



**GOVERNMENT OF PUERTO RICO**  
DEPARTMENT OF NATURAL AND ENVIRONMENTAL RESOURCES

**Puerto Rico Non-Attainment State Implementation Plan  
Sulfur Dioxide (SO<sub>2</sub>) National Ambient Air Quality Standard**

**Prepared by:** Department of Natural and Environmental Resources  
Air Quality Area

**Objective:** To bring into compliance with the 2010 1-Hour Sulfur Dioxide (SO<sub>2</sub>) primary NAAQS the designated SO<sub>2</sub> non-attainment areas in Puerto Rico

# Contents

	Page
Acronyms.....	2
1.0 Overview.....	3
1.1 Introduction.....	3
1.2 National Ambient Air Quality Standard (NAAQS).....	4
1.3 Geographical Description.....	5
2.0 Clean Act Requirements.....	6
3.0 Emission Inventory.....	7
4.0 Attainment Demonstration.....	9
5.0 Non-Attainment New Source Review 172(c)(5).....	12
6.0 Reasonable Further Progress 172 (c)(2) CAA.....	13
7.0 Reasonably Available Control Measure / Reasonably Available Control Technology 172 (c)(1).....	16
8.0 Contingency Measure 172(c)(9) CAA.....	17
9.0 Conclusions.....	18
10.0 Appendix.....	18

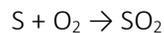
## Acronyms

AQCRs:	Air Quality Control Regions
AQS:	Air Quality System
CAA:	Clean Air Act
DNER:	Department of Natural and Environmental Resources'
EPA:	Environmental Protection Agency
FIP:	Federal Implementation Plan
FR:	Federal Register
IRP:	Integrated Resource Plan
NAAQS:	National Ambient Air Quality Standards
NAA-SIP:	Non-Attainment Area-State Implementation Plan
NANSR:	Non-Attainment New Source Review
ppb:	parts per billion
PRDNER:	Puerto Rico Department of Natural and Environmental Resources
PREB	Puerto Rico Energy Board
PREPA:	Puerto Rico Electric Power Authority
PREPPA:	Puerto Rico Environmental Public Policy Act
PREQB:	Puerto Rico Environmental Quality Board
PTE:	Potential to Emit
RCAP:	Regulation for the Control of Atmospheric Pollution
SIP:	State Implementation Plan
SO <sub>2</sub> :	Sulfur Dioxide
SO <sub>x</sub>	other Sulfur Dioxide
tpy:	tons per year
ULSD:	Ultra Low Sulfur Diesel
ug/m <sup>3</sup> :	micrograms per cubic meter
USEPA:	Unites States Environmental Protection Agency

## 1.0 Overview

### 1.1 INTRODUCTION

Sulfur dioxide (SO<sub>2</sub>) is a colorless, reactive air pollutant with a strong odor. The effects of this gas can be a threat to human health, animal health, and plant life. Short-term exposures to SO<sub>2</sub> can harm the human respiratory system and make breathing more difficult. Clinical Studies had demonstrated that people with asthma, particularly children, are more sensitive to the SO<sub>2</sub>. The sulfur containing compounds in the material is oxidized in the presence of oxygen to form sulfur dioxide via the following chemical reaction:



High concentrations of SO<sub>2</sub> in the air generally lead to the formation of other sulfur oxides (SO<sub>x</sub>) which can react with other compounds in the atmosphere to form small particles, increasing particulate matter concentration and ambient pollution. SO<sub>x</sub> can also react with water to form acids.

The general population may be exposed to sulfur dioxide mainly by breathing air that contains it. In addition, one may also be exposed to sulfur dioxide by skin contact with it. Some health effects associated with exposure to SO<sub>2</sub> emissions are: (1) difficult breathing, (2) changes in ability to breathe, and (3) burning nose and throat (ATSDR, 1998). Sulfur dioxide irritates the skin and mucous membranes of the eyes, nose, throat, and lungs. High concentrations of SO<sub>2</sub> can cause inflammation and irritation of the respiratory system, especially during heavy physical activity. The resulting symptoms associated with SO<sub>2</sub> exposure can include: (1) pain when taking a deep breath, (2) coughing, (3) throat irritation, and (4) breathing difficulties. High concentrations of SO<sub>2</sub> can affect lung function, worsen asthma attacks, and worsen existing heart disease in sensitive groups. The gases containing SO<sub>2</sub> can also react with other chemicals in the air and change to a small particle that can get into the lungs and cause similar health effects (NPS, 2018).

Sulfur dioxide (SO<sub>2</sub>) is one of six "criteria" pollutants scientists have identified as being particularly harmful to human health and the environment. For this reason, the Clean Air Act (CAA) requires the United States Environmental Protection Agency (USEPA or EPA) to set primary air quality standards at a level judged to be requisite to protect the public health with an adequate margin of safety. The CAA also required EPA to establish secondary standards to protect public welfare from any known or anticipated effects associated with the pollutant in the ambient air, including effects on crops, vegetation, wildlife, buildings and national monuments, and visibility. Sulfur dioxide is primarily derived from fossil fuel combustion at power plants and other industrial facilities. Other sources of SO<sub>2</sub> include industrial processes like extracting metal from ore and the burning of high sulfur fuels by locomotives, large ships, and non-road equipment.

## 1.2 NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

On June 22, 2010 (75 FR 35520) the Environmental Protection Agency strengthened the primary National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO<sub>2</sub>). Specifically, EPA replaced the annual and 24-hour primary standards with a new 1-hour SO<sub>2</sub> standard set at 75 parts per billion (ppb) or 196 ug/m<sup>3</sup> as determined in accordance with Appendix T of Title 40 of Code of Federal Regulations (40 CFR), part 50. EPA significantly strengthened the primary standard based on health studies showing that people with asthma experience negative respiratory effects following very short exposure to SO<sub>2</sub> while breathing at elevated rates.

On August 21, 2015, the EPA issued the Data Requirements Rule for the 2010 1-Hour SO<sub>2</sub> Primary NAAQS (80 FR 51052). Under this rule, each air regulatory agency was required to submit a list to the EPA by January 15, 2016, that identified all sources within its jurisdiction that have SO<sub>2</sub> emissions that exceeded the 2,000 tons per year (tpy) annual threshold. The rule requires air quality characterization of the area associated with each listed source and provides two options to undertake this characterization: (1) the use of monitoring or (2) modeling the impacted Air Basin using approved EPA dispersion models.

On December 21, 2015, the Department of Natural and Environmental Resources (DNER), submitted to the EPA the list of sources with SO<sub>2</sub> emissions above the 2,000 ton per year statutory threshold. Table # 1 below presents the sources included in the notification provided by the DNER, as well as their SO<sub>2</sub> emissions, as reported.

*Table # 1: Source with emission on or above 2,000 ton per year of SO<sub>2</sub>. As reported to EPA on December 21, 2015.*

Source	Municipality	SO <sub>2</sub> Emission Rate (ton/year)	
		Allowable	Actual
PREPA Aguirre Power Plant	Salinas	30,038.09	9,264.11
PREPA South Coast Steam Power Plant <sup>1</sup>	Guayanilla	11,505.53	8,336.43
PREPA San Juan Power Plant	San Juan	7,787.05	4,903.39
PREPA Palo Seco Power Plant	Toa Baja	17,344.16	3,125.37

The EPA explained in the Data Requirements Rule (80 FR 51057) that the current ambient SO<sub>2</sub> monitoring network, overall, is not appropriately positioned / located, or of adequate size, for purposes of demonstrating compliance with the new standard, to characterize and measure the ambient air quality around many of the Island of Puerto Rico larger emitting SO<sub>2</sub> sources in operation today. The EPA stated that, because ambient SO<sub>2</sub> concentrations are not the result of complex chemical reactions (unlike ozone or PM<sub>2.5</sub>), they can be modeled accurately using well understood air quality modeling tools, especially in areas where one or only a few sources exist. Air quality modeling and ambient monitoring are appropriate tools for characterizing ambient air quality for purposes of informing future decisions to implement the SO<sub>2</sub>

<sup>1</sup> While PREPA South Coast was identified in Table 1 as a source with equal or greater than 2,000 tons per year of SO<sub>2</sub>, the modeling analysis determined this source did not contribute to nonattainment, resulting in the area near and surrounding PREPA South Coast to be designated attainment.

NAAQS. Therefore, both options are available to the state to characterize the areas geared to demonstrate compliance with the new SO<sub>2</sub> 1-hour NAAQS promulgated.

If the air monitoring option was selected, the EPA required that the monitors being used to satisfy this rulemaking must be operational by January 1, 2017. It recognizes that the logistical and financial burdens of installing an ambient air monitoring station can vary in difficulty and the resources required. The EPA believes that any further delay in air quality characterization around sources identified as a result of this rulemaking will delay implementation of the standard and public health protection in areas where there may be a violation of the standard. The DNER made several attempts to relocate the SO<sub>2</sub> air monitoring network, but lack of infrastructure or adequate site characteristics limited the capability of the agency to relocate the existing monitors and its stations. In order to comply with regulatory requirements, on June 20, 2016, DNER notified EPA that the modeling option was going to be used to characterize peak 1-hour SO<sub>2</sub> concentrations. The document also enclosed the Dispersion Modeling Protocol required under 40 CFR 51.1203(d).

In March of 2017, the DNER submitted to EPA a 1-hour SO<sub>2</sub> modeling assessment and boundary recommendations for the designation of Puerto Rico area. DNER provided updated modeling between October and November 2017, in response to EPA comments on the March 2017 submission, which allowed EPA to finalize the SO<sub>2</sub> designation for Puerto Rico.

### 1.3 GEOGRAPHICAL DESCRIPTION

On January 9, 2018, EPA notified in the Federal Register (83 FR 1098) the designation of two (2) areas, comprised of several wards in different municipalities of Puerto Rico, as non-attainment for the new SO<sub>2</sub> NAAQS. This designation was based on EPA mathematical dispersion modeling, as provided by the regulation. According to the dispersion model's results, the Puerto Rico Electric Power Authority (PREPA) Plants located in the designated non-attainment areas were the only contributors of the NAAQS exceedances.

DNER's modeling assessment indicates the main SO<sub>2</sub> emitters in the non-attainment areas are: PREPA San Juan Power Plant and PREPA Palo Seco Power Plant in the San Juan Metro Area, and PREPA Aguirre Power Plant in Guayama-Salinas Area. Table # 2 presents the designated non-attainment areas for sulfur dioxide as defined in the Federal Register. Note that the areas are defined by municipalities and wards.

Table #2: Designated *non-attainment areas* as defined in the Federal Register

San Juan Metro Area	Guayama - Salinas Area
<ul style="list-style-type: none"> <li>● Cataño Municipality (All)</li> <li>● Toa Baja Municipality (Partial)               <ul style="list-style-type: none"> <li>○ Palo Seco Ward</li> <li>○ Sabana Seca Ward</li> </ul> </li> <li>● San Juan Municipality (Partial)</li> <li>● Guaynabo Municipality (Partial)</li> <li>● Bayamón Municipality (Partial)</li> </ul>	<ul style="list-style-type: none"> <li>● Salinas Municipality (Partial)               <ul style="list-style-type: none"> <li>○ Aguirre Ward</li> <li>○ Lapa Ward</li> </ul> </li> </ul>



Technology. As stated in Section 191(a) of the CAA the state should submit an NAA-SIP with a demonstration to reach attainment within 5 years of the designation.

### 3.0 EMISSIONS INVENTORY

Emissions inventory and source emission rate data serve as the foundation for modeling and other required analyses. Sulfur dioxide emissions come from anthropogenic sources such as fossil fuel combustion and biogenic sources such as volcanic activity. Anthropogenic emissions of SO<sub>2</sub> in Puerto Rico are mainly due to combustion of fossil fuels by external combustion boilers (~90 %), internal combustion engines (~1.6%) and transportation-related sources (~8.4%) based on 2014 EPA National Emission Inventory (USEPA, 2014), shown in Figure #3.

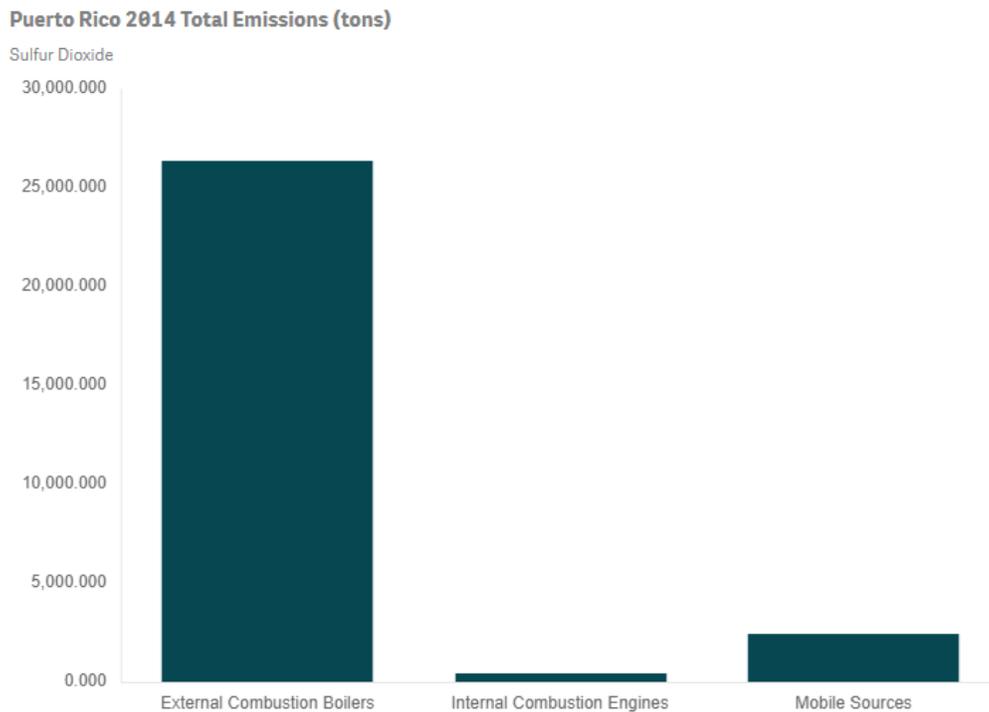


Figure #3: NEI 2014 SO<sub>2</sub> Emission based on process

The 2014 National Emission Inventory for SO<sub>2</sub> Non Attainment Areas for San Juan Area and Guayama-Salinas Area are shown as follows:

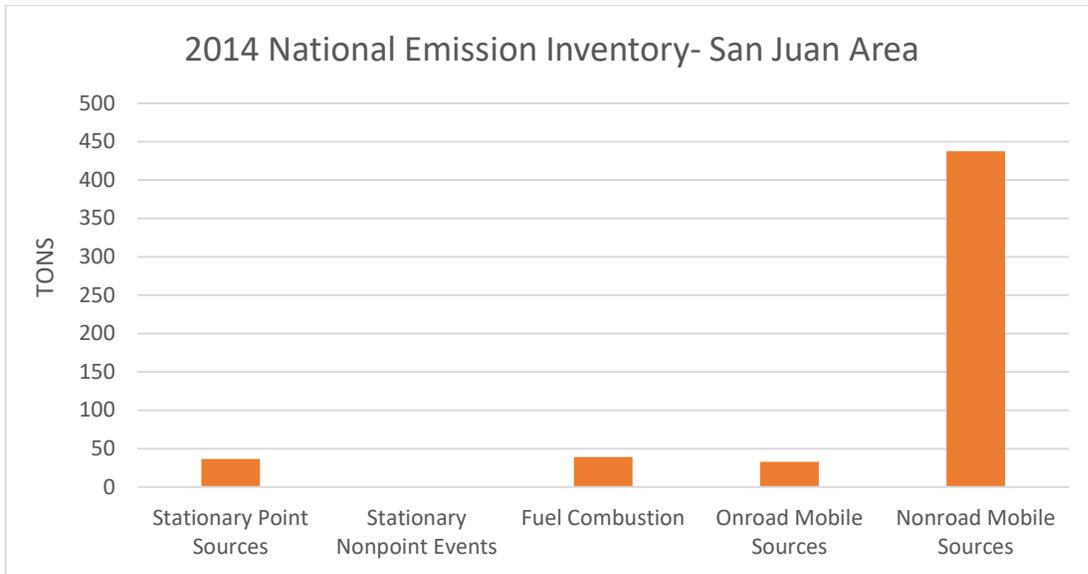


Figure #4: SO<sub>2</sub> Non Attainment Areas- San Juan

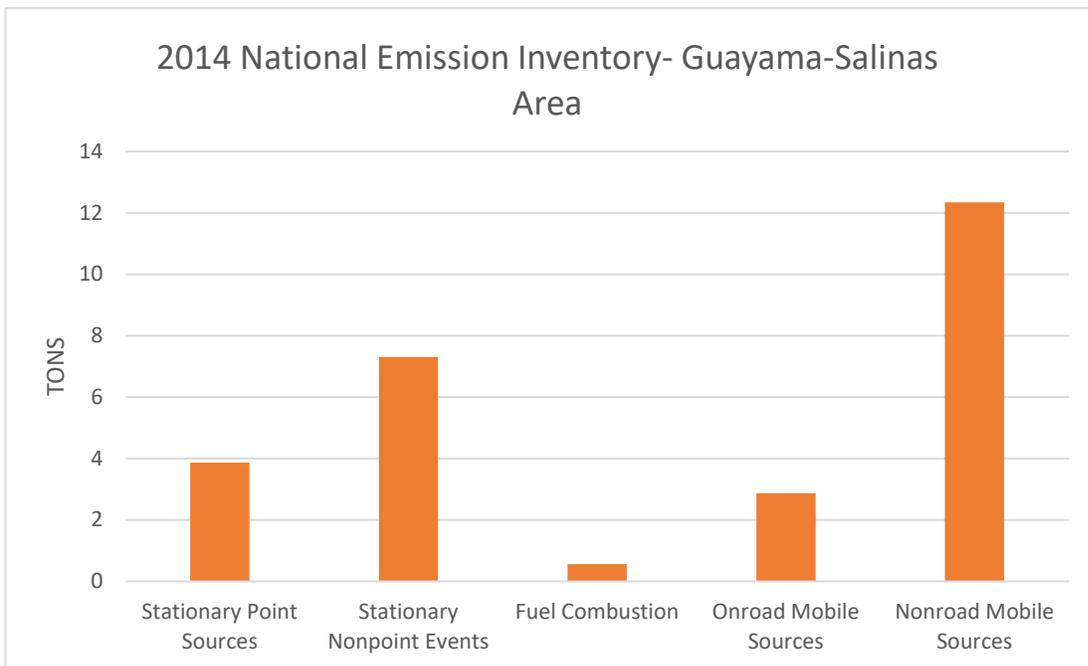


Figure #5: SO<sub>2</sub> Non Attainment Areas-Guayama

As required under Section 172(c)(3) of the CAA, the air regulatory agency should develop a comprehensive, accurate and current inventory of actual emission from all relevant sources of SO<sub>2</sub>. Inventory should be consistent with data requirements codified in 40 CFR, part 51, Subpart A.

DNER prepared the projected emission inventory 2019-2030, for the 1- hour SO<sub>2</sub> non-attainment SIP, in the areas of San Juan Metro and Guayama-Salinas. The principal SO<sub>2</sub> emitters in each area are: PREPA San Juan and Palo Seco in San Juan, and PREPA Aguirre, in Guayama-Salinas. All of them are comprised primarily of external combustion boilers, combined cycle and internal combustion generation units.

The projected emission inventory includes five years of SO<sub>2</sub> allowable emissions, from 2019-2023. This inventory shows the required reductions in SO<sub>2</sub> potential emissions, that PREPA facilities should reach, to comply with the 1-hour SO<sub>2</sub> NAAQS. To satisfy the projected emission inventory requirement, the DNER prepared a document titled: *Puerto Rico 1-Hour SO<sub>2</sub> Non-Attainment Area State Implementation Plan: 2019-2023 Projected Emission Inventory*.

#### 4.0 ATTAINMENT DEMONSTRATION

The two (2) nonattainment areas in Puerto Rico for the 1-hour SO<sub>2</sub> NAAQS are San Juan Metro and Guayama-Salinas. The San Juan Metro nonattainment area, includes the following municipalities and wards; within Cataño, (Palmas and Barrio Pueblo Wards), in Toa Baja (Palo Seco and Sabana Seca Wards), within Guaynabo (Pueblo Viejo Ward), in Bayamón (Juan Sánchez Ward) and in San Juan (San Juan Antiguo, Santurce, Hato Rey Norte and Gobernador Piñero Wards). The rest of the wards in each municipality were classified as attainment/unclassified.

The largest SO<sub>2</sub> sources in San Juan Metro area are, PREPA San Juan in San Juan municipality and PREPA Palo Seco in Toa Baja. Both sites are located within urban areas. In Guayama -Salinas area, the major SO<sub>2</sub> emissions comes from PREPA Aguirre, and this facility is located in Salinas municipality. The Guayama-Salinas area is classified as rural. See modeling protocol for additional information of the area characterization.

The other SO<sub>2</sub> sources in San Juan Metro area are: Bacardi, Edelcar and other minor sources, and Applied Energy System (AES) and other minor sources in Guayama-Salinas area. Previously modeling analysis showed that the SO<sub>2</sub> emissions contributions for these industries were insignificant. However, these minor sources emissions contributions will be addressed with the 1- hour SO<sub>2</sub> background concentration.

The attainment demonstration will be conducted by emission projections and dispersion modeling analysis. In addition to dispersion modeling, ambient air monitoring in the designated nonattainment areas will be used to measure current air quality and to compare the results of the SO<sub>2</sub> ground level concentration values predicted through the dispersion modeling analysis. This NAA-SIP developed by the DNER was prepared to establish the Government of Puerto Rico's strategy to reach compliance of the 2010 Sulfur Dioxide (SO<sub>2</sub>) primary NAAQS.

In particular, the NAA-SIP that has been developed will use the modeling tools available through the EPA-approved modeling program and will be complemented with a new ambient monitoring network geared to compare actual ground-level concentrations of SO<sub>2</sub> within the two (2) designated Non-Attainment Areas. The locations where these new monitoring stations will be located (Six (6) units per Non-Attainment Area) are to be the same as the points of high SO<sub>2</sub> concentration calculated through the modeling exercise. DNER's goal is to compare the Model concentration predictions with the data secured from these new monitoring stations. All data to be secured will be fully validated through the EPA's Quality Assurance / Quality Control guidelines implemented at the DNER.

Modeling Methodology

The dispersion model used for the analysis is the AERMOD modeling system. This model is the USEPA recommendation in the Guideline on Air Quality Models<sup>2</sup> (GAQM), for the modeling of the 1-hour SO<sub>2</sub> NAAQS. The AERMOD model version used by PRDNER, is the latest available or the 21112. The AERMOD default modeling options are used in the analysis.

PRDNER attainment modeling scenario in each nonattainment area is based on the potential emissions or PTE rate, the PREPA new operating scenario using natural gas, and the proposed emission unit retirements, through the integration of renewable projects to the power grid. The modeling scenarios have the Natural Gas PTE certified emissions, that PREPA provided PRDNER. PREPA calculated the new emission rates for Natural Gas in all the emission units that will stay operating in their facilities. See modeling protocol for SO<sub>2</sub> emissions data.

The model for San Juan area, includes in the same modeling run, the allowable emissions of PREPA San Juan and PREPA Palo Seco, due to the proximity of each plant. The model for Guayama-Salinas area, only considers the allowable emissions for PREPA Aguirre. The contribution to the 1- hour SO<sub>2</sub> emissions from nearby sources in both nonattainment areas, is represented by the 1- hour SO<sub>2</sub> background concentration.

The AERMOD parameters used in the analysis were the default options, including building downwash for all PREPA plants. The emission units stack parameters data including the updated coordinates, was submitted and revised by PREPA. PREPA submitted PRDNER the height, width and length of the buildings in each facility, along with maps identifying the structures. PREPA also submitted the BPIP Prime output model data to be used in the 1- hour SO<sub>2</sub> attainment model in San Juan and Guayama-Salinas areas. PRDNER used this BPIP data for PREPA San Juan, Palo Seco and Aguirre.

PRDNER use a coarse and refined receptor grid for the modeling analysis. An additional receptor grid was used to determine fence line concentrations. The coarse grid is used to determine the maximum 1-hour SO<sub>2</sub> concentrations and the extension of the area of significant impact, or the area where the model predicts violations of the 1-hour SO<sub>2</sub> NAAQS. The refined grid is denser and covers the area where the previous model predicts the 1-hour SO<sub>2</sub> maximum concentration. See modeling protocol for additional information about the receptor grids.

The onsite meteorological data for the 1-hour SO<sub>2</sub> SIP model, was provided by PREPA and reprocessed by PRDNER. PREPA submitted PRDNER, meteorological data from PREPA San Juan, PREPA Palo Seco and PREPA Aguirre stations. The data from PREPA San Juan is from 2013 and in the case of PREPA Aguirre, the data is from years 2014-2016.

The SO<sub>2</sub> background concentration is a Tier 1 approach or based on a monitored design value. The design value is from the SO<sub>2</sub> monitor at Guayama, AQS-72-057-009. The concentration is 47 ug/m<sup>3</sup> or 18 ppb, and this value will be added to the AERMOD model result, or the highest four highest (H4H).

## Model Results

The model results for the LNG scenario demonstrate attainment with the 1- hour SO<sub>2</sub> NAAQS in both nonattainment areas. According to the model results the H4H concentration was below the NAAQS. The Table 1 shows the model results in each nonattainment areas.

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<sup>2</sup>40CFR Part 51. Guideline on Air Quality Models. Environmental Protection Agency. January 2017.

Table1: 1-Hour Modeling Results for the SO<sub>2</sub> SIP

Facility	X (m)	Y (m)	H4H (µg/m <sup>3</sup> )	Background (µg/m <sup>3</sup> )	Design Concentration (µg/m <sup>3</sup> )	NAAQS SO <sub>2</sub> (µg/m <sup>3</sup> )
PREPA San Juan	805500	2038922	11.97	47	58.97	196
PREPA Palo Seco	800950	2043422	13.44	47	60.44	196
PREPA San Juan/Palo Seco	800950	2043422	13.45	47	60.45	196
PREPA Aguirre	791000	1998000	21.77	47	68.77	196

The H4H in San Juan Metro area was 60.45 µg/m<sup>3</sup> and was registered to the northwest of PREPA Palo Seco. PREPA Palo Seco had the major contribution to this concentration. Refer to Figure 1. The Palo Seco boilers were the emission units with more contribution to the H4H design concentration.

In the Guayama-Salinas area the H4H was 68.77 µg/m<sup>3</sup> and was registered north of PREPA Aguirre. Refer to Figure 2. The major contribution to this concentration was from the boilers and the combined cycles HRSG.

Figure 1: San Juan Metro Area LNG Modeling Results



Figure 6: San Juan Metro Area LNG Modeling Results

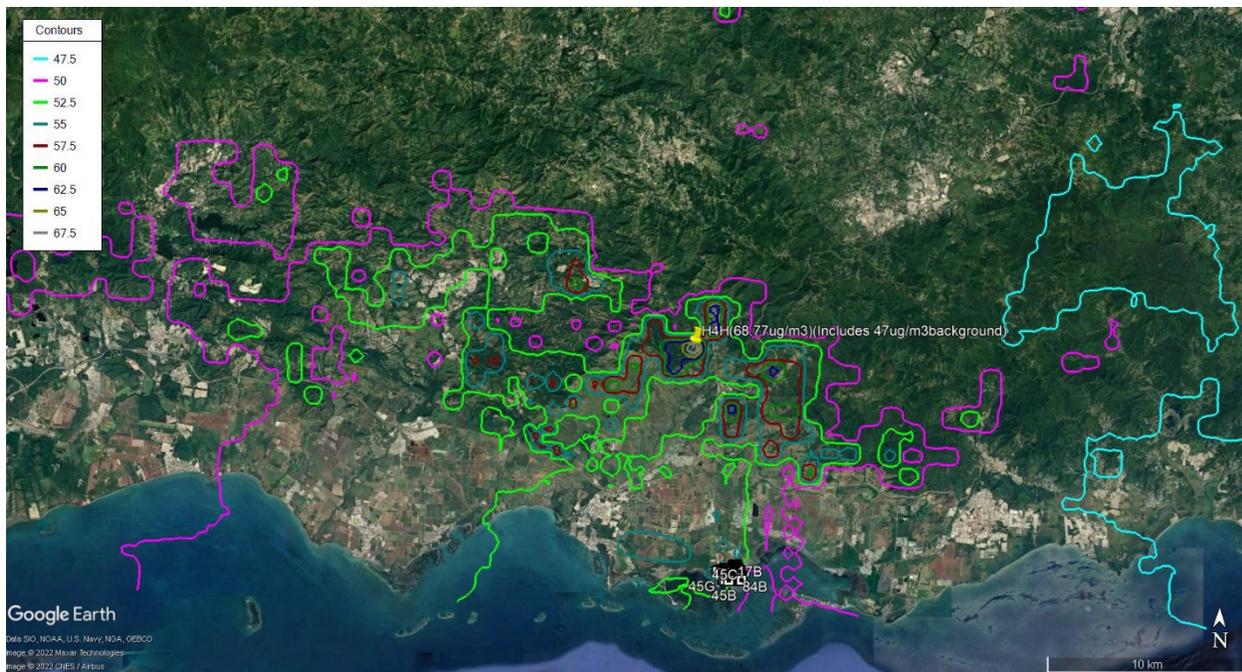


Figure 7: Guayama-Salinas Area LNG Modeling Results

## 5.0. NON-ATTAINMENT NEW SOURCE REVIEW 172 (c)(5)

### Permits for new and modified major stationary sources.

The location or construction of any new major stationary source, or major modification, or significant source shall obtain a location approval from the DNER, prior to its construction in accordance with Rule 201 of Regulation for the Control of Atmospheric Pollution (RCAP). The DNER shall notify the public of the location approval application. An application for location approval shall include information about alternative sites, proposed facility size, production, processes, and environmental control techniques that demonstrate that the benefits of the proposed source significantly outweigh the environmental and social costs imposed as a result of its location, construction, or modification.

The requirements for location approval are included in Rule 201. Rule 201 requires that emission sources to be located within a designated non-attainment area will be regulated and limited by means of the replacement of existing fuels with new renewable energy projects and using natural gas in the Puerto Rico Electric Power Authority (PREPA) generation fleet. For emissions sources located in attainment areas, air pollutants emitted from the new major source, major modification, or significant source must be limited by means of the best available control technology (BACT).

Non Attainments provisions are included in Rule 210 for stationary sources locating in designated clean or unclassifiable areas which would cause or contribute to a violation of a national ambient air quality standard.

The provisions for Non-attainment SO<sub>2</sub> areas for San Juan and Guayama-Salinas are included in Rule 425. This rule contemplates control measures to reach attainment or improve air quality using different alternatives, such as, renewable energy sources, switching fuel to ultra low sulfur diesel and natural gas conversion.

## 6.0 REASONABLE FURTHER PROGRESS 172 (c)(2) CAA

This NAA-SIP had been developed under the basis of the integration of renewable energy sources, an aggressive fuel-switching program under which the PREPA power generation fleet located within the designated Non-Attainment Areas will be switching diesel fuel to Ultra Low Sulfur Diesel (ULSD) fuel (once all existing inventory of diesel fuel are exhausted) and from Bunker C fuel oil to natural gas, for achieving attainment at the PREPA Palo Seco, San Juan and Aguirre Power Plants.

On August 24, 2020, the Energy Bureau issued the IRP Final Order, with respect to the Integrated Resource Plan (“IRP”) of the PREPA.<sup>3</sup> The Approved IRP includes a Modified Preferred Resource Plan (Action Plan) considering specific power generation capacity additions<sup>4</sup> and retirements.<sup>5</sup> In the Approved IRP, the Energy Bureau established a schedule for minimum quantities of renewable resources and battery energy storage resources and directed PREPA to submit a renewable resource and battery energy storage procurement plan. The Approved IRP included a program for six (6) tranches of procurement for renewable energy and battery storage resources from third parties,<sup>6</sup> in support of, among other things, meeting Act 17-2019<sup>7</sup> targets for renewable energy installations.<sup>8</sup>

The schedule of minimum quantities of renewables and battery storage additions is expected to be as follows:

Procurement Tranche	RFP Target Release Date	Solar PV or equivalent other energy, MW	4-hr. Battery Storage equivalent, MW
1	Dec-20	1000	500
2	April 2022	500	250

<sup>3</sup> Final Resolution and Order on the Puerto Rico Electric Power Authority’s Integrated Resource Plan, *In re. Review of the Puerto Rico Electric Power Authority Integrated Resource Plan*, Case No. CEPR-AP-2018-0001, August 24, 2020 (“Approved IRP”).

<sup>4</sup> *Id.*, ¶¶847-867, pp. 263-269.

<sup>5</sup> *Id.*, ¶¶869-873, pp. 270-271.

<sup>6</sup> *Id.*, ¶ 860, pp. 266-268.

<sup>7</sup> Known as *Puerto Rico Energy Public Policy Act* (“Act 17-2019”).

<sup>8</sup> Approved IRP, p. 266.

Procurement Tranche	RFP Target Release Date	Solar PV or equivalent other energy, MW	4-hr. Battery Storage equivalent, MW
3-4	September 2022	1000	500
5	March 2023	500	125
6	September 2023	750	125

As part of the SIP, DNER proposes an Interim Plan, to strengthen the existing SIP to improve air quality. The Interim Plan proposes fuel switching from diesel to ultra-low sulfur diesel ("ULSD") in certain units, starting in 2022, once existing inventory of diesel fuel is exhausted., as described below:

### Interim Plan (Fuel Switching)

PREPA Facility	Generation Unit	Fuel Switching Date
Palo Seco	Power Block 1-1, 1-2	Upon exhaustion of existing diesel inventory
Palo Seco	Power Block 2-1	Upon exhaustion of existing diesel inventory
Palo Seco	Power Block 2-2	Upon exhaustion of existing diesel inventory
Palo Seco	Power Block 3-1	Upon exhaustion of existing diesel inventory
Palo Seco	Power Block 3-2	Upon exhaustion of existing diesel inventory
Palo Seco	FT8 Mobile Pack 1	Upon exhaustion of existing diesel inventory
Palo Seco	FT8 Mobile Pack 2	Upon exhaustion of existing diesel inventory
Palo Seco	FT8 Mobile Pack 3	Upon exhaustion of existing diesel inventory
San Juan	HRSG 5&6	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC1-1HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC1-2HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC1-3HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC1-4HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC2-1HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC2-2HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC2-3HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine CC2-4HRSG	Upon exhaustion of existing diesel inventory
Aguirre	Gas Turbine AGGT2-1, 2-2	Upon exhaustion of existing diesel inventory

Also, the Interim Plan considers the retirement of certain units as described below:

### Interim Plan (Retirements)

PREPA Facility	Generation Unit	Unit Retirement Date
Palo Seco	Boiler 2	June 2023
Palo Seco	Power Block 2-2	June 2023
Palo Seco	Power Block 3-2	June 2023

This is contingent to renewable the effective integration of new renewable energy projects forecasted by the Energy Bureau. This action is required to maintain the power grid stability for Puerto Rico and in compliance with the best management practices.

The DNER proposes a Final Plan to attain compliance with the SO<sub>2</sub> NAAQS. The Final Plan consists of the conversion of several units to be able to use natural gas as the primary fuel, as described below:

**Final Plan (Gas Conversions)**

<b>PREPA Facility</b>	<b>Generation Unit</b>	<b>Conversion Date</b>
Palo Seco	Boiler 1	July 1, 2030
Palo Seco	Boiler 3	July 1, 2029
Palo Seco	Boiler 4	July 1, 2028
Palo Seco	Power Block 1-1, 1-2	To be determined
Palo Seco	Power Block 2-1	To be determined
Palo Seco	Power Block 2-2	To be determined
Palo Seco	Power Block 3-1	To be determined
Palo Seco	Power Block 3-2	To be determined
Palo Seco	FT8 Mobile Pack 1	To be determined
Palo Seco	FT8 Mobile Pack 2	To be determined
Palo Seco	FT8 Mobile Pack 3	To be determined
San Juan	HRSB 5&6	July 1, 2022
San Juan	Boiler 7	January 31, 2024
San Juan	Boiler 8	January 31, 2026
San Juan	Boiler 9	January 31, 2028
San Juan	Boiler 10	January 31, 2030
Aguirre	AG1	July 1, 2028
Aguirre	AG2	July 1, 2030
Aguirre	Gas Turbine CC1-1HRSB	To be determined
Aguirre	Gas Turbine CC1-2HRSB	To be determined
Aguirre	Gas Turbine CC1-3HRSB	To be determined
Aguirre	Gas Turbine CC1-4HRSB	To be determined
Aguirre	Gas Turbine CC2-1HRSB	To be determined
Aguirre	Gas Turbine CC2-2HRSB	To be determined
Aguirre	Gas Turbine CC2-3HRSB	To be determined
Aguirre	Gas Turbine CC2-4HRSB	To be determined
Aguirre	Gas Turbine AGGT2-1, 2-2	To be determined

If required to meet its generation power commitments, PREPA would request a waiver to utilize an alternate fuel whenever there is a natural disaster or emergency or other extraordinary event under which the natural gas primary fuel is not available for an extended period. This will be done through the request of an Emergency Waiver before the DNER.

- a. The emergency waiver must be approved by PRDNER and EPA. PRDNER will submit the waiver request to USEPA OECA. The waiver must provide (1) evidence and justification for the emergency, (2) how long the waiver is needed, (3) projection for when the natural gas supply will be restored, (4) interim measures to reduce excess emissions. If EPA determines the waiver request is warranted, EPA will approve the temporary emergency waiver. If EPA

does not approve the waiver, EPA and PRDNER may use their discretion to determine noncompliance and/or issue a finding of failure to implement the SIP.

**7.0 REASONABLY AVAILABLE CONTROL MEASURE/ REASONABLY AVAILABLE CONTROL TECHNOLOGY 172 (c) (1) and (6) measures to be reasonably available and contribute to attainment as expeditiously as practicable**

*Enforceable emission limitations and control measures*

The DNER RCAP has rules to implement and enforce the NAAQS and other air quality standards. These rules include formal systematic procedures for construction and operation permits that will meet the federal requirements. As part of this SIP, the RCAP will be amended to include more specific rules (Rule 210 and 425) for non-attainment areas.

- (1) If attainment of SO<sub>2</sub> air quality standards in the Non-Attainment Areas are not achieved, DNER will undertake aggressive follow-up for compliance and enforcement at any source within the boundaries of San Juan Metro and Guayama-Salinas Non-Attainment Areas. This includes expedited procedures for establishing enforceable consent agreements pending the adoption of revised SIPs. Any source that is found in violation of any compliance plan approved by the Board or any requirement within such plan will be subject to sanctions specified in Rule 115.
- (2) In the event adoption of any additional control measures is necessary, it will be subject to DNER's administrative and legal process.
- (3) If a new measure/control is already promulgated and scheduled to be implemented at the federal or state level, and that measure/control is determined to be sufficient to address a violation of the SO<sub>2</sub> NAAQS, additional local measures may be unnecessary. Furthermore, DNER will submit to EPA an analysis to demonstrate the proposed measures are adequate to bring the area to attainment.
- (4) The DNER may require any owner or operator responsible for any source of sulfur dioxide emissions which may be contributing to air pollution to install, operate, and maintain monitoring devices; to maintain records; and file periodic reports.
  - a. Within three (3) months of the receipt of any order under Rule 425 of the RCAP, or within another time period that such order may specify, the owner or operator shall submit a plan to the DNER. Such plan shall include an air quality and meteorological measurement network consistent with the objective of obtaining an accurate assessment of the sulfur dioxide air quality and meteorology within the zone impacted by sulfur dioxide emissions from the source. The plan shall follow criteria guidelines furnished by the DNER for number of instruments; site location; monitoring methods; equipment performance specifications; equipment operation and maintenance; analytical and data reduction quality assurance; and data reporting. The DNER may issue additional orders to require that a previously submitted plan be clarified, updated, corrected, supplemented, or otherwise amended.

## 8.0 CONTINGENCY MEASURE

Identify sources of violation of the SO<sub>2</sub> NAAQS: DNER may declare an air pollution alert, warning or emergency, and will determine that such condition requires immediate action for the protection of the health of human beings. The DNER will order persons causing or contributing to the atmospheric pollution to reduce their emissions to eliminate such condition, or to immediately discontinue the emission of pollutants. In addition, the DNER also maintains air quality information in a form readily available to the public on the DNER Website ([www.drna.pr.gov](http://www.drna.pr.gov)).

Compliance and enforcement: Article 9(a)(7) of Puerto Rico Environmental Public Policy Act (PREPPA) 416 of September 22, 2004, provides the Secretary of the DNER the authority to order persons causing or contributing to a condition which harms the environment and natural resources, or which poses an imminent danger for the public health and safety, to immediately diminish or discontinue their actions. Also, Article 9(a)(8) of PREPPA provides the authority to issue orders to do or forbear or to cease and desist so as to take the preventive or control measures that, in its judgment, are necessary to achieve the purposes of this Act and the regulations promulgated thereunder.

*Upon notification by DNER that a nearby air monitor for the area has registered four validated ambient SO<sub>2</sub> concentrations in excess of the standard, or that a monitored SO<sub>2</sub> violation based on the design value occurred during calendar years 2022 and beyond, PREPA will, without any further action by DNER or EPA, undertake a full system audit of all emissions units subject to control under this plan. PREPA will submit a written system audit report to DNER within 30 days of the notification. The system audit report must detail the operating parameters of all emissions units for four 10-day periods up to and including the date upon which the reference monitor registered each exceedance, together with recommended provisional SO<sub>2</sub> emission control strategies for each affected unit and evidence that these control strategies have been deployed, as appropriate. Upon receipt of the system audit report, DNER will immediately begin a 30-day evaluation period to diagnose the cause of the monitored exceedance. This evaluation will be followed by a 30-day consultation period with PREPA to develop and implement operational changes necessary to prevent future monitored violations of the standard. These changes may include fuel switching to reduce or eliminate the use of sulfur containing fuels, physical or operational reduction of production capacity, or other changes as appropriate. If any new emission limits are necessary, they would be submitted to EPA as a SIP revision.*

Establishment of a New Attainment Ambient Monitoring Networks (NAAMN): The 2010 SO<sub>2</sub> NAAQS attainment strategy in this SIP considers the development of a NAAMN in the Guayama-Salinas and the San Juan Metro non-attainment areas. The data gathered from the existing monitoring network allows the DNER to propose the development of a NAAMN to be installed at the designated non-attainment areas in Puerto Rico, geared to compare NAAQS compliance. It is recommended to install twelve (12) monitoring stations under the NAAMN, placing six (6) in each of the two non-attainment areas. The analysis developed to select the monitoring station locations will be based upon the areas predicted to have the maximum concentrations, predicted through the use of EPA-approved AERMOD<sup>9</sup> Modeling Program. This is directed

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<sup>9</sup> AERMOD is a “steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.” [Air Quality Dispersion Modeling - Preferred and Recommended Models | US EPA](#)

to address EPA's concerns, as well as to fully validate the Government of Puerto Rico's compliance with the Clean Air Act NAAQS requirements.

## **9.0 CONCLUSION**

On January 9, 2018, the EPA's decision to designate areas of Puerto Rico as non-attainment areas for the 2010 SO<sub>2</sub> NAAQS was published in the Federal Register (83 FR. 1098). The non-attainment designations that took effect on April 9, 2018, correspond to the Air Quality Control Regions (AQCRs) covering: 1. Areas within the Municipalities of San Juan, Guaynabo, Toa Baja, and Bayamón, together with the entire Cataño Municipality on the north of the main island (San Juan Metro Area); 2. Sectors of the Guayama and Salinas Municipalities on the south of the main island. For areas designated as nonattainment, states must develop a State Implementation Plan that meets the requirements of Section 172(c) Clean Air Act (CAA). Paragraphs 172(c) and 172(a)(2) establish the requirements for the implementation of reasonably available control measures to achieve compliance as soon as practicable but no later than five years after the nonattainment designation. In response to the promulgation of the 2010 1-Hour SO<sub>2</sub> Primary National Ambient Air Quality Standard, this SIP is submitted, according to the requirements established in Sections 172(b) and (c) of the (CAA). With this plan, the DNER will meet all requirements to demonstrate attainment with the 2010 1-hour SO<sub>2</sub> NAAQS ambient air monitoring in the designated non-attainment San Juan Metro and Guayama-Salinas areas. This plan demonstrates that the implementation of the control measures at existing sources limit SO<sub>2</sub> emissions below the 2010 NAAQS for sulfur dioxide.

## **10.0 APPENDIX**

- A. Puerto Rico 1-Hour So<sub>2</sub> Nonattainment Area State Implementation Plan-Modeling Protocol (Draft Final)
- B. Puerto Rico 1-Hour So<sub>2</sub> Nonattainment Area State Implementation Plan-2019-2023 Projected Emission Inventory (Draft)