant

3.3.1. Introduction

This section presents all the available air quality modeling information for a portion of the Navajo Nation that includes Four Corners, geographically located in San Juan County, New Mexico. (This portion of the Navajo Nation will often be referred to as "the Navajo Nation portion of San Juan County" within this section). This area contains the following SO_2 source around which the Navajo Nation is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- Four Corners emits 2,000 tons or more annually. Specifically, based on the 2014 National Emissions Inventory (NEI) Four Corners emitted 6,317 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR source list, and the Navajo Nation has chosen to characterize it with modeling.

In addition, although it is not located on the Navajo Nation area of Indian country or any other area of Indian country, SJGS is located approximately 13 km from Four Corners, and emits 2,000 tons or more annually. Specifically, based on the 2014 NEI, SJGS emitted 4,989 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR source list, and New Mexico has chosen to characterize it with modeling. That modeling is evaluated in a separate chapter for New Mexico, in the section addressing the non-Navajo Nation portion of San Juan County.

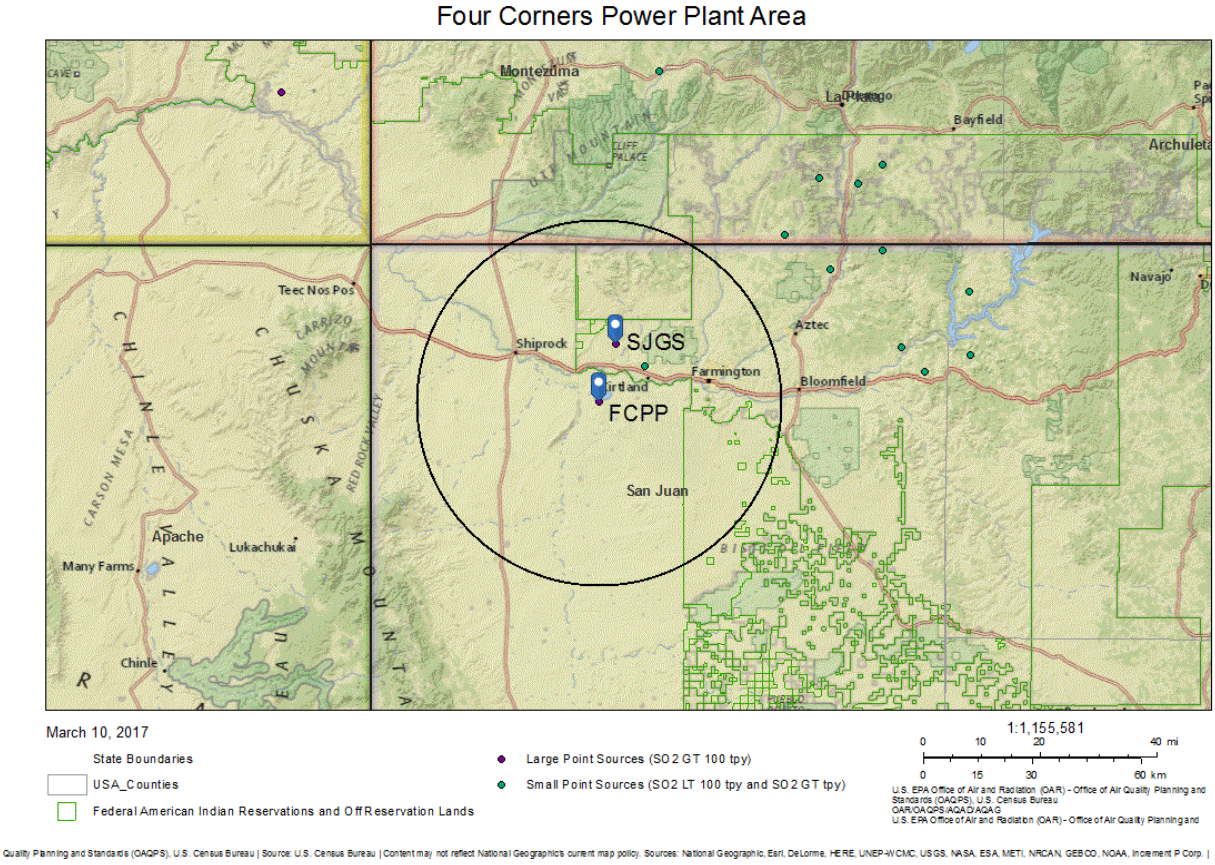
Because we have available results of air quality modeling in which these sources are modeled together, this section considers the impacts of both FCPP and SJGS.

In its submission, the Navajo Nation stated that its modeling analysis supports an attainment designation but did not include any discussion of boundaries for the designated area. The Navajo Nation's assessment and characterization was performed using air dispersion modeling software, *i.e.*, AERMOD, analyzing actual emissions. After careful review of the Tribe's assessment, supporting documentation, and all available data, the EPA finds that the modeling analysis for Four Corners supports a designation of unclassifiable/attainment. Our reasoning for this conclusion is explained in section 3.3.11 of this chapter, after all the available information is presented.

As seen in Figure 2 below, Four Corners is located near Fruitland, New Mexico, just south of the San Juan River, a tributary of the Colorado River. Figure 2 includes a 50-km radius circle around Four Corners.

Also included in Figure 2 are other nearby emitters of SO_2.[9] These are SJGS and the San Juan River Gas Plant, located in the same river valley as FCPP. The figure does not reflect the tribe's recommended area for the Navajo Nation designation, as no specific area was recommended. The EPA's intended unclassifiable/attainment designation boundary for the Navajo Nation portion of San Juan County is not shown in this figure, but is shown in a figure in section 3.9 below that summarizes our intended designation.

Figure 2. Map of the Navajo Nation portion of San Juan County Addressing Four Corners



The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's guidance documents dated July 22, 2016, and March 20, 2015, as appropriate.

For this area, the EPA received and considered one modeling assessment, dated January 12, 2017, from the Navajo Nation Environmental Protection Agency (NNEPA) and no assessment from any other party. Note that the Navajo Nation modeling was a variant of that performed for a 2015 Environmental Impact Statement ("FCPP EIS"), [10] so that much of the pre-processing work could be reused, which was an important consideration given Navajo Nation's limited resources. Using that previous analysis as a starting point constrained some of the modeling inputs such that the modeling inputs might not, in all cases, exactly match those recommended in the Modeling TAD.

[9] All other SO_2 emitters of 20 tpy or more (based on information in the 2014 NEI) are shown in Figure 2.
[10] "Four Corners Power Plant and Navajo Mine Energy Project Environmental Impact Statement NAAQS Modeling Study," Prepared for Arizona Public Service, AECOM, August 2014.

3.3.2. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

The Navajo Nation used AERMOD version 15181, using all regulatory default options.[11] AERMOD version 16216r has since become the regulatory model version. There were no updates from 15181 to 16216r that when using the regulatory default options in version 15181 would significantly affect the concentrations predicted here, therefore, we conclude that the Navajo Nation's use of AERMOD version 15181 using all regulatory default options is appropriate. A discussion of the Navajo Nation's approach to the individual components is provided in the corresponding discussion that follows.

3.3.3. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purpose of performing the modeling for the area of analysis, the Navajo Nation determined that it was most appropriate to run the model in rural mode. This issue was not explicitly addressed in the NNEPA analysis; however, it is clear from aerial photographs that the area of analysis is predominantly uninhabited desert and desert scrub, with some irrigated fields, but with no urbanized areas. The nearest town to FCPP is Nenahnezad, population 726; Farmington with population 45,426 is approximately 24 km away. The EPA agrees that it is appropriate to use AERMOD in rural mode.

[11] The AERMOD modeling system is the model identified in 40 CFR Part 51, Appendix W, for use in regulatory applications, for near-field dispersion of emissions for distances up to 50 km. The EPA periodically releases updated versions of AERMOD. Version 15181 was released with several beta options. The regulatory default for version 15181 is the use of version 15181, as released by the EPA, without the use of any of the beta options. *See* https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models.

3.3.4. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The sources of SO_2 emissions subject to the DRR in this area are described in the introduction to this section. For the Navajo Nation portion of San Juan County, the Navajo Nation considered one other emitter of SO_2 (SJGS) within 40 km of FCPP in any direction. The Navajo Nation determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas.

The San Juan River Gas Plant is 12.7 km from FCPP, but was not included based on the Navajo Nation applying a "20D" screening rule often used in New Source Review permitting analyses to exclude sources unlikely to cause a significant concentration gradient in the area. Under this New Source Review screening method[12] if the source's emissions in tons per year (tpy) are smaller than 20 times the source's distance from the primary source in km, then it is excluded. This method gives an emissions threshold of 254 tpy, whereas the San Juan River Gas Plant has a permitted limit of 229.4 tpy,[13] and 2014 NEI emissions of only 90.6 tpy, well below the threshold. The EPA's Modeling TAD does not mention the 20D screening approach and recommends including sources in the modeling that have the potential to cause concentration gradients within the area of analysis. The Navajo Nation described this significant concentration gradient analysis based on the modeled impacts of SJGS and it showed only a small percent difference between the impact at FCPP and the impact at the location of FCPP's own maximum concentration, indicating an insignificant gradient attributable to SJGS. The Navajo Nation concluded it is therefore unlikely to cause a significant concentration gradient and that SJGS is adequately represented by the monitored background, therefore it need not be included in the modeling of FCPP. As further support, the Navajo Nation also performed supplemental modeling that included SJGS along with FCPP, and found that it increased the maximum concentration by only 0.2 micrograms per cubic meter ($\mu g/m^3$). Further consideration is given below to the supplemental modeling Navajo Nation performed that included SJGS with FCPP.

No other sources beyond 40 km were determined by the Navajo Nation to have the potential to cause concentration gradient impacts within the area of analysis.

The grid receptor spacing for the area of analysis chosen by the Navajo Nation is as follows:[14]

[12] EPA's "Screening Threshold" Method for PSD Modeling, 1985.

[13] New Mexico Environment Department, Air Quality Bureau, April 7, 2014, "PUBLIC NOTICE For Air Quality Operating Permit for San Juan River Gas Plant of WGR Asset Holding Company LLC", https://www.env.nm.gov/aqb/permit/documents/Public_Notice_WGF_SanJuanRiverGasPlant_P106R2_07Apr14.pdf.

[14] This description of receptor spacing is derived from the AERMOD input files, and differs slightly from the text description provided by Navajo Nation.

- spacing of 100 m out to a distance of 2 km from the source
- spacing of 250 m from that point out to a distance of 3 km
- spacing of 500 m from that point out to a distance of 5 km
- spacing of 1 km from that point out to a distance of 10 km
- spacing of 2.86 km (20 km ÷ 7) from that point out to a distance of 30 km
- spacing of 5 km from that point out to a distance of 50 km

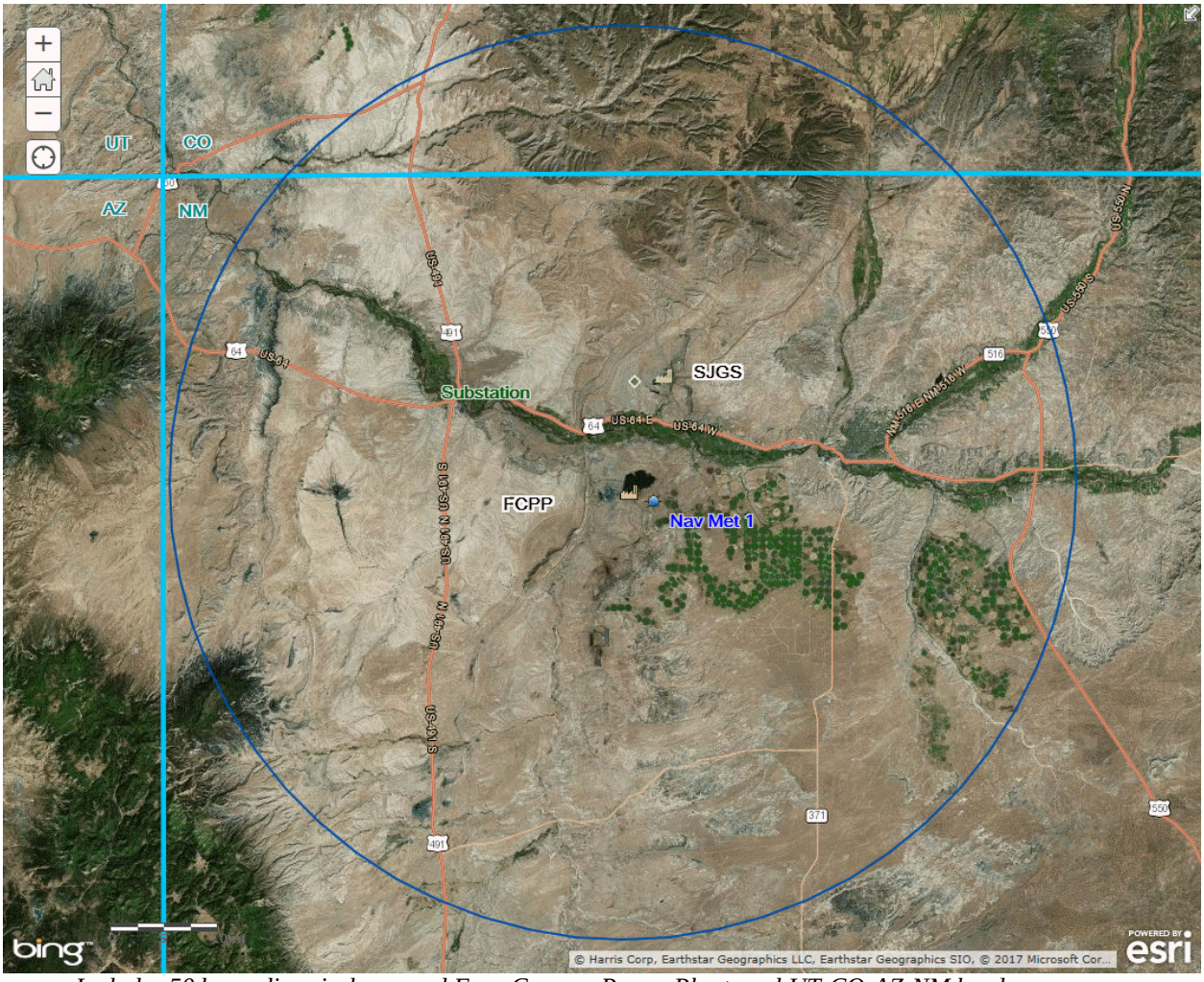
In addition, receptors were placed with 50 m spacing along the facility fence line, and with 100 m spacing over the area of Hogback Ridge, which extends from 5 km to 15 km toward the southwest, where elevated terrain had the potential to cause higher modeled impacts.

The receptor network contained 4,034 receptors, and the network covered a 100 km by 100 km square centered on FCPP, almost all within the geographic boundaries of San Juan County, New Mexico, but extending a bit into Montezuma and La Plata Counties in Colorado.

Figures 3, 4, and 5 show the Navajo Nation's chosen area of analysis surrounding FCPP, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the Navajo Nation placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property with the exceptions of locations described in Section 4.2 of the Modeling TAD as not being feasible locations for placing a monitor. Receptors were not placed over the area of Morgan Lake, which is just north of FCPP and provides it with cooling water. While this was not explained explicitly, presumably this was because it would be infeasible to place monitors on the lake. Monitors were also not included within the fence line of FCPP; as such locations would not be considered to be ambient air relative to FCPP if shown that public access is precluded. Although no additional information was provided relating to the preclusion of public access by the fence, fences are visible in satellite photographs of the area, and correspond to the interior gap of receptors in Figure 5.

Figure 3: Area of Analysis for the Navajo Nation Portion of San Juan County



Includes 50 km radius circle around Four Corners Power Plant, and UT-CO-AZ-NM borders

Figure 4: Receptor Grid for the Navajo Nation Portion of San Juan County

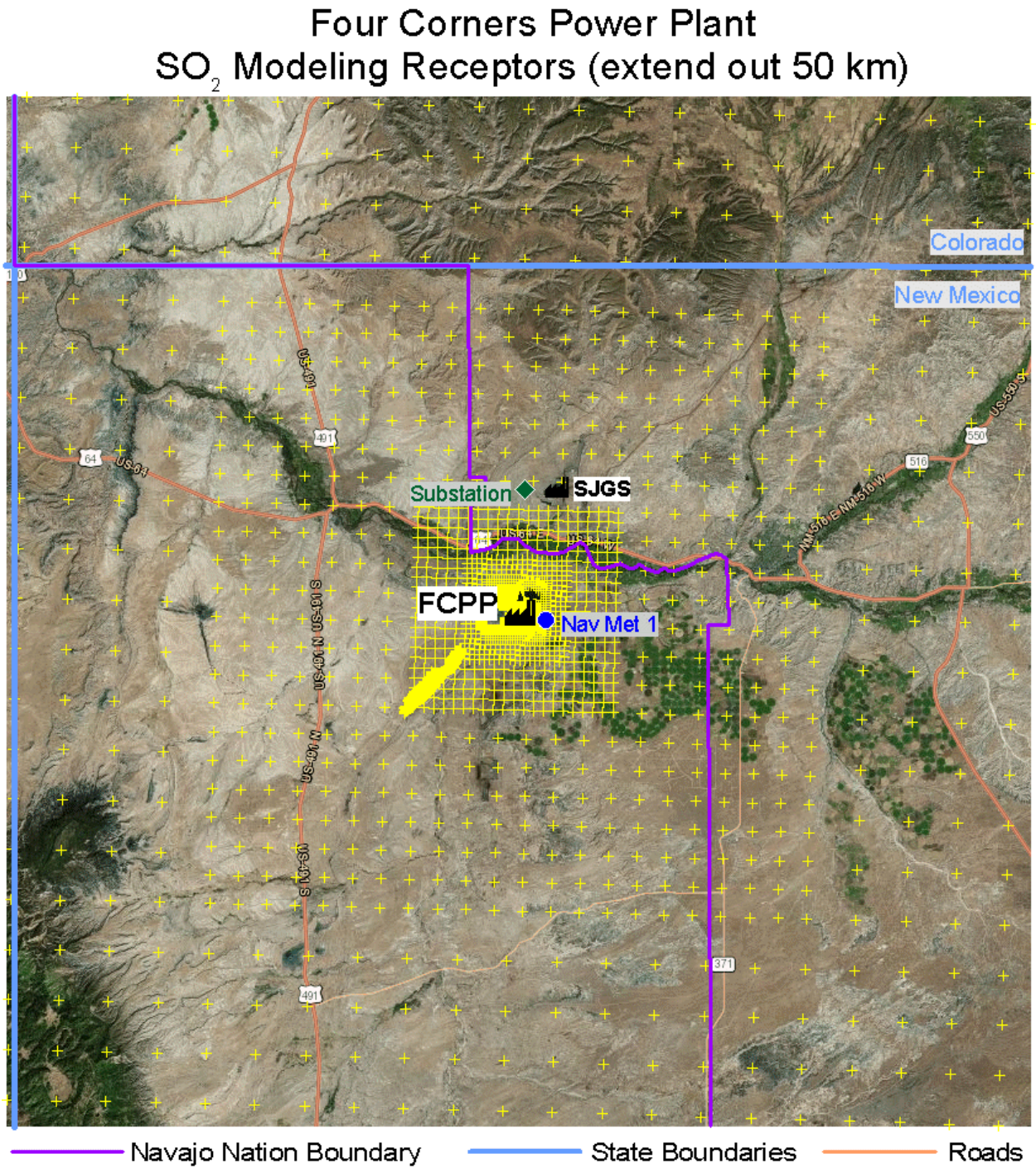
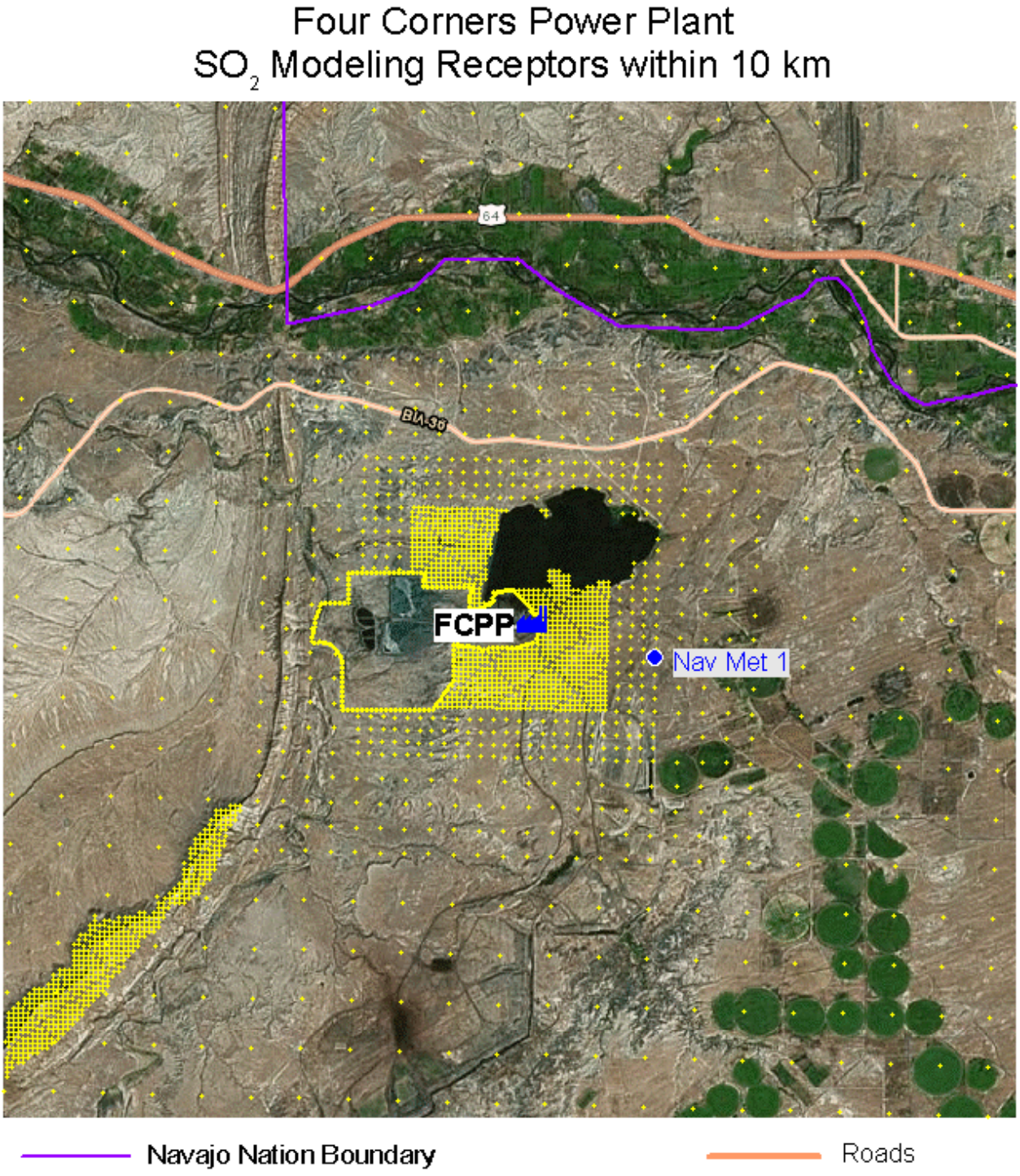


Figure 5: Nearby Receptor Grid for the Navajo Nation Portion of San Juan County



The EPA finds that the placement of model receptors was adequate to assess maximum SO_2 concentrations, and that receptors excluded from the modeling were appropriate to exclude.

3.3.5. Modeling Parameter: Source Characterization

The Navajo Nation included Four Corners explicitly in its modeling because it is the sole DRR-listed source within the Navajo Nation portion of San Juan County, New Mexico. In supplemental modeling, the Navajo Nation also included SJGS, to assess the possibility of overlapping impact areas and their effect on SO_2 concentrations. The supplemental modeling also included an FCPP auxiliary boiler, with SO_2 emissions of 0.6 tpy.

The Navajo Nation characterized these sources within the area of analysis in accordance with the best practices outlined in the Modeling TAD. Specifically, the Navajo Nation used actual stack heights in conjunction with actual emissions. The Navajo Nation also adequately characterized the source's building layout and location, as well as the stack parameters, *e.g.*, exit temperature, exit velocity, location, and diameter. The AERMOD component BPIPPRM was used to assist in addressing building downwash.

FCPP has two emitting units, units 4 and 5, with separate flues that exhaust into a common stack. Only a single stack was modeled, representing their combined emission. For each hour, the stack diameter and the total flow for both units were used to compute exit velocity, and the temperatures for both units were weighted by their respective hourly flow to compute exit temperature.

The EPA finds that the Navajo Nation adequately characterized the sources in its AERMOD modeling.

3.3.6. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the affected source(s).

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, for a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE emission rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the

most recent 3 calendar years. In these cases, the Modeling TAD notes that a state or tribe should be able to find the necessary emissions information for designations-related modeling in the existing SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

Units 1, 2, and 3 at FCPP permanently closed by January 2014. The closure of units 1, 2, and 3 was in accordance with the EPA's Federal Implementation Plan for Best Available Retrofit Technology (BART) under the Regional Haze Rule as an alternative compliance option to source-specific BART limits.[15] Based on the federally-enforceable requirement, the EPA considers the exclusion of these emissions from the modeling a more realistic assessment of current and future conditions than including all five units' emissions during the modeled period, the default under the Modeling TAD. An alternative approach, as recommended under the TAD, would have been to use true actual emissions for just units 4 and 5 after the closure of units 1, 2, and 3, i.e. for 2014 – 2016, which would have likely yielded similar results.

As previously noted, the Navajo Nation included FCPP and one other emitter of SO_2 within 40 km in the area of analysis. The Navajo Nation has chosen to model these facilities using actual emissions, with the previously noted exception of the now-shutdown units 1, 2, and 3 of FCPP. The facilities in the modeling analysis and their associated annual actual SO_2 emissions between 2012 and 2014 are summarized below.

For FCPP and SJGS, the Navajo Nation provided annual actual SO_2 emissions between 2012 and 2014. This information is the sum of hourly emissions used in the modeling, and is summarized in Table 2. A description of how the Navajo Nation obtained hourly emission rates is given below this table.

Table 2. Actual SO_2 Emissions Between 2012 – 2014 from Facilities in the Navajo Nation portion of San Juan County and Surrounding Areas

	SO_2 Emissions (tpy)		
Facility Name	**2012**	**2013**	**2014**
Four Corners Power Plant (units 4 and 5)	7,179	6,636	5,718
San Juan Generating Station	4,558	5,978	4,968
Total Emissions from All Modeled Facilities in the State's Area of Analysis	11,738	12,615	10,686

For FCPP, the actual hourly emissions data were obtained from CEMS data obtained from the plant operator, Arizona Public Service (APS). These hourly emissions were summed by the EPA to get the annual figures in Table 2 above. The APS data included the hourly varying stack exit temperatures and exit velocities discussed above. Note that this includes emissions only from FCPP units 4 and 5; units 1, 2, and 3 shut down by January 2014. As stated previously, based on the federally-enforceable requirement, the EPA considers the exclusion of the emissions from

[15] *See* 40 CFR 49.5512 (i)(3). 77 FR 51619 (August 24, 2012).

units 1, 2, and 3 from the modeling to be a more realistic assessment of current and future conditions. The EPA notes that emissions from the remaining units 4 and 5 did increase slightly in 2015 to approximately 7,256 tons as reported to CAMD. However, the most recent emissions reported to CAMD for FCPP units 4 and 5 decreased to 4,411 tons in 2016. The EPA finds that the minimal total difference in emissions from the modeled years to the more recent years would likely have little effect on the resulting modeled concentrations.

For SJGS, actual hourly emissions data were obtained from CEMS data from the New Mexico Environment Department (NMED). The annual emissions from SJGS in Table 2 are based on annual emissions data from the EPA Air Markets Program Database.[16]

Although there are differences in the CAMD data compared to the state modeled data on an annual basis (e.g. in 2014, the CAMD emissions were 6,317 tons while the state's emissions summed to 5,718 tons), we don't expect wide variations in individual hours such that the modeled design values would show 1-hour violations. In fact, by 2016, the actual emissions are on the order of 40% lower relative to 2012 emissions, so the modeled concentrations would follow suit.

The EPA finds that the Navajo Nation adequately characterized the emissions from the SO_2 sources it modeled.

[16] https://ampd.epa.gov/ampd/.

3.3.7. Modeling Parameter: Meteorology and Surface Characteristics

As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

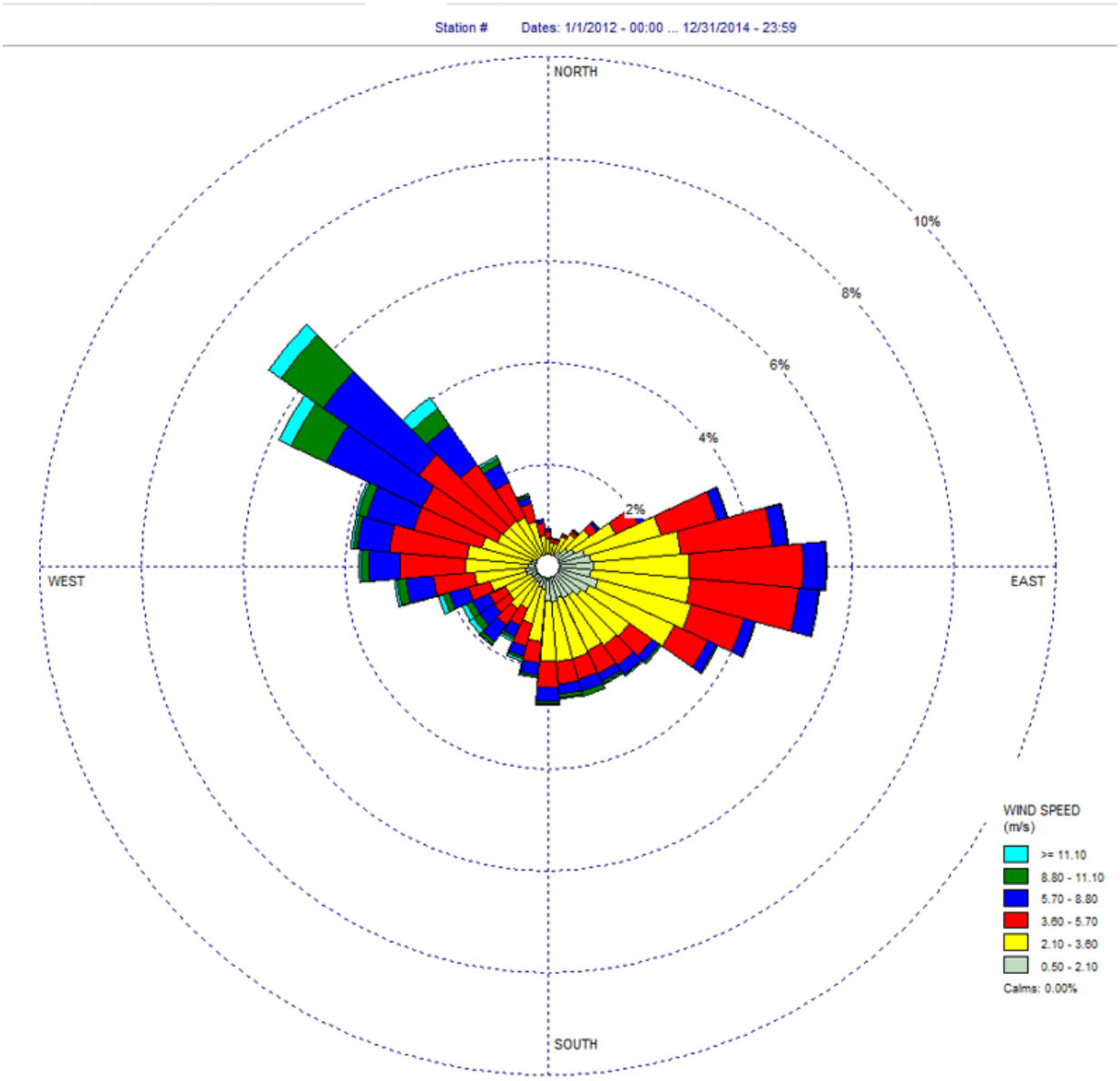
For the area of analysis for the Navajo Nation portions of San Juan County, the Navajo Nation selected the surface meteorology from the "Navajo Met Tower 1" station operated by APS/Navajo Mine, located at 36.680°N, 108.450°W, 2.9 km east-southeast of FCPP, and coincident upper air observations from Albuquerque International Sunport (ICAO: KABQ) in Albuquerque, New Mexico, located at 35.042 °N, 106.606 °W, 184 km southeast of FCPP. Cloud cover and precipitation data were taken from Farmington Regional Airport (ICAO: FKAM) located at 36.744°N, 108.229°W, 23.3 km east of FCPP. These were chosen to best represent meteorological conditions within the area of analysis.

The Navajo Nation used AERSURFACE version 13016 using data from the Navajo Met 1 station to estimate the surface characteristics of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "zo." The tribe estimated surface roughness values for 12 spatial sectors out to 1 km at a monthly temporal resolution for each of the dry, wet, and average conditions.

Figure 3 above, included in the Navajo Nation's submittal, shows the location of this meteorological station relative to the area of analysis.

As part of its analysis, the Navajo Nation provided the 3-year surface wind rose for the Navajo Met 1 station. In Figure 6, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Wind most often comes from the northwest, with east winds also common, and some south. Only rarely does wind come from the north.

Figure 6: Navajo Nation Portion of San Juan County Cumulative Annual Wind Rose for Years 2012 – 2014



Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor are suitable for being applied with AERMOD input files for AERMOD modeling runs. The Navajo Nation followed the methodology and settings presented in the "AERMOD Implementation Guide", AERMOD Implementation Workgroup, EPA OAQPS, 2009 in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET, and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration is sometimes used and integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. However, in this case, 1-minute data was not available because the nearby Navajo Met 1 station was used. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, Navajo Nation set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

The EPA finds that the meteorological data inputs for AERMOD were prepared in an adequate way, in accordance with EPA-recommended procedures.

3.3.8. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as fairly flat along the San Juan River valley, with gently rolling terrain nearby, with increasing elevated terrain starting at 15 km away, with the exception of the Hogback Ridge, which extends from 5 km to 15 km away from FCPP towards the southwest. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation Dataset (NED) from USGS.

The EPA finds that the topographical data inputs for AERMOD were prepared in an adequate way, in accordance with EPA-recommended procedures.

3.3.9. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99^{th} percentile monitored concentrations by hour of day and season or month. For this area of analysis, the Navajo Nation used a tier 2 approach. Hourly monitored values from the Shiprock Substation (AQS site ID # 35-045-1005) monitor site operated by NMED were used or obtained. The site is about 12 km north of FCPP, and 3.1 km west of SJGS. The Navajo Nation concluded that it was close enough to SJGS that the monitored concentrations include the impacts of SJGS. (As discussed above, the Navajo Nation nevertheless conducted supplemental modeling that included FCPP, SJGS, as well as the monitored background.)

The background concentrations for this area of analysis were determined by the Navajo Nation to vary from 0.87 micrograms per cubic meter ($\mu g/m^3$), equivalent to 0.33 ppb when expressed in two significant figures, to 31.4 $\mu g/m^3$ (12.0 ppb), with an average value of 8.2 $\mu g/m^3$ (3.1 ppb).[17]

The EPA finds that the background concentrations used were appropriate for the modeling analysis.

3.3.10. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Navajo Nation portions of San Juan County of analysis are summarized below in Table 3.

[17] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1 ppb = approximately 2.619 $\mu g/m^3$.

Table 3: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Navajo Nation Portion of San Juan County

Input Parameter	Value
AERMOD Version	15181 (default options)
Dispersion Characteristics	Rural
Modeled Sources	2
Modeled Stacks	6 (1 stack represented 2 merged flues)
Modeled Structures	26
Modeled Fence Lines	1
Total receptors	4,034
Emissions Type	Actual
Emissions Years	2012 – 2014
Meteorology Years	2012 – 2014
Station for Surface Meteorology	Nearby Navajo Met Tower #1
NWS Station Upper Air Meteorology	Albuquerque International Sunport
Station for Calculating Surface Characteristics	Nearby Navajo Met Tower #1
Methodology for Calculating Background SO_2 Concentration	Tier 2: 99th percentile hourly and seasonal, using Shiprock Substation, AQS Site # 35-045-1005
Calculated Background SO_2 Concentration	Range 0.87 - 31.4 µg/m^3 with mean 8.2 µg/m^3

The results presented below in Table 4 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

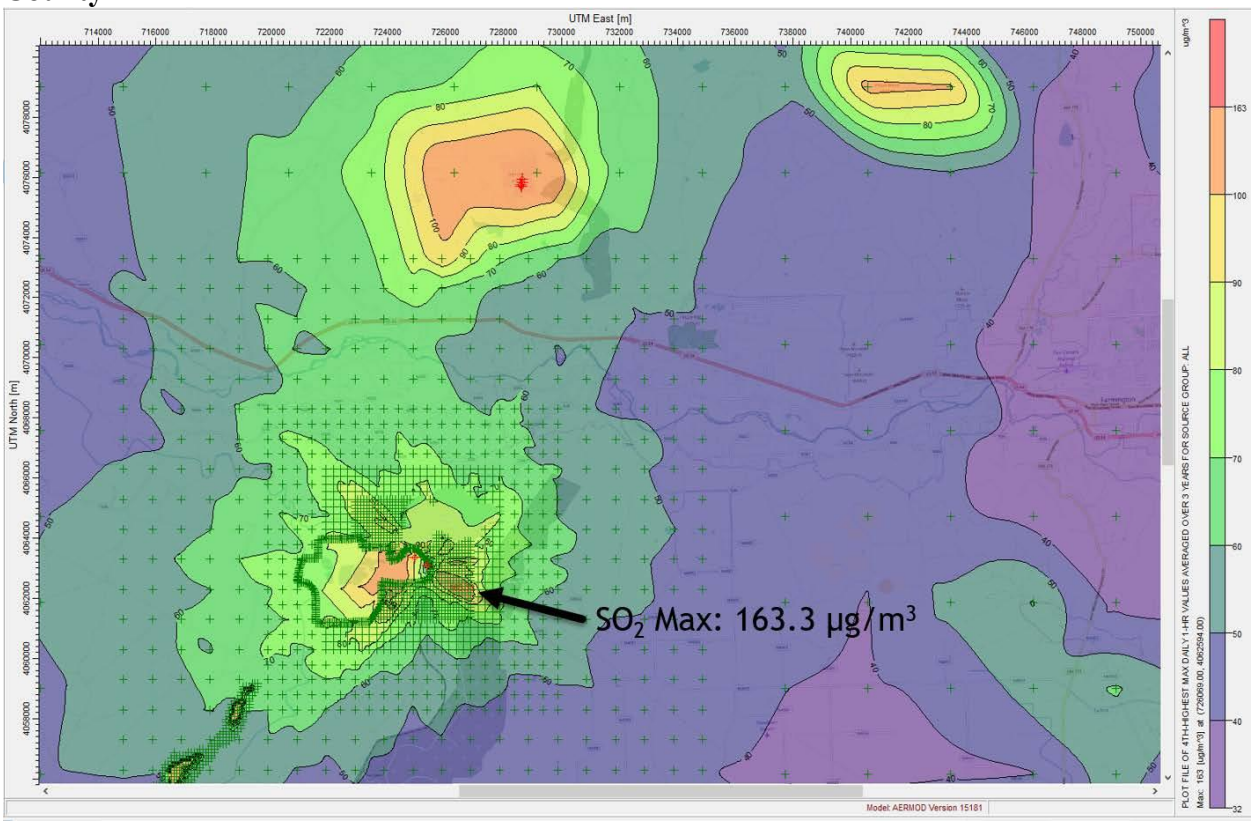
Table 4. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 3 Years for the Area of Analysis for the Navajo Nation Portion of San Juan County

Averaging Period	Data Period	Receptor Location UTM zone 12, NAD 83		99th percentile daily maximum 1-hour SO_2 Concentration (µg/m^3)	
		UTM easting	UTM northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2012 - 2014	726,069.00	4,062,594.00	163.1	196.4*
99th Percentile 1-Hour Average	2012 - 2014	726,069.00	4,062,594.00	163.3 w/ SJGS	196.4*

*Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 µg/m^3 conversion factor

The Navajo Nation's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 163.1 µg/m^3, equivalent to 62.3 ppb. When SJGS is included, the corresponding maximum is 163.3 µg/m^3, equivalent to 62.4 ppb. This modeled concentration included the background concentration of SO_2, and is based on actual emissions from the facility. Figure 7 below was included as part of the Navajo Nation's analysis, and indicates that the predicted value occurred less than 1 km from FCPP, toward the southeast. The Navajo Nation's receptor grid is also shown in the figure.

Figure 7: Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 3 Years for the Area of Analysis for the Navajo Nation Portion of San Juan County



The modeling submitted by the Navajo Nation indicates that the 1-hour SO_2 NAAQS is not violated at the receptor with the highest modeled concentration.

3.3.11. The EPA's Assessment of the Modeling Information Provided by the Tribe

While more complete documentation could have been provided on several issues, overall the Navajo Nation's modeling analysis is adequate for SO_2 designations and mostly follows applicable EPA regulations, guidance documents, and recommended procedures. One deviation from the procedure recommended in the Modeling TAD is the use of 2012 – 2014 emissions and meteorology, in lieu of emissions and meteorology from 2013 – 2015 or 2014 – 2016. Another was the exclusion of units 1, 2, and 3, which closed at the beginning of 2014.

The Navajo Nation modeling was a variant of that performed for a 2015 Environmental Impact Statement ("FCPP EIS").[18] Annual emissions of SO_2 from units 4 and 5 from FCPP over 2012 – 2014 ranged from 6,317 – 7,976 tpy according to data from the EPA Air Markets Program Data. In 2015 and 2016, emissions of SO_2 from Units 4 and 5 were 7,256 and 4,411 tons, respectively. The EPA finds that the 2012 – 2014 period, which is quite recent, is adequate for the SO_2 designation modeling analysis.

3.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Navajo Nation portion of San Juan County

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

3.5. Jurisdictional Boundaries in the Navajo Nation portion of San Juan County

Existing jurisdictional boundaries are considered for the purposes of informing the EPA's designation action. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

The Navajo Nation is a sovereign federally-recognized Indian tribe. The Navajo Nation Environmental Protection Agency (NNEPA) has delegation to administer the major source operating permit program in its areas of Indian country.

The Navajo Nation stated in its modeling reports that the modeling analysis for Four Corners support designations of attainment. However, the Navajo Nation did not provide specific recommendations for the boundaries of the designated area or areas, *e.g.*, whether the Navajo Nation should be designated separately from or with the surrounding multi-jurisdictional areas.

3.6. Other Information Relevant to the Designations for the Navajo Nation portion of San Juan County

In 2011, the EPA issued a memorandum outlining the EPA's approach for designating areas of Indian country. If the EPA either does not receive an initial designation recommendation from a tribe, or receives a recommendation that does not specify designation of a separate area, the EPA intends to designate the relevant tribe's area of Indian country as part of the surrounding area, and to the extent possible, to ensure that a single tribe's areas of Indian country are not

[18] "Four Corners Power Plant and Navajo Mine Energy Project Environmental Impact Statement NAAQS Modeling Study," Prepared for Arizona Public Service, AECOM, August 2014.

inadvertently split based on the use of other jurisdictional boundaries (*e.g.*, county boundaries) when designating the surrounding state areas.[19]

The Navajo Nation has not been designated as a separate area for any previous NAAQS. Generally, the Navajo Nation has been designated with the areas of Arizona and New Mexico in which the lands of the Navajo Nation are geographically located (*e.g.*, 1997 and 2012 Annual $PM_{2.5}$, 1997 and 2006 24-hour $PM_{2.5}$, 1997 and 2008 8-hour ozone, 2010 NO_2, 2008 lead NAAQS).[20]

Four Corners is subject to the Best Available Retrofit Technology (BART) requirements of the Regional Haze Rule, and the EPA promulgated a Federal Implementation Plan (FIP) for FCPP in 2012. As already discussed, the FIP for Four Corners established source-specific BART emission limits but offered as an alternative compliance option the closure of Units 1-3, which occurred in 2013 and was consistent with intended operational changes by the facility operator, and the installation of selective catalytic reduction (SCR) to reduce emissions of NOx in 2018.[21] We further note that a Consent Decree entered in the United States District Court for the District of New Mexico on August 17, 2015, requires additional reductions of SO_2 at Four Corners in 2018.[22]

3.7. The EPA's Assessment of the Available Information for the Navajo Nation portion of San Juan County

There is no approved SO_2 monitoring network located on lands of the Navajo Nation. In San Juan County, New Mexico, within 50 km of Four Corners, the state of New Mexico operates SO_2 monitors in Farmington and Bloomfield. The most recent design values for both monitors are below the 2010 SO_2 NAAQS. These data were available to the EPA for consideration in the designations process, however, since it is unclear if these monitors are located in maximum concentration for this area, it is unclear if the data are representative of the area's actual air quality.

[19] Memorandum from Stephen D. Page, Director, Office of Air Quality Planning and Standards, to Regional Air Directions, Regions I-X, dated December 20, 2011.
[20] 40 CFR 81.303 – Arizona and 40 CFR 81.332 – New Mexico.
[21] 77 FR 51619 (August 24, 2012).
[22] *See* Consent Decree for *Dine CARE v. Arizona Public Service Company* and *EPA v. Arizona Public Service Company*, US District Court for the District of New Mexico, Case No. 1:11-cv-00889-JB-SCY (August 17, 2015).

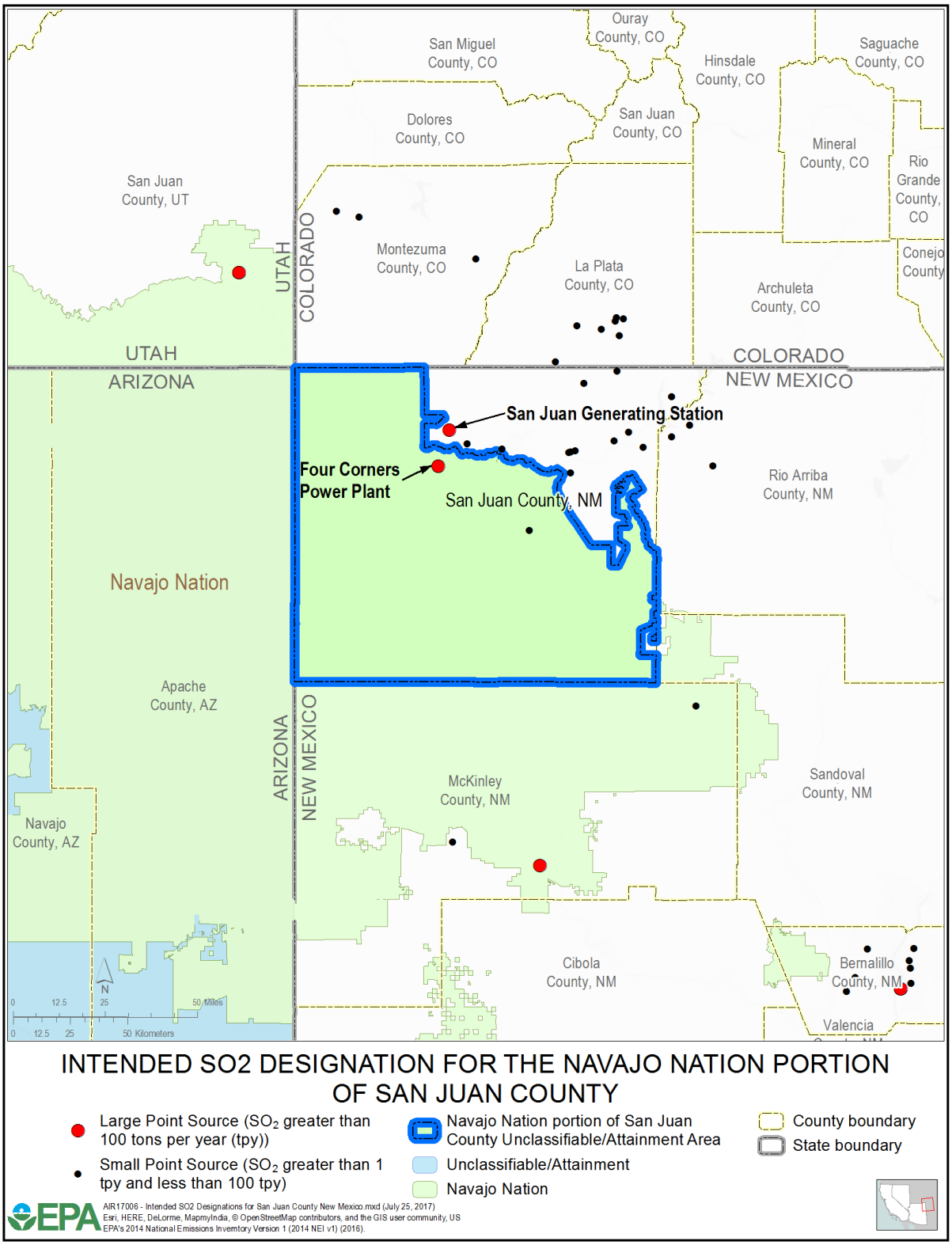
As discussed above, the EPA has reviewed the modeling analysis for Four Corners and finds it to be supportive of a designation of unclassifiable/attainment for the Navajo Nation portion of San Juan County. The modeling submitted by the Navajo Nation demonstrates that the Four Corners area is attaining the standard. Additionally, there are no nearby nonattainment areas, so the EPA finds that the area containing Four Corners does not contribute to any nearby nonattainment areas. The Navajo Nation did not recommend a boundary for this designation. This designation of unclassifiable/attainment for the area around Four Corners differs from the EPA's intended designation of unclassifiable/attainment for San Juan County, New Mexico, based on modeling submitted by New Mexico for SJGS (*see* chapter for New Mexico). However, the distinction between these two designations would have no practical effect on the CAA requirements that would apply to sources located in these areas going forward.

The EPA believes that our intended unclassifiable/attainment area, bounded by the boundaries of the Navajo Nation portion of San Juan County, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable/attainment area.

3.8. Summary of Our Intended Designation for the Navajo Nation portion of San Juan County

After careful evaluation of Navajo Nation's recommendation and supporting information, as well as all available relevant information, the EPA intends to designate the Navajo Nation portion of San Juan County as unclassifiable/attainment for the 2010 SO_2 NAAQS because, based on available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the EPA has determined the area (i) meets the 2010 SO_2 NAAQS, and (ii) does not contribute to ambient air quality in a nearby area that does not meet the NAAQS. Figure 8 shows the boundary of this intended Navajo Nation unclassifiable/attainment area.

Figure 8: Map of Intended Designation for Navajo Nation portion of San Juan County



4. Technical Analysis for the Navajo Nation portion of Coconino County, Arizona

4.1. Introduction

The EPA must designate the Navajo Nation portion of Coconino County by December 31, 2017, because this portion of the Navajo Nation has not been previously designated and the Navajo Nation has not installed and begun timely operation of a new, approved SO_2 monitoring network to characterize air quality in the vicinity of any source in the Navajo Nation portion of Coconino County. There is one source of SO_2 emissions located on the Navajo Nation portion of Coconino County that emits SO_2 in excess of 2,000 tpy, Navajo Generating Station (NGS).

NGS is located on the Navajo Nation portion of Indian country geographically located in Coconino County, Arizona. Coconino County is located in the northern central portion of Arizona and shares a border with the state of Utah.

4.2. Air Quality Monitoring Data for the Navajo Nation portion of Coconino County

This factor considers the SO_2 air quality monitoring data near the Navajo Nation portion of Coconino County. There is no approved SO_2 monitoring network located on the Navajo Nation portion of Coconino County.

4.3. Air Quality Modeling Analysis for the Navajo Nation portion of Coconino County Addressing the Navajo Generating Station

4.3.1. Introduction

This section presents all the available air quality modeling information for the Navajo Nation portion of Coconino County, Arizona, that includes NGS. (This portion of Coconino County will often be referred to as "the Navajo Nation portion of Coconino County" within this section.) This area contains the following SO_2 source, around which the Navajo Nation is required by the DRR to characterize SO_2 air quality, or alternatively to establish an SO_2 emissions limitation of less than 2,000 tons per year:

- NGS emits 2,000 tons or more annually. Specifically, NGS emitted 5,666 tons of SO_2 in 2014. This source meets the DRR criteria and thus is on the SO_2 DRR source list, and the Navajo Nation has chosen to characterize it with modeling.

In its submission, the Navajo Nation stated that its modeling analysis supports a designation of attainment but did not recommend a particular boundary for the designated area. This assessment and characterization was performed using air dispersion modeling software, *i.e.*, AERMOD, analyzing allowable emissions. After careful review of Navajo Nation's assessment, supporting

documentation, and all available data, based on the considerations discussed below, the EPA finds that the modeling analysis for NGS supports a designation of unclassifiable. Our reasoning for this conclusion is explained in section 4.3.11 of this chapter, after all the available information is presented.

The area that the Navajo Nation has assessed with air quality modeling is located in north-central Arizona, near the Utah border, and northeast of Grand Canyon National Park. As seen in Figures 9 and 10 below, NGS is located just east of Page, Arizona. It is close to the northeast tip of Grand Canyon National Park, and just south of Lake Powell, which is behind the Glen Canyon Dam on the Colorado River. Figure 9 also shows a 50-km radius circle around NGS that extends from Coconino County, Arizona, into Kane and San Juan Counties, Utah. There are no stationary sources that emit greater than 100 tpy of SO_2 within 50 km of NGS.

Figure 9 does not include the tribe's recommended area for the Navajo Nation designation, as no specific area was recommended. The EPA's intended unclassifiable designation boundary for the Navajo Nation portion of Coconino County is not shown in Figure 9, but is shown in a figure in section 4.8 below that summarizes our intended designation.

Figure 9. Map of the Navajo Nation portion of Coconino County Addressing NGS

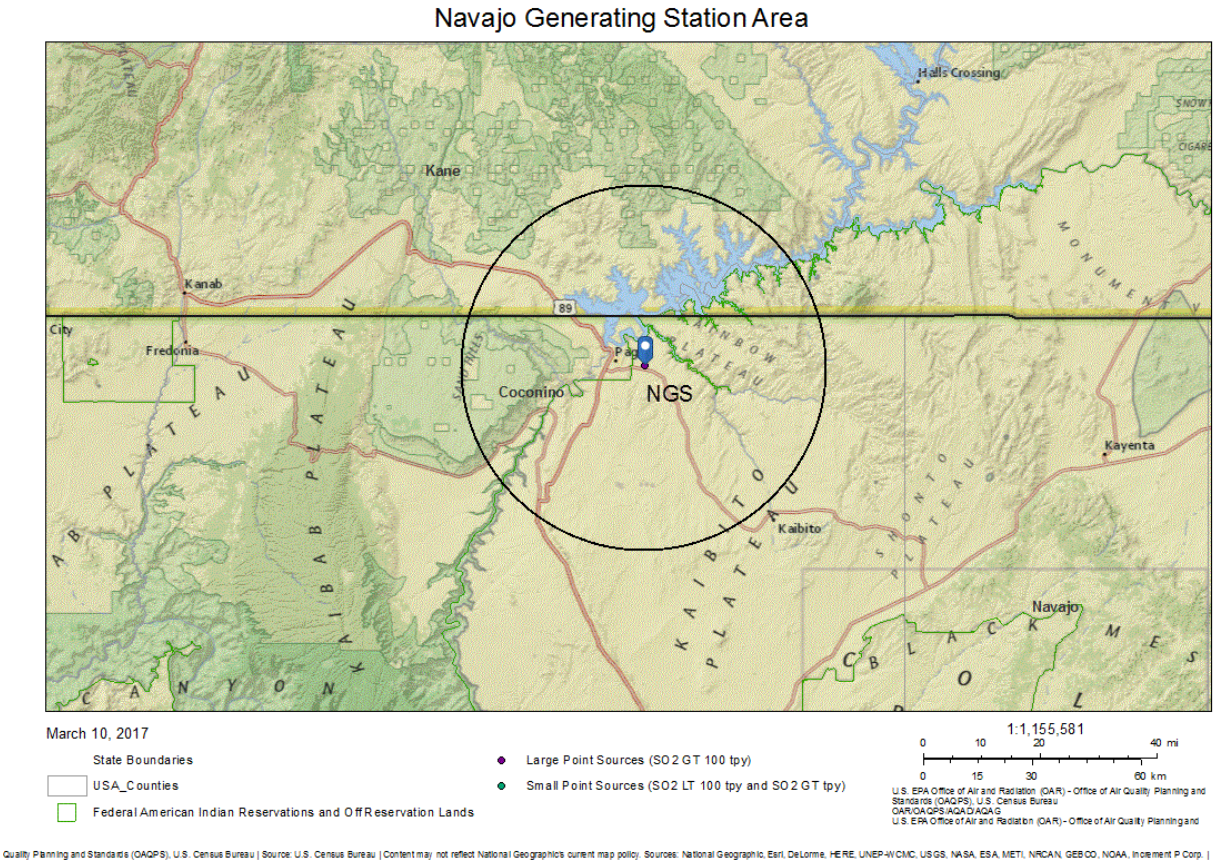
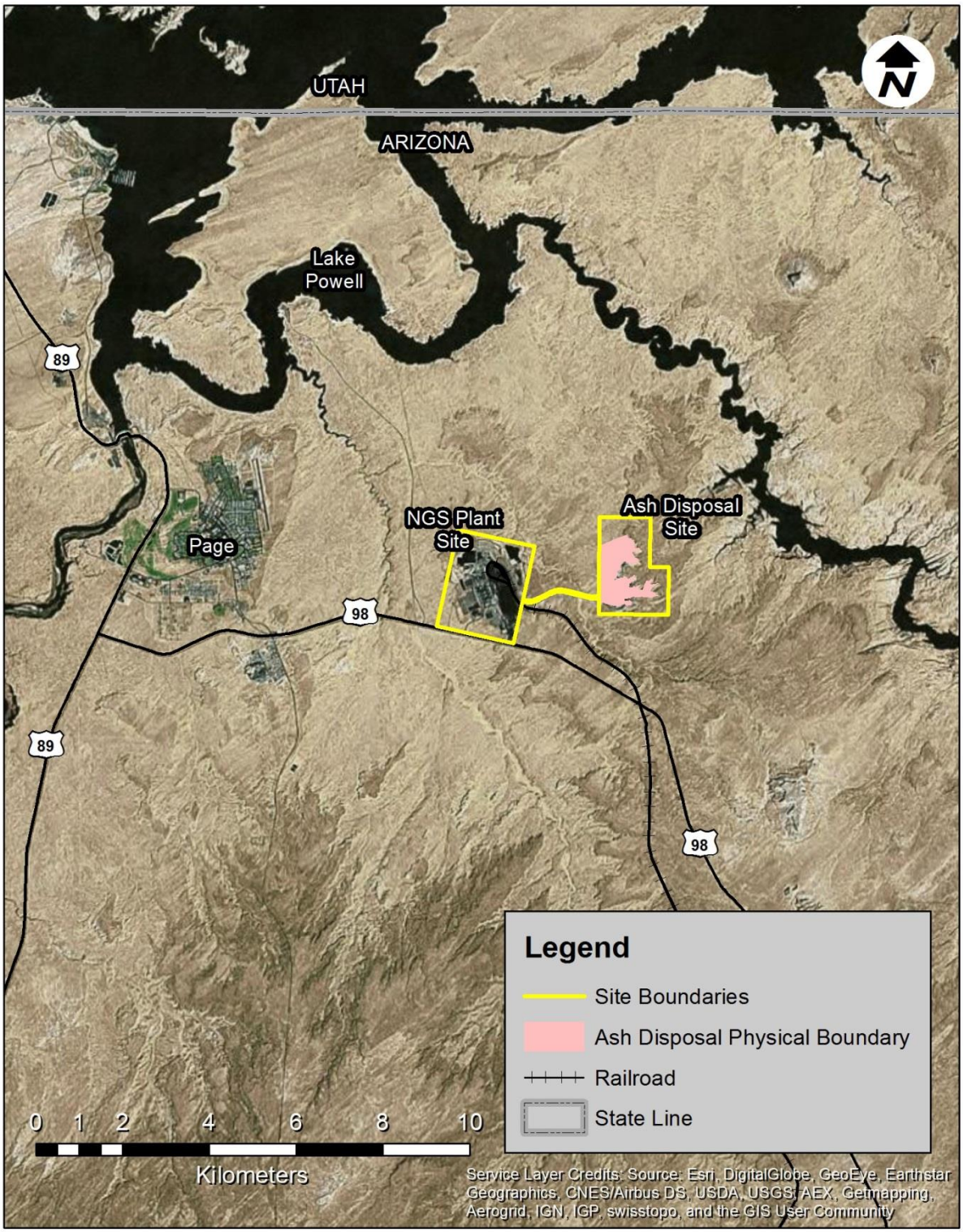


Figure 10. Satellite Imagery of NGS Site and Vicinity



Source: NGS EIS: 2015 Environmental Impact Statement for the NGS-Kayenta Mine Complex, cited below

The discussion and analysis that follows below will reference the Modeling TAD and the factors for evaluation contained in the EPA's guidance documents dated July 22, 2016, and March 20, 2015, as appropriate.

For this area, the EPA received and considered one modeling assessment from the Navajo Nation. No assessment was received from any other party.

4.3.2. Model Selection and Modeling Components

The EPA's Modeling TAD notes that for area designations under the 2010 SO_2 NAAQS, the AERMOD modeling system should be used, unless use of an alternative model can be justified. The AERMOD modeling system contains the following components:

- AERMOD: the dispersion model
- AERMAP: the terrain processor for AERMOD
- AERMET: the meteorological data processor for AERMOD
- BPIPPRM: the building input processor
- AERMINUTE: a pre-processor to AERMET incorporating 1-minute automated surface observation system (ASOS) wind data
- AERSURFACE: the surface characteristics processor for AERMET
- AERSCREEN: a screening version of AERMOD

The Navajo Nation used AERMOD version 14314, the most recent version at the time the modeling was originally performed, for an Environmental Impact Statement (EIS) for the NGS-Kayenta Mine Complex ("NGS EIS").[23] The model was run in conjunction with AERMET using a beta option for the surface friction velocity (adjust u*, or ADJ_U*, parameter).[24] There was no formal approval process undertaken for the use of AERMOD version 14134 with ADJ_U* for NGS. AERMOD version 16216r has since become the regulatory model version. Recently a programming error ("bug") was discovered in the formulation of the ADJ_U* option in AERMOD version 15181 that was used in some cases to meet the SO_2 DRR requirements, where approved by EPA's Model Clearing House. The EPA issued a memorandum to recommend how agencies should address this in the SO_2 designations process.[25] The memo's main recommendation is that such modeling for designations should be redone using the latest AERMOD version, *i.e.,* 16216r. The memo also recommends that "modeling submitted based on the use of any other beta options in the AERMOD Modeling System or alternative modeling techniques that also did not gain alternative model approval... should be supplemented with the

[23] The Navajo Nation submittal refers to the "2015 Navajo Generating Station – Kayenta Mine Complex EIS study" and also to the '"July 2016 Final Near-field AERMOD modeling" report prepared for the DEIS'. This document is "Near-Field Air Dispersion and Deposition Modeling Report for Navajo Generating Station National Environmental Policy Act Environmental Impact Statement and Endangered Species Act Compliance, Final Report", Ramboll Environ, July, 2016, in electronic file "NGS Near-Field Air Modeling Report_Final_July 2016.pdf".

[24] The AERMOD modeling system is the model identified in 40 CFR Part 51, Appendix W, for use in regulatory applications, for near-field dispersion of emissions for distances up to 50 km. The EPA periodically releases updated versions of AERMOD. Version 14314 was released with several beta options. *See* https://www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models.

[25] "Clarification on the AERMOD Modeling System Version for Use in SO_2 Implementation Efforts and Other Regulatory Actions," Memorandum from Chet Wayland, Director, Air Quality Assessment Division, EPA, to Regional Air Division Directors, EPA, March 8, 2017.

appropriate justification and provided to the appropriate EPA Regional Office for approval as an alternative model to best inform the EPA's consideration in the Round 3 – SO_2 designations process."

A discussion of the Navajo Nation's approach to the individual model components is provided in the corresponding discussion that follows.

4.3.3. Modeling Parameter: Rural or Urban Dispersion

For any dispersion modeling exercise, the "urban" or "rural" determination of a source is important in determining the boundary layer characteristics that affect the model's prediction of downwind concentrations. For SO_2 modeling, the urban/rural determination is important because AERMOD invokes a 4-hour half-life for urban SO_2 sources. Section 6.3 of the Modeling TAD details the procedures used to determine if a source is urban or rural based on land use or population density.

For the purposes of performing the modeling for the area of analysis, the Navajo Nation determined that it was most appropriate to run the model in rural mode. This issue was not explicitly addressed in the NNEPA analysis; however, it is clear from aerial photographs that the area of analysis is predominantly uninhabited desert and desert scrub, with some areas of steep relief, and also Lake Powell to the north and northeast. The nearest town is Page, Arizona, 11.8 km away with a population of 7,247. The next nearest town is Kaibeto, Arizona, 42.9 km away with a population of 1,522. The EPA agrees that it is appropriate to use AERMOD in rural mode.

4.3.4. Modeling Parameter: Area of Analysis (Receptor Grid)

The TAD recommends that the first step towards characterization of air quality in the area around a source or group of sources is to determine the extent of the area of analysis and the spacing of the receptor grid. Considerations presented in the Modeling TAD include but are not limited to: the location of the SO_2 emission sources or facilities considered for modeling; the extent of significant concentration gradients due to the influence of nearby sources; and sufficient receptor coverage and density to adequately capture and resolve the model predicted maximum SO_2 concentrations.

The source of SO_2 emissions subject to the DRR in this area is described in the introduction to this section. For the Navajo Nation portion of Coconino County, the Navajo Nation has included no other emitters of SO_2 within 50 km of NGS in any direction. According to the 2014 NEI, there are no stationary sources that emitted more than 100 tpy located within 50 km of NGS. The Navajo Nation determined that this was the appropriate distance to adequately characterize air quality through modeling to include the potential extent of any SO_2 NAAQS exceedances in the area of analysis and any potential impact on SO_2 air quality from other sources in nearby areas. No other sources beyond 50 km were determined by Navajo Nation to have the potential to cause concentration gradient impacts within the area of analysis. This was based on communication between the NGS EIS contractor and the Arizona Department of Environmental Quality, which provides regional emission inventories for modeling facilities in Arizona, and reported no sources within 50 km. The EPA concurs there are no sources over 100 tpy located within 50 km of NGS.

The receptor grid spacing for the area of analysis chosen by the Navajo Nation is as follows:[26]

- spacing of 100 m out to a distance of 2 km from the source
- spacing of 200 m from that point out to a distance of 10 km
- spacing of 500 m from that point out to a distance of 20 km
- a polar grid with 1-degree angular spacing at 30 km
- a polar grid with 1-degree angular spacing at 40 km
- a polar grid with 1-degree angular spacing at 50 km
- a polar grid with 1-degree angular spacing at 80 km

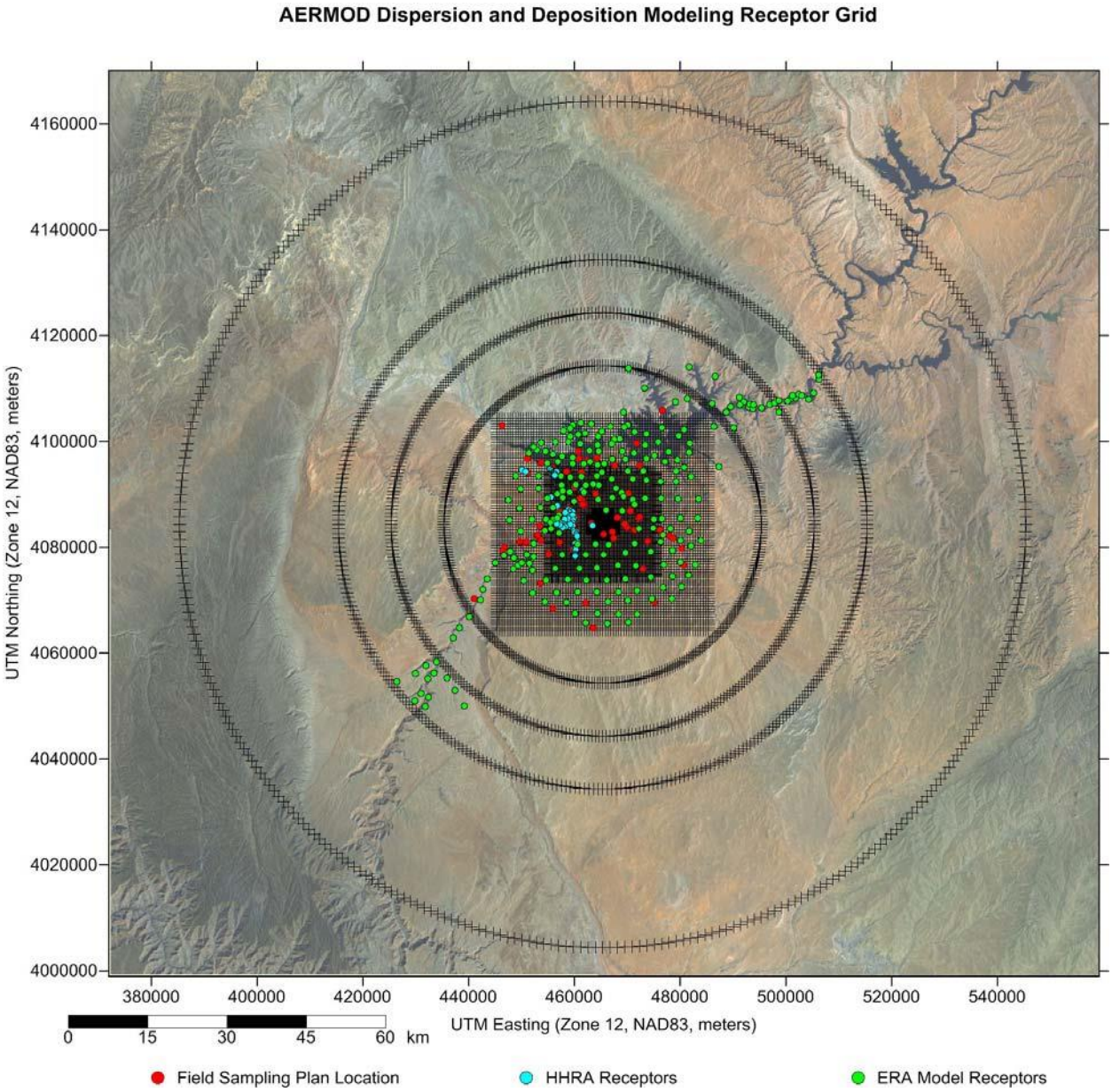
In addition, receptors were placed with 10 m spacing along the facility fence line. There were also 380 receptors placed at daycare facilities, schools, hospitals and health care facilities, senior homes and centers, residential areas, and parks. These extended in either direction along the Colorado river, outside the 20-km square receptor grid. (These receptors were included for the health risk assessment performed for the EIS for the NGS-Kayenta Mine Complex.) Altogether, the receptor network contained 19,629 receptors, and the network covered portions of Coconino County, Arizona, and extended east into Navajo County, Arizona, and north into Kane and Garfield Counties in Utah.

Figures 11 and 12, one from the EIS and one generated by the EPA, show the Navajo Nation's chosen area of analysis surrounding NGS, as well as the receptor grid for the area of analysis.

Consistent with the Modeling TAD, the Navajo Nation placed receptors for the purposes of this designation effort in locations that would be considered ambient air relative to each modeled facility, including other facilities' property. For this analysis, no receptor locations were excluded other than those within the NGS fence line. No additional information was provided relating to the preclusion of public access by the fence, other than a statement in the NGS EIS that the fence line location was verified;[27] in addition, the fences are visible in satellite photographs.

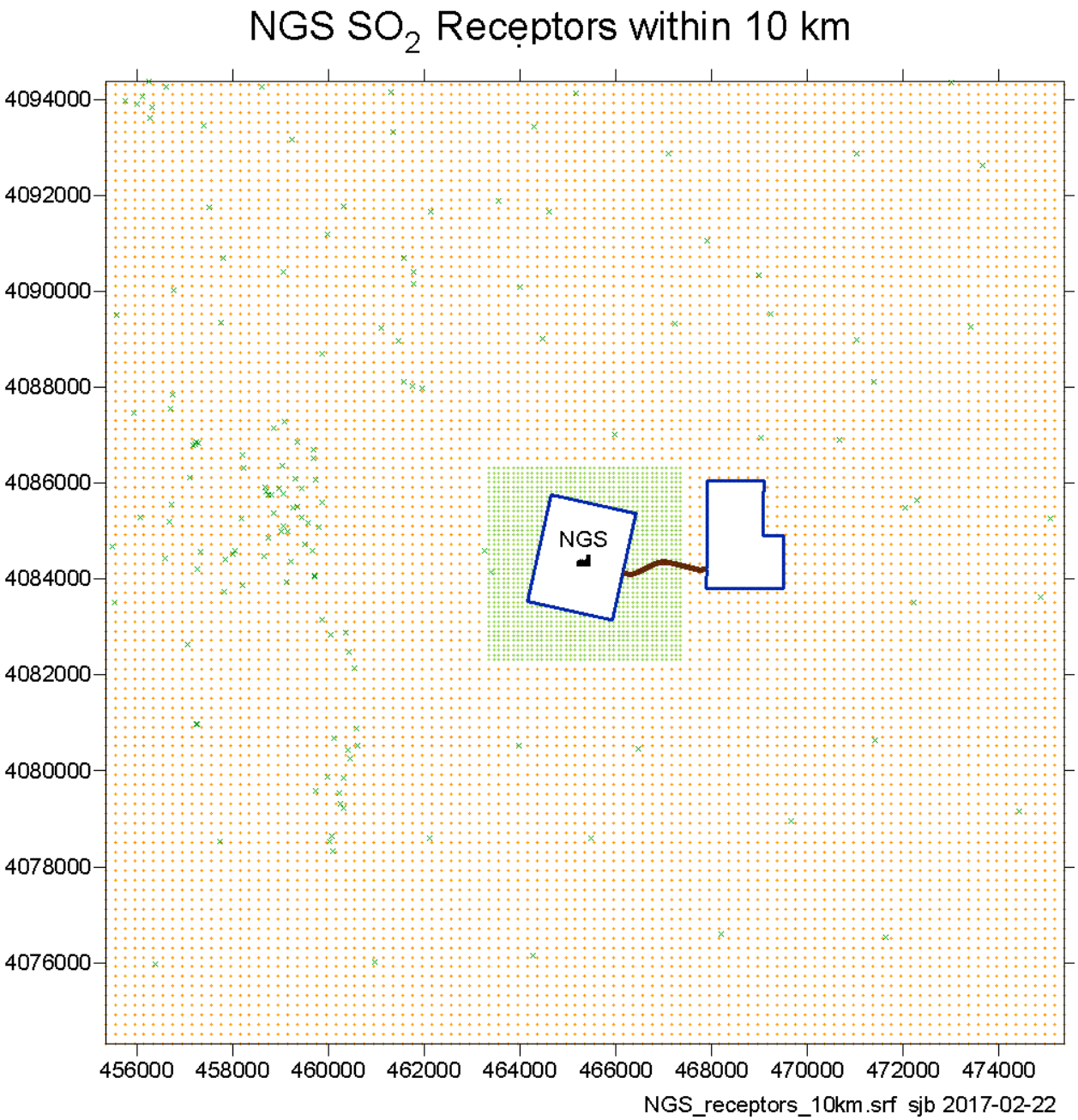
[26] This description of receptor spacing is derived from the AERMOD input files, and differs slightly from the text description provided by the Navajo Nation.
[27] *See* NGS EIS, p.159.

Figure 11: Area of Analysis and Receptor Grid for the Navajo Nation Portion of Coconino County



Receptors are spaced every 1 degree along circles at 30, 40, 50, and 80 km from NGS, and spaced 500 m within 20 km of NGS, and more densely within closer distances Source: 2015 EIS

Figure 12: Nearby Receptor Grid for the Navajo Nation Portion of Coconino County



Receptors are spaced every 10 m along fence line around NGS plant site, Ash disposal site, and connecting road

The EPA finds that the placement of model receptors was adequate to assess maximum SO_2 concentrations, and that the receptors excluded from the modeling were appropriate to exclude.

4.3.5. Modeling Parameter: Source Characterization

Section 6 of the Modeling TAD offers recommendations on source characterization including source types, use of accurate stack parameters, inclusion of building dimensions for building downwash (if warranted), and the use of actual stack heights with actual emissions or following GEP policy with allowable emissions.

The Navajo Nation included NGS explicitly in its modeling because it is the sole DRR-listed source within the Navajo Nation portion of Coconino County.

The Navajo Nation characterized this source within the area of analysis mostly in accordance with the best practices outlined in the Modeling TAD. Specifically, the tribe used actual stack heights. The Navajo Nation also adequately characterized the source's building layout and location, as well as the stack parameters, *e.g.*, exit temperature, exit velocity, location, and diameter. Where appropriate, the AERMOD component BPIPPRM was used to assist in addressing building downwash. However, it is not clear that modeling with actual stack heights was appropriate. The Navajo Nation estimated actual emissions partly based on a federally enforceable annual emission limit, which would normally be used in estimating allowable emissions, for which GEP stack height policy would apply.

The EPA finds that the Navajo Nation adequately characterized the sources in its AERMOD modeling except for potential concerns related to the modeled stack heights.

4.3.6. Modeling Parameter: Emissions

The EPA's Modeling TAD notes that for the purposes of modeling to characterize air quality for use in designations, the recommended approach is to use the most recent 3 years of actual emissions data and concurrent meteorological data. However, the TAD also indicates that it would be acceptable to use allowable emissions in the form of the most recently permitted (referred to as PTE or allowable) emissions rate that is federally enforceable and effective.

The EPA believes that continuous emissions monitoring systems (CEMS) data provide acceptable historical emissions information, when they are available. These data are available for many electric generating units. In the absence of CEMS data, the EPA's Modeling TAD highly encourages the use of AERMOD's hourly varying emissions keyword HOUREMIS, or through the use of AERMOD's variable emissions factors keyword EMISFACT. When choosing one of these methods, the EPA recommends using detailed throughput, operating schedules, and emissions information from the affected source.

In certain instances, states and other interested parties may find that it is more advantageous or simpler to use PTE rates as part of their modeling runs. For example, for a facility that has recently adopted a new federally enforceable emissions limit or implemented other federally enforceable mechanisms and control technologies to limit SO_2 emissions to a level that indicates compliance with the NAAQS, the state may choose to model PTE rates. These new limits or conditions may be used in the application of AERMOD for the purposes of modeling for designations, even if the source has not been subject to these limits for the entirety of the most recent 3 calendar years. In these cases, the Modeling TAD notes that a state or tribe should be able to find the necessary emissions information for designations-related modeling in the existing

SO_2 emissions inventories used for permitting or SIP planning demonstrations. In the event that these short-term emissions are not readily available, they may be calculated using the methodology in Table 8-1 of Appendix W to 40 CFR Part 51 titled, "Guideline on Air Quality Models."

As previously noted, the Navajo Nation included only NGS in the area of analysis because there are no other nearby sources. Average annual emissions of SO_2 from NGS over 2001 - 2008 are summarized below. The emissions were computed from an SO_2 emission limit of 0.1 lb/MMBtu (based on a rolling annual average), required under 40 CFR 52.145(d)(2) and (3).[28] This emission limit was multiplied by the average hourly heat input over 2001 – 2008 of 64.8 MMBtu per year for each emitting unit to get the hourly emission rate input to the air quality model. The modeling did not use actual hourly emissions.

For NGS, the Navajo Nation provided annual SO_2 emission estimates based on average heat input over 2001-2008 that it applied to the meteorology data for years 2008-2012. This information is summarized in Table 5.

Table 5. Average SO_2 Emissions over 2001 - 2008 from Facilities in the Navajo Nation portions of Coconino County

Facility Name	SO_2 Emissions (tpy) 2001-2008
NGS Unit 1	3,329.6
NGS Unit 2	3,329.6
NGS Unit 3	3,329.6
Total Emissions from All Modeled Facilities in Navajo Nation's Area of Analysis for NGS	9,718.8

Although the modeled emissions for NGS generally appear to approximate actual emissions (because they are partly based on actual heat inputs), in reality the modeling used neither allowable emissions nor hourly actual emissions. Therefore, the EPA finds that the emissions modeled by the Navajo Nation are not adequate for characterizing the effect of NGS' emissions on the area's air quality or for comparison to the 1-hour SO_2 NAAQS. We provide our additional considerations and conclusions related to the emission inputs used in the modeling in section 4.3.11.

[28] Two emission limitations for SO_2 apply to NGS: a limit of 0.1 lb/MMBtu calculated on a rolling an annual average (40 CFR 52.145(d)) and a limit of 1.0 lb/MMBtu calculated on a 3-hour average basis (40 CFR 49.5513(d)).

4.3.7. Modeling Parameter: Meteorology and Surface Characteristics

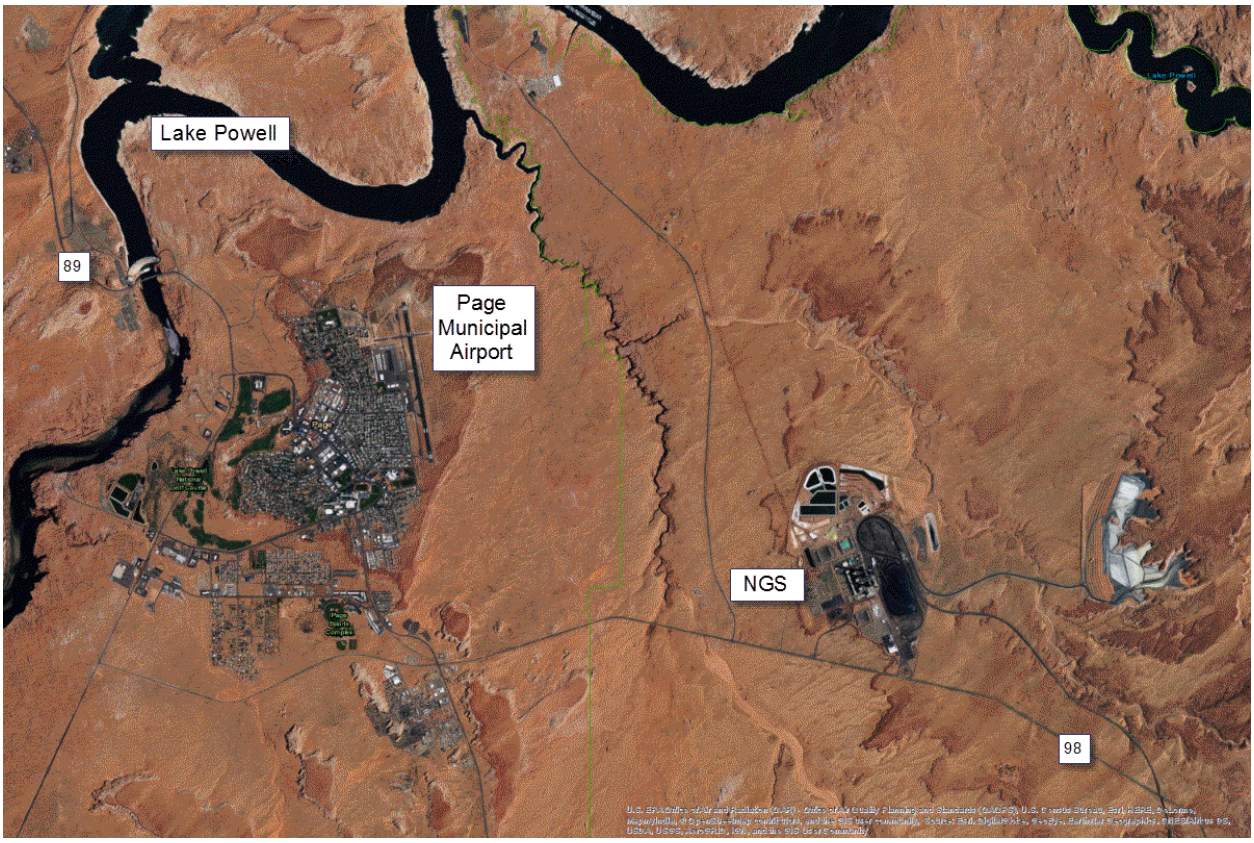
As noted in the Modeling TAD, the most recent 3 years of meteorological data (concurrent with the most recent 3 years of emissions data) should be used in designations efforts. The selection of data should be based on spatial and climatological (temporal) representativeness. The representativeness of the data is determined based on: 1) the proximity of the meteorological monitoring site to the area under consideration, 2) the complexity of terrain, 3) the exposure of the meteorological site, and 4) the period of time during which data are collected. Sources of meteorological data include National Weather Service (NWS) stations, site-specific or onsite data, and other sources such as universities, Federal Aviation Administration (FAA), and military stations.

For the area of analysis for the Navajo Nation portion of Coconino County, the Navajo Nation selected the surface meteorology from Page Municipal Airport (ICAO: KPGA, COOP ID 26180) in Page, AZ, located at 36.9211°N, 111.4487°W, 5.6 km west of NGS, and coincident upper air observations from the Flagstaff, AZ station (ICAO: KFGZ, WMO ID 72376, "Flagstaff/Bellem") located at 35.2309 °N, 111.82150 °W, 190 km south of NGS as most representative of meteorological conditions within the area of analysis.

Navajo Nation used AERSURFACE version 13016 using data from Page Municipal Airport to estimate the surface characteristics of the area of analysis. Albedo is the fraction of solar energy reflected from the earth back into space, the Bowen ratio is the method generally used to calculate heat lost or heat gained in a substance, and the surface roughness is sometimes referred to as "zo." The tribe estimated surface roughness values for 12 spatial sectors out to 1 km at a monthly temporal resolution for each of the dry, wet, and average conditions.

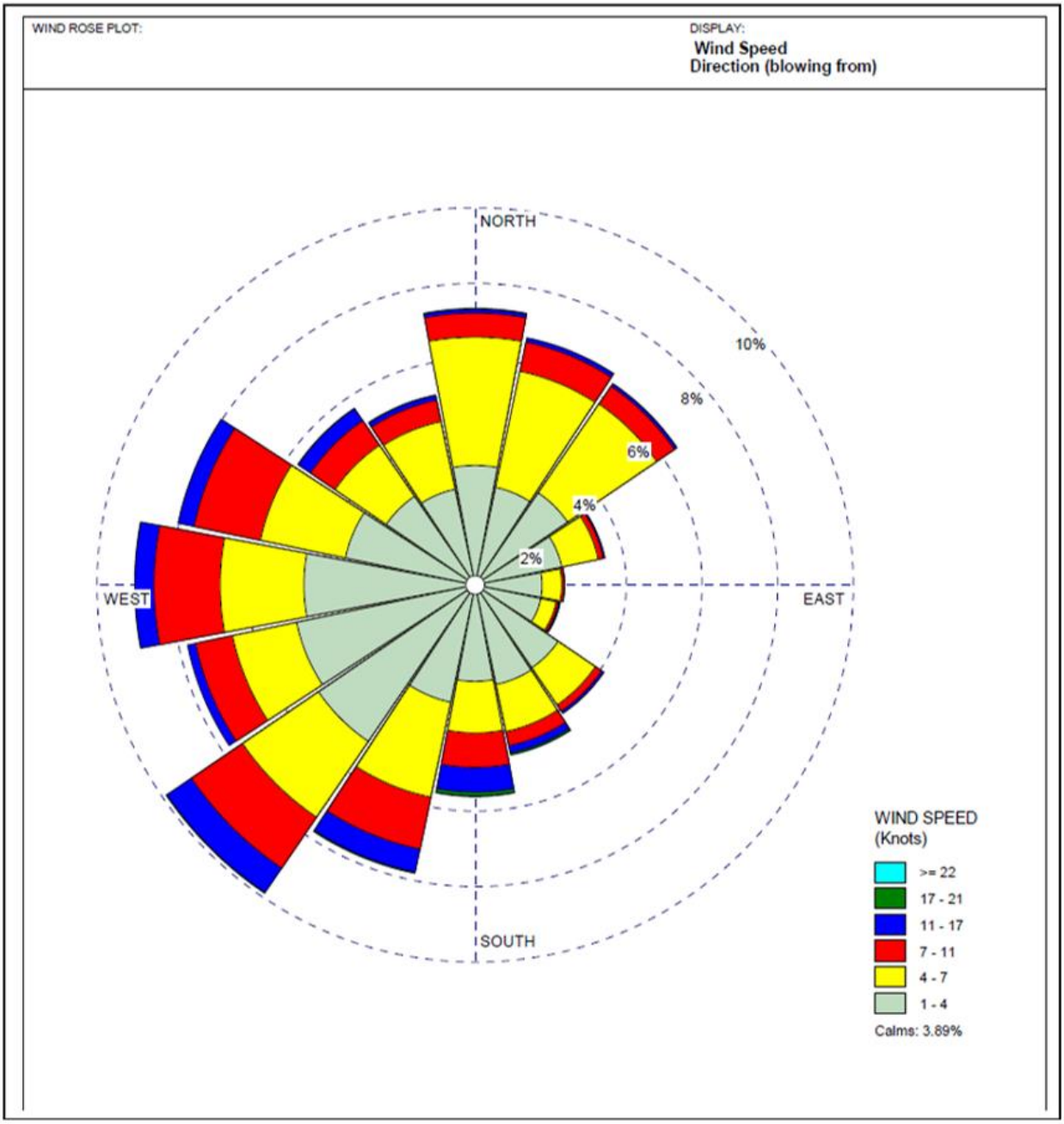
In Figure 13 below, generated by the EPA, the location of these meteorological stations is shown relative to the area of analysis.

Figure 13. Area of Analysis and the NWS station in the Navajo Nation Portion of Coconino County



As part of its recommendation, the Navajo Nation provided a 5-year surface wind rose for the Page Municipal Airport station data. In Figure 14, the frequency and magnitude of wind speed and direction are defined in terms of from where the wind is blowing. Winds from the west and southwest are most common, with south and north winds less so, and winds from the east are very uncommon.

Figure 14: Cumulative Annual Wind Rose for Years 2008 -2012 for the Navajo Nation Portion of Coconino County



Source: Environ 2015.

Meteorological data from the above surface and upper air NWS stations were used in generating AERMOD-ready files with the AERMET processor. The output meteorological data created by the AERMET processor is suitable for being applied with AERMOD input files for AERMOD modeling runs. Navajo Nation followed the methodology and settings presented in the "AERMOD Implementation Guide", AERMOD Implementation Workgroup, EPA OAQPS, 2009 in the processing of the raw meteorological data into an AERMOD-ready format, and used AERSURFACE to best represent surface characteristics.

Hourly surface meteorological data records are read by AERMET and include all the necessary elements for data processing. However, wind data taken at hourly intervals may not always portray wind conditions for the entire hour, which can be variable in nature. Hourly wind data may also be overly prone to indicate calm conditions, which are not modeled by AERMOD. In order to better represent actual wind conditions at the meteorological tower, wind data of 1-minute duration was provided from Page Municipal Airport station, but in a different formatted file to be processed by a separate preprocessor, AERMINUTE. These data were subsequently integrated into the AERMET processing to produce final hourly wind records of AERMOD-ready meteorological data that better estimate actual hourly average conditions and that are less prone to over-report calm wind conditions. This allows AERMOD to apply more hours of meteorology to modeled inputs, and therefore produce a more complete set of concentration estimates. As a guard against excessively high concentrations that could be produced by AERMOD in very light wind conditions, the Navajo Nation set a minimum threshold of 0.5 meters per second in processing meteorological data for use in AERMOD. In setting this threshold, no wind speeds lower than this value would be used for determining concentrations. This threshold was specifically applied to the 1-minute wind data.

The EPA finds that the meteorological data inputs for AERMOD were prepared in an adequate way, in accordance with EPA-recommended procedures.

4.3.8. Modeling Parameter: Geography, Topography (Mountain Ranges or Other Air Basin Boundaries) and Terrain

The terrain in the area of analysis is best described as complex, with areas of significant relief and deep canyons. To account for these terrain changes, the AERMAP terrain program within AERMOD was used to specify terrain elevations for all the receptors. The source of the elevation data incorporated into the model is from the National Elevation Dataset (NED) from USGS.

The EPA finds that the topographical data inputs for AERMOD were prepared in an adequate way, in accordance with EPA-recommended procedures.

4.3.9. Modeling Parameter: Background Concentrations of SO_2

The Modeling TAD offers two mechanisms for characterizing background concentrations of SO_2 that are ultimately added to the modeled design values: 1) a "tier 1" approach, based on a monitored design value, or 2) a temporally varying "tier 2" approach, based on the 99th percentile monitored concentrations by hour of day and season or month. For this area of analysis, the Navajo Nation used a tier 1 approach, using data from the NGS Glen Canyon Dam monitor, about 10 km west-northwest of the NGS facility. The single value of the background concentration for this area of analysis was determined by the Navajo Nation to be 22.5 micrograms per cubic meter ($\mu g/m^3$), equivalent to 8.6 ppb when expressed in two significant figures and that value was incorporated into the final AERMOD results.[29]

The EPA finds that the background concentrations used were appropriate for the modeling analysis.

4.3.10. Summary of Modeling Inputs and Results

The AERMOD modeling input parameters for the Navajo Nation portion of Coconino County area of analysis are summarized below in Table 6.

Table 6: Summary of AERMOD Modeling Input Parameters for the Area of Analysis for the Navajo Nation Portion of Coconino County

Input Parameter	Value
AERMOD Version	14314 (with ADJ_U* option)
Dispersion Characteristics	Rural
Modeled Sources	1
Modeled Stacks	3
Modeled Structures	26
Modeled Fence Lines	3 (power plant, ash disposal area, connecting road)
Total receptors	19,629
Emissions Type	Average actual emissions, *see* text
Emissions Years	2001 – 2008
Meteorology Years	2008 – 2012
NWS Station for Surface Meteorology	Page Municipal Airport
NWS Station Upper Air Meteorology	Flagstaff/Bellem
NWS Station for Calculating Surface Characteristics	Page Municipal Airport
Methodology for Calculating Background SO_2 Concentration	Tier 1 using nearby Glen Canyon Dam monitor
Calculated Background SO_2 Concentration	22.5 $\mu g/m^3$

[29] The SO_2 NAAQS level is expressed in ppb but AERMOD gives results in $\mu g/m^3$. The conversion factor for SO_2 (at the standard conditions applied in the ambient SO_2 reference method) is 1 ppb = approximately 2.619 $\mu g/m^3$.

The results presented below in Table 7 show the magnitude and geographic location of the highest predicted modeled concentration based on the input parameters.

Table 7. Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentration Averaged Over 5 Years for the Area of Analysis for the Navajo Nation Portion of Coconino County

Averaging Period	Data Period	Receptor Location UTM zone 12N, NAD83		99th percentile daily maximum 1-hour SO_2 Concentration ($\mu g/m^3$)	
		UTM easting	UTM northing	Modeled concentration (including background)	NAAQS Level
99th Percentile 1-Hour Average	2008 - 2012	472,355	4,079,915	163.6	196.4*

* Equivalent to the 2010 SO_2 NAAQS of 75 ppb using a 2.619 $\mu g/m^3$ conversion factor

The Navajo Nation's modeling indicates that the highest predicted 99th percentile daily maximum 1-hour concentration within the chosen modeling domain is 163.6 $\mu g/m^3$, equivalent to 62.5 ppb. This modeled concentration included the background concentration of SO_2, and is based on an estimate of average annual emissions from the facility. Figure 15 below is a version of one that was included as part of the Navajo Nation's analysis, and indicates that the predicted value occurred 8.3 km southeast of NGS. This maximum appears to coincide with Leche-E Rock, which rises abruptly to an elevation of 1,798 m. Figure 16 shows an image of this topographic feature. The Navajo Nation's receptor grid is also shown in Figure 15.

Figure 15: Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations Averaged Over 5 Years for the Area of Analysis for the Navajo Nation Portion of Coconino County

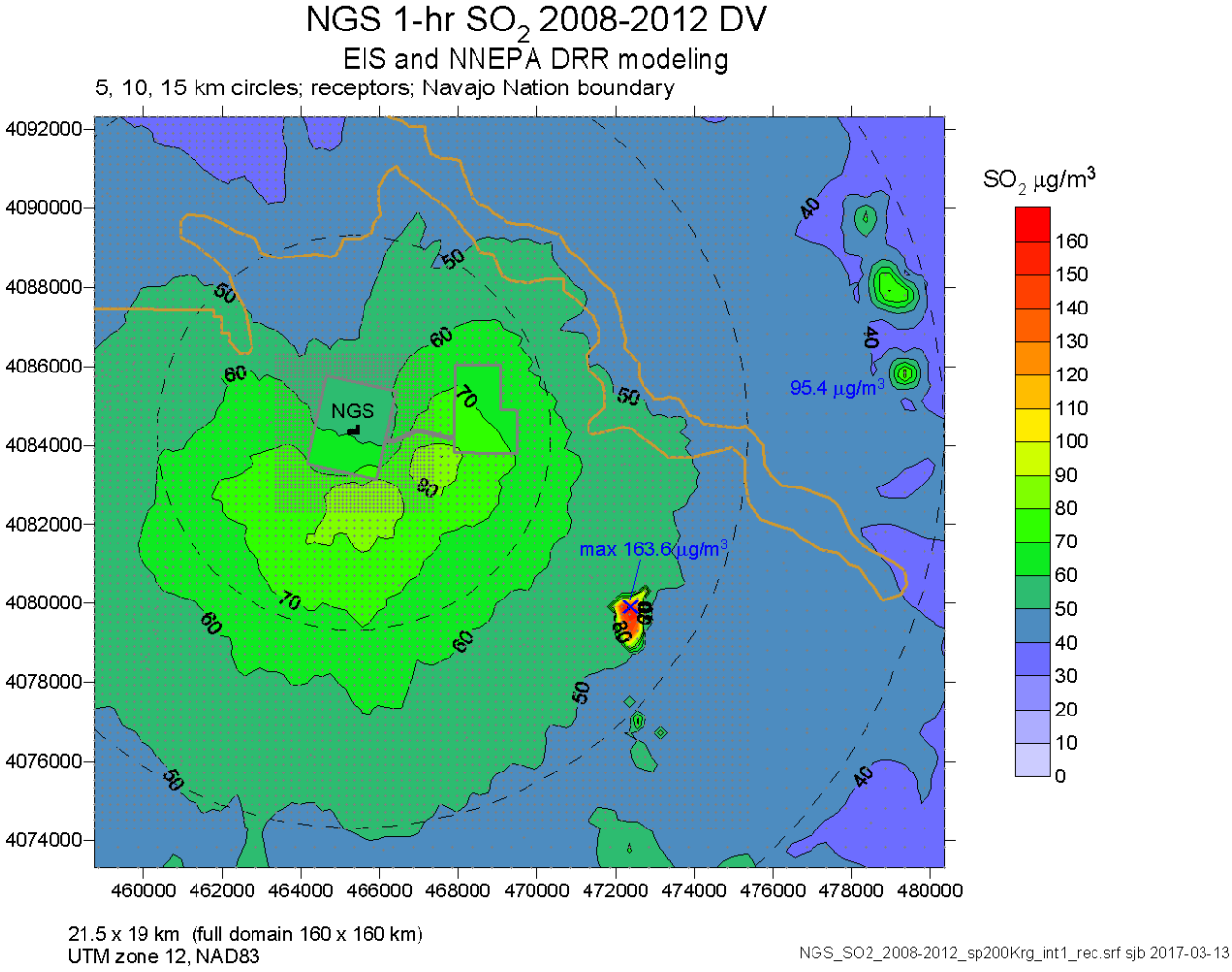
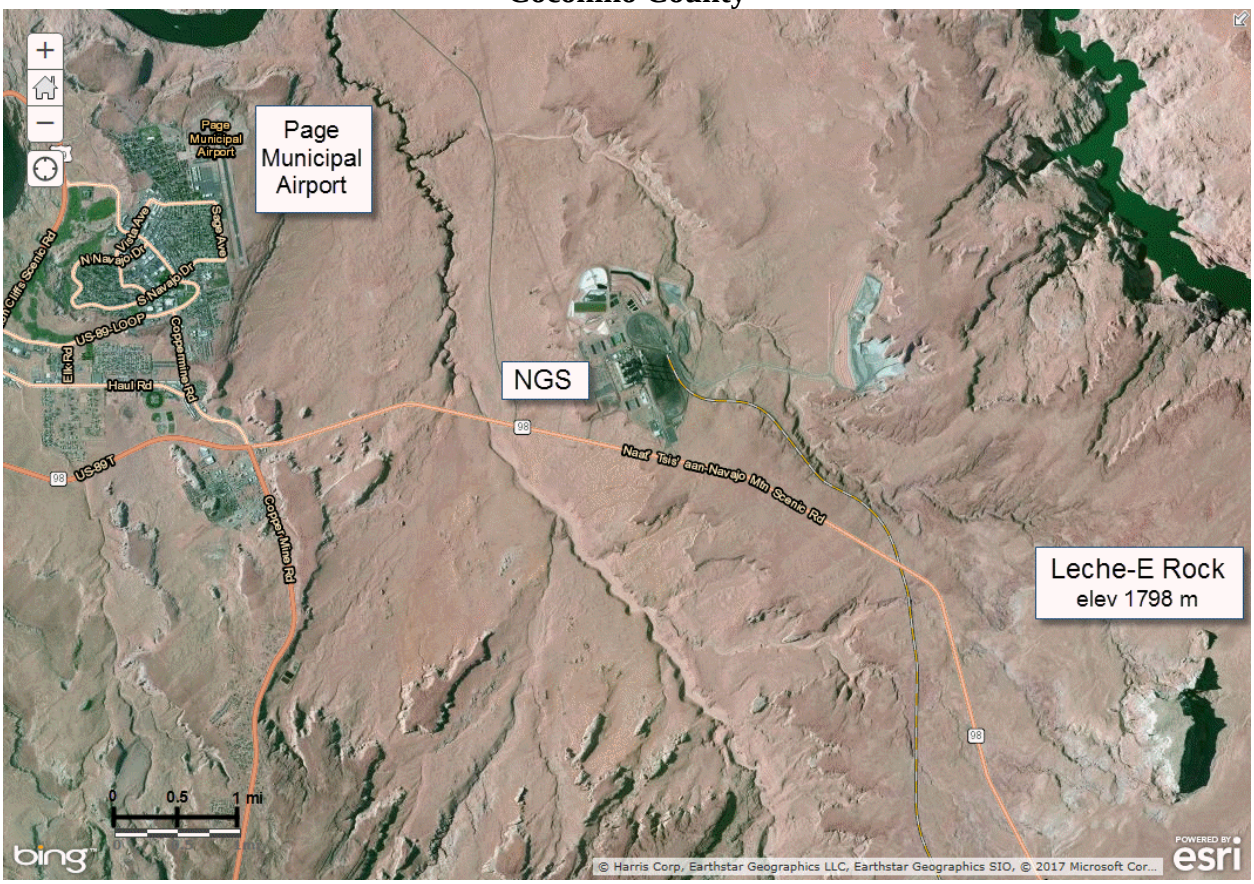


Figure 16. Topographic Feature at Maximum Predicted 99th Percentile Daily Maximum 1-Hour SO_2 Concentrations for the Area of Analysis for the Navajo Nation Portion of Coconino County



The modeling submitted by the Navajo Nation indicates that the 1-hour SO_2 NAAQS is not violated at the receptor with the highest modeled concentration.

4.3.11. The EPA's Assessment of the Modeling Information Provided by the Navajo Nation

Recently a programming error ("bug") was discovered in the formulation of the ADJ_U* option in AERMOD version 15181 that was used in some cases to meet the SO_2 DRR requirements, where approved by EPA's Model Clearing House. The EPA issued a memorandum to recommend how agencies should address this in the SO_2 designations process.[30] The memo's main recommendation is that such modeling for designations should be redone using the latest AERMOD version, *i.e.*, 16216r. The memo also recommends that "modeling submitted based on the use of any other beta options in the AERMOD Modeling System or alternative modeling techniques that also did not gain alternative model approval... should be supplemented with the appropriate justification and provided to the appropriate EPA Regional Office for approval as an alternative model to best inform the EPA's consideration in the Round 3 – SO_2 designations process." There was no formal approval process undertaken for the use of AERMOD version 14134 with ADJ_U* for NGS.

The modeling for NGS was taken from an analysis performed for a 2015 EIS for the NGS-Kayenta Mine Complex, and generally follows applicable EPA regulations, guidance documents, and recommended procedures with some important deviations. One deviation from the procedure recommended in the Modeling TAD is the use of 2008 – 2012 meteorology, in lieu of meteorology from 2013 – 2015 or 2014 – 2016. Another deviation was the use of a single long-term average hourly emission value based on an annual emission limit (in terms of lb/MMBtu) and an average of actual hourly heat input from 2001 – 2008, instead of using actual hourly emissions from 2013 – 2015 or 2014 – 2016. Because source emissions are variable on an hourly basis, modeling using this long-term average emission rate does not reflect 1-hour average source impacts: true emissions could be higher than this rate for many hours, and could lead to annual 4th highest concentrations above the 1-hour SO_2 NAAQS. For these reasons, the EPA finds that the modeling for NGS that is available at this time is not sufficient to determine that emissions from NGS do not cause or contribute to violations of the 2010 SO_2 NAAQS.

4.4. Emissions and Emissions-Related Data, Meteorology, Geography, and Topography for the Navajo Nation

These factors have been incorporated into the air quality modeling efforts and results discussed above. The EPA is giving consideration to these factors with respect to the portion of the Navajo Nation included in the receptor grids for NGS by considering whether they were properly incorporated and by considering the air quality concentrations predicted by the modeling.

[30] "Clarification on the AERMOD Modeling System Version for Use in SO_2 Implementation Efforts and Other Regulatory Actions," Memorandum from Chet Wayland, Director, Air Quality Assessment Division, EPA, to Regional Air Division Directors, EPA, March 8, 2017.

4.5. Jurisdictional Boundaries in the Navajo Nation portion of Coconino County

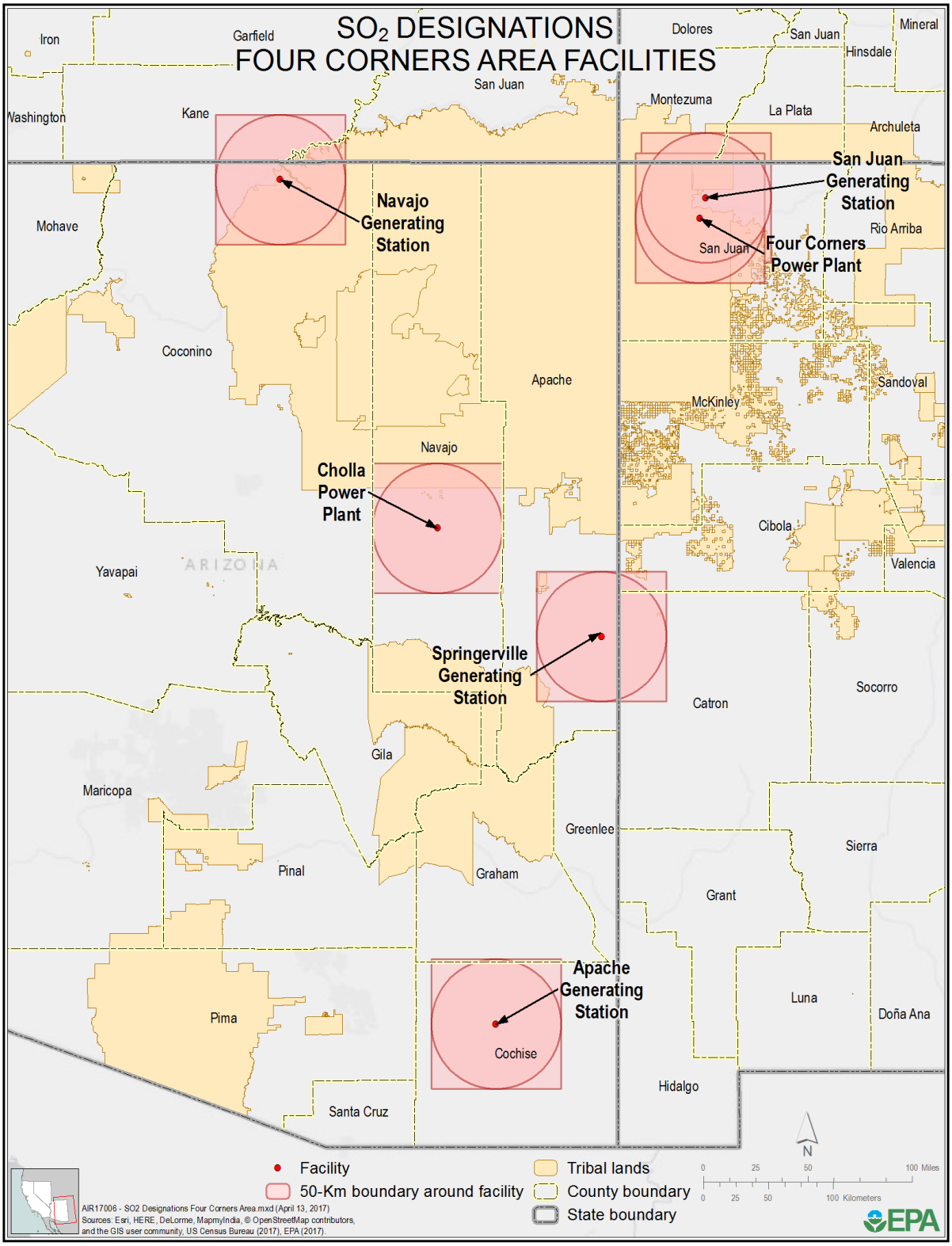
Existing jurisdictional boundaries are considered for the purposes of informing the EPA's designation action. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

The Navajo Nation is a sovereign federally-recognized Indian tribe. Lands of the Navajo Nation span several counties in three states. NNEPA has delegation to administer the major source air permitting program in its areas of Indian country.

The Navajo Nation stated in its January 2017 letter that the modeling analysis for NGS supports a designation of attainment. The Navajo Nation did not provide specific recommendations for the boundaries of the designated area, *e.g.*, whether the Navajo Nation portion of Coconino County should be designated separately or with the surrounding multi-jurisdictional area.

As shown in Figure 17, the area of analysis for NGS includes Navajo Nation and Arizona portions of Coconino County, as well as portions of Kane and San Juan counties, Utah. Within this area, the Navajo Nation has jurisdiction over the Navajo Nation portions of Coconino County, Arizona, and San Juan County, Utah. The state of Arizona has jurisdiction over the Arizona-portions of Coconino County, and state of Utah has jurisdiction over the Utah-portions of San Juan County, Utah, and all of Kane County, Utah. As discussed in the respective TSD chapters for Arizona and Utah, the EPA intends to designate the non-Navajo Nation portions of Coconino County in Arizona, and Kane County, Utah, and the non-Navajo Nation portion of San Juan County, Utah, as unclassifiable/attainment for the 2010 SO_2 NAAQS. The distinction between designations of unclassifiable/attainment versus unclassifiable will have no practical effect on CAA requirements that apply to the state or tribe, or to sources going forward.

Figure 17. Map of SO_2 Sources Subject to the DRR in the Four Corners Area



4.6. Other Information Relevant to the Designations for the Navajo Nation portion of Coconino County

In 2011, the EPA issued a memorandum outlining the EPA's approach for designating areas of Indian country. If the EPA either does not receive an initial designation recommendation from a tribe, or receives a recommendation that does not specify designation of a separate area, the EPA intends to designate the relevant tribe's area of Indian country as part of the surrounding area, and to the extent possible, to ensure that a single tribe's areas of Indian country are not inadvertently split based on the use of other jurisdictional boundaries (*e.g.*, county boundaries) when designating the surrounding state areas.[31]

The Navajo Nation has not been designated as a separate area for any previous NAAQS. Generally, the Navajo Nation has been designated with the areas of Arizona and New Mexico in which the lands of the Navajo Nation are located (*e.g.*, 1997 and 2012 Annual $PM_{2.5}$, 1997 and 2006 24-hour $PM_{2.5}$, 1997 and 2008 8-hour ozone, 2010 NO_2, 2008 lead NAAQS).[32]

Like Four Corners, NGS is also subject to the BART requirements of the Regional Haze Rule, and the EPA promulgated a FIP for NGS in 2014.

Consistent with future ownership and operational changes at NGS, the FIP for NGS generally requires the closure or curtailment of approximately one unit (of three units) at NGS by the end of 2019, and the installation of SCR on two units in 2030, or equivalent emission reductions.[33] Emissions of SO_2 from NGS are therefore expected to be reduced by approximately one-third by the end of 2019. Recently, the operator of NGS has announced its intention to close all units at NGS by the end of 2019 due to the changing economics of the energy industry.[34] The Department of the Interior is facilitating discussions with stakeholders to explore options for preserving continued operation of NGS beyond 2019.[35]

4.7. The EPA's Assessment of the Available Information for the Navajo Nation portion of Coconino County

There is no approved SO_2 monitoring network located on lands of the Navajo Nation.

The Navajo Nation submitted a modeling analysis for NGS to support a designation of attainment. The analysis focused on areas within 50 km of the facility, and includes portions of Coconino County, Arizona, and Kane and San Juan Counties, Utah.

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[31] Memorandum from Stephen D. Page, Director, Office of Air Quality Planning and Standards, to Regional Air Directions, Regions I-X, dated December 20, 2011.
[32] 40 CFR 81.303 – Arizona and 40 CFR 81.332 – New Mexico.
[33] 79 FR 46552 (August 8, 2014).
[34] http://www.srpnet.com/newsroom/releases/021317.aspx. *See also* http://www.ngspower.com/about/newsroom.aspx.
[35] https://www.doi.gov/pressreleases/department-leads-discussions-future-options-navajo-generating-station.

As discussed above, the EPA has reviewed the modeling analysis provided for NGS. Although the analysis indicates that no area within the modeling domain exceeds the 2010 SO_2 NAAQS as a result of emissions from NGS, the EPA has identified several concerns with the modeling, including concerns that the modeled hourly emissions from NGS are not representative of actual peak hourly emissions from the facility. Based on these concerns, we conclude that the modeling submitted for NGS is not sufficient to demonstrate that SO_2 emissions from NGS do not cause or contribute to violations of the 2010 SO_2 NAAQS. Therefore, the EPA intends to designate the area around NGS as unclassifiable. Because this unclassifiable designation is based on concerns with the modeling analysis, which evaluated air quality generally within a 50-km radius of NGS, the EPA is using a 50-km radius around NGS as the boundary of the unclassifiable area. However, the area around NGS includes portions of counties that fall within separate jurisdictions of the Navajo Nation, Arizona, and Utah. Based on our consideration of the importance of jurisdictional boundaries, the EPA intends to further limit the boundary of the intended unclassifiable area to be just the Navajo Nation portion of Coconino County located within a 50-km radius of NGS.

The EPA's 2011 tribal designations policy expresses a preference to not split a single tribe's area of Indian country into areas with different designations or areas that are designated as separate areas even with the same designation. However, based on our review of the modeling analyses, the modeling supports an unclassifiable/attainment designation in the area around Four Corners and an unclassifiable designation in the area around NGS. Therefore, in this case, the EPA considers different intended designations for the portion of the Navajo Nation in San Juan County, New Mexico, (unclassifiable/attainment) and the portion of the Navajo Nation in Coconino County, Arizona, (unclassifiable) to be appropriate. The distinction between these two designations would have no practical effects on the CAA requirements that would apply to sources located in these areas going forward. The remaining areas on the Navajo Nation are addressed in Section 5.

The EPA believes that our intended unclassifiable area, bounded by the portion of the Navajo Nation located in Coconino County within a 50-km radius of NGS, will have clearly defined legal boundaries, and we intend to find these boundaries to be a suitable basis for defining our intended unclassifiable area.

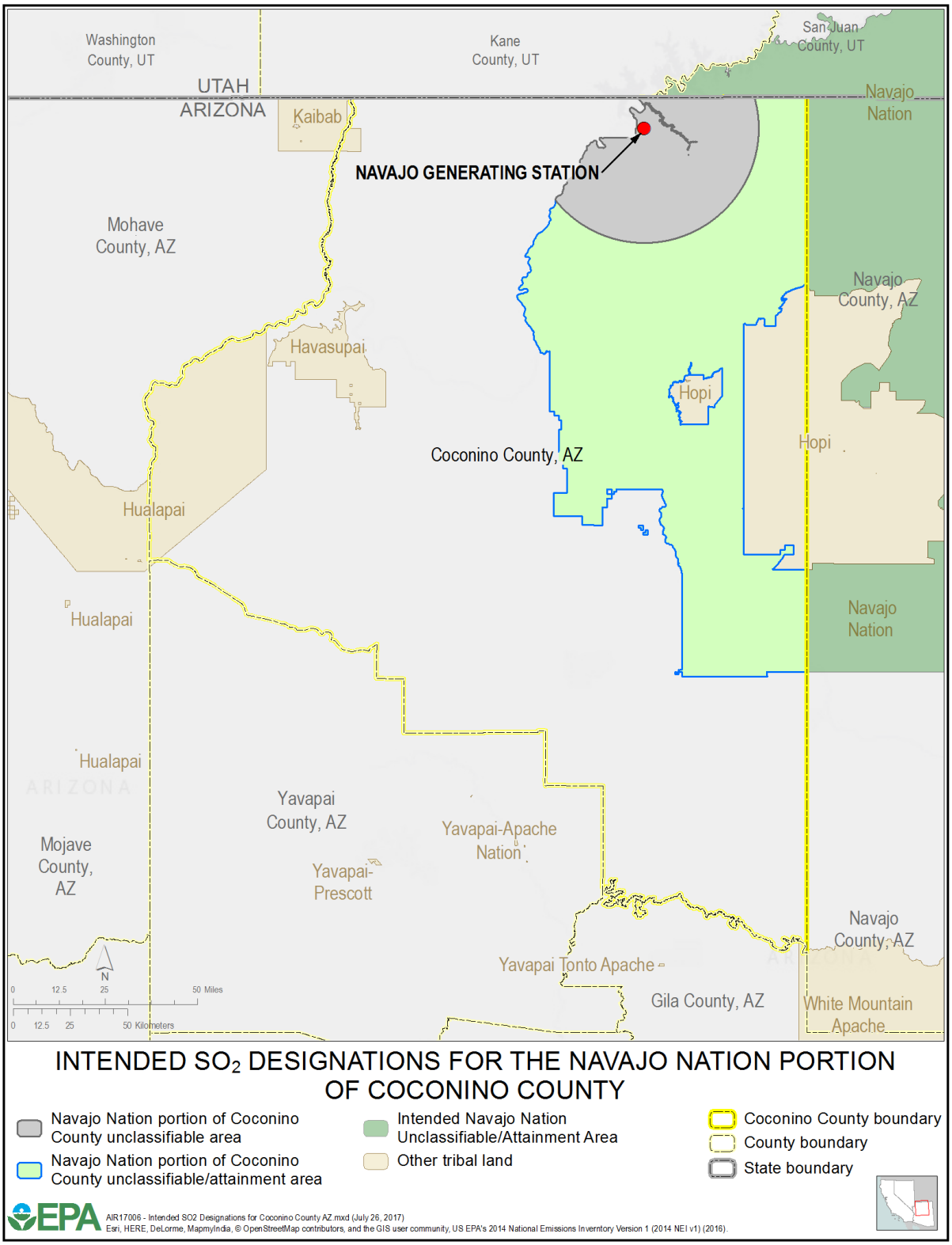
4.8. Summary of Our Intended Designation for the Navajo Nation portion of Coconino County

After careful evaluation of the Navajo Nation's recommendation and supporting information, as well as all available relevant information, the EPA intends to modify the tribe's recommendation and intends to designate the Navajo Nation portion of Coconino County that is located within a 50-km radius of NGS as unclassifiable for the 2010 SO_2 NAAQS because, on the basis of available information including (but not limited to) appropriate modeling analyses and/or monitoring data, the area cannot be classified as either: (i) meeting or not meeting the 2010 SO_2 NAAQS, or (ii) contributing or not contributing to ambient air quality in a nearby area that does

not meet the NAAQS. Figure 18 shows the boundary of this intended Navajo Nation unclassifiable area.[36]

[36] The EPA also intends to designate the lands of the Hopi Tribe as unclassifiable/attainment. The EPA discusses the designation of the lands of the Hopi Tribe in the Chapter for Arizona.

Figure 18. Boundary of the Intended Navajo Nation Unclassifiable Area



5. Technical Analysis for the Rest of the Navajo Nation

5.1. Introduction

The Navajo Nation has not timely installed and begun operation of a new, approved SO_2 monitoring network meeting EPA specifications referenced in the EPA's SO_2 DRR for any sources of SO_2 emissions in the Navajo Nation portion of the counties identified in Table 8. Accordingly, the EPA must designate these counties by December 31, 2017. At this time, there are no air quality modeling results available to the EPA for these counties and portions of counties. In addition, there is no air quality monitoring data that indicate any violation of the 2010 SO_2 NAAQS. The EPA is designating the remaining portion of the Navajo Nation as "unclassifiable/attainment" because these areas were not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS.

Table 8. Remaining Portion of the Navajo Nation that the EPA Intends to Designate Unclassifiable/Attainment

Navajo Nation	Navajo Nation's Recommended Area Definition	Navajo Nation's Recommended Designation	EPA's Intended Area Definition*	EPA's Intended Designation
Remaining Portion of Navajo Nation	No recommendation provided	No recommendation provided	Remaining portion of Navajo Nation, excluding the intended unclassifiable portion of the Navajo Nation located in Coconino County within a 50-km radius of NGS	Unclassifiable/ Attainment

*EPA is not determining the boundaries of any area of Indian country in this document, including any area of Indian country located in the larger designation area. This document is not a determination related to regulatory authority under the Clean Air Act for such area of Indian country.

As reflected in Table 8, the Navajo Nation did not provide a recommendation for the remaining portion of the Navajo Nation. The remaining portion of the Navajo Nation addressed in this section includes all of the Navajo Nation, except for the portions already addressed in Section 3 (*i.e.,* the intended unclassifiable/attainment Navajo Nation portion of San Juan County, New Mexico) and Section 4 (the intended unclassifiable Navajo Nation portion of Coconino County, Arizona, within a 50-km radius of NGS). The remaining portion of the Navajo Nation spans counties in Arizona, Utah, and New Mexico.

5.2. Air Quality Monitoring Data for the Rest of the Navajo Nation

There is no approved SO_2 monitoring network on the Navajo Nation.

5.3. Jurisdictional Boundaries in the Rest of the Navajo Nation

Existing jurisdictional boundaries are considered for the purposes of informing the EPA's designation action. Our goal is to base designations on clearly defined legal boundaries, and to have these boundaries align with existing administrative boundaries when reasonable.

The Navajo Nation is a sovereign federally-recognized Indian tribe. Lands of the Navajo Nation span several counties in three states. NNEPA has delegation to administer the major source air permitting program in its areas of Indian country.

5.4. Other Information Relevant to the Designations for the Rest of the Navajo Nation

In 2011, the EPA issued a memorandum outlining the EPA's approach for designating areas of Indian country. If the EPA either does not receive an initial designation recommendation from a tribe, or receives a recommendation that does not specify designation of a separate area, the EPA intends to designate the relevant tribe's area of Indian country as part of the surrounding area, and to the extent possible, to ensure that a single tribe's areas of Indian country are not inadvertently split based on the use of other jurisdictional boundaries (*e.g.*, county boundaries) when designating the surrounding state areas.[37]

The Navajo Nation has not been designated as a separate area for any previous NAAQS. Generally, the Navajo Nation has been designated with the areas of Arizona and New Mexico in which the lands of the Navajo Nation are located (*e.g.*, 1997 and 2012 Annual $PM_{2.5}$, 1997 and 2006 24-hour $PM_{2.5}$, 1997 and 2008 8-hour ozone, 2010 NO_2, 2008 lead NAAQS).[38]

Because the air quality modeling for Four Corners supports a designation of unclassifiable/attainment for the Navajo Nation portion of San Juan County, and because the modeling for NGS supports a designation of unclassifiable for the Navajo Nation portion of Coconino County within a 50-km radius of NGS, the EPA considers two different designations for these two portions of the Navajo Nation to be appropriate.

[37] Memorandum from Stephen D. Page, Director, Office of Air Quality Planning and Standards, to Regional Air Directions, Regions I-X, dated December 20, 2011.
[38] 40 CFR 81.303 – Arizona and 40 CFR 81.332 – New Mexico.

5.5. The EPA's Assessment of the Available Information for the Rest of the Navajo Nation

The remaining portion of the Navajo Nation was not required to be characterized under 40 CFR 51.1203(c) or (d) and the EPA does not have available information including (but not limited to) appropriate modeling analyses and/or monitoring data that suggests that the area may (i) not be meeting the NAAQS, or (ii) contribute to ambient air quality in a nearby area that does not meet the NAAQS. The remaining portion of the Navajo Nation meets the definition of an "unclassifiable/attainment" area. Therefore, the EPA intends to designate the remaining portion of the Navajo Nation as unclassifiable/attainment. Jurisdictional considerations combined with the EPA's tribal designations policy suggests that a single designation for all of the remaining portions of the Navajo Nation is appropriate.

As discussed in Section 3, the EPA intends to designate the portion of the Navajo Nation located in San Juan County, New Mexico, as unclassifiable/attainment. As discussed in Section 4, because the modeling for NGS is not sufficient to conclude that SO_2 emissions from NGS do not cause or contribute to violations of the 2010 SO_2 NAAQS, the EPA intends to designate the area around NGS, specifically the portion of the Navajo Nation located in Coconino County, Arizona, within a 50-km radius of NGS, as unclassifiable. The EPA intends to designate the portion of Navajo Nation located in Coconino County, Arizona, that is located beyond a 50-km radius of NGS as unclassifiable/attainment.

The result of this intended designation for the Navajo Nation portion of Coconino County within a 50-km radius of NGS would be that adjacent areas that EPA intends to designate as unclassifiable/attainment, *e.g.*, Kane and San Juan Counties, Utah, the Arizona portion of Coconino County, and the Navajo Nation portion of Coconino County beyond a 50-km radius of NGS, would be designated differently than the Navajo Nation portion of Coconino County within a 50-km radius of NGS. However, the distinction between these two designations would have no practical effects on the CAA requirements that would apply to sources located in these areas going forward. The EPA's intended designations for Utah, Arizona, and New Mexico are addressed in other chapters of this TSD.

5.6. Summary of Our Intended Designation for the Rest of the Navajo Nation

As shown in Figure 19, the EPA intends to designate all of the Navajo Nation, excluding the Navajo Nation portion of Coconino County within a 50-km radius of NGS, as unclassifiable/attainment. We intend to designate the Navajo Nation portion of Coconino County within a 50-km radius of NGS as unclassifiable.

Following completion of the Round 3 designations for the Navajo Nation, there will be no remaining undesignated areas on the Navajo Nation.

Figure 19. Summary of Intended Designations for the Navajo Nation