



GOVERNMENT OF PUERTO RICO  
OFFICE OF THE GOVERNOR  
ENVIRONMENTAL QUALITY BOARD



Chairman's Office

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June 3, 2011

MRS. JUDITH A. ENCK  
REGIONAL ADMINISTRATOR  
USEPA – REGION II  
290 BROADWAY 25<sup>TH</sup> FLOOR  
NEW YORK NY 10007-1866

**RE: Puerto Rico Designation for the New 1-Hour SO<sub>2</sub> NAAQS**

Dear Mrs. Enck:

The Puerto Rico Environmental Quality Board (PREQB) as the lead agency of the Government of Puerto Rico for air quality encloses the recommendations for the Puerto Rico area designations on the new 1-hour SO<sub>2</sub> National Ambient Air Quality Standard (NAAQS), as required by section 107(d)(1)(A) of the Clean Air Act.

On June 22, 2010, the Environmental Protection Agency strengthened the primary National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO<sub>2</sub>). The revision established a new 1-hour standard at a level of 75 parts per billion (ppb).

To classify the areas of Puerto Rico, PREQB used the hybrid analytic approach that combines the use of air quality monitoring and modeling to assess compliance with the new 1-hour SO<sub>2</sub> NAAQS, as required by EPA Title 40 of the Code of Federal Regulations, Parts 50, 53 and 58. As required, the PREQB used the monitoring data from the existing SO<sub>2</sub> network for the years 2007 to 2009. The initial designation also includes the results of the refined air dispersion models for the areas that have the potential to cause or contribute to a NAAQS violation.

Pursuant to the modeling and monitoring results for the new 1-hour SO<sub>2</sub> NAAQS, the areas are designed as follows:

**Non-Attainment:**

- Barceloneta - Manatí Area
- Guayama Area
- San Juan Area
- Guayanilla - Ponce Area

**Unclassified:**

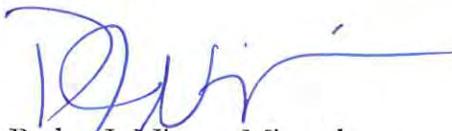
- Mayaguez Area
- Fajardo-Humacao Area

This designation will be temporary, until the Puerto Rico SO<sub>2</sub> network has gathered sufficient air quality data from the monitoring stations, according to the NAAQS. EQB will collect three years of complete quality assured and certified data, generated from the SO<sub>2</sub> monitoring network. EQB expects compliance. Final actions and determination will be taken in June 2014, once the monitoring stations have gathered three years of data and it can be analyzed to confirm or discard the potential non attainment designation.

Also, included with this designation, as support document, is a copy of the *Puerto Rico Designation for the New 1-Hour SO<sub>2</sub> NAAQS*, see *Enclosure 1*.

Please feel free to contact me at (787) 767-8181 if you have any questions regarding these recommendations, or call our staff contact Mr. Luis Sierra, P.E., Director of the Air Quality Area, at (787) 767-8181 extension 3269.

Cordially,



Pedro J. Nieves Miranda  
Chairman

Attachments

c: George Pavlou  
Carl Soderberg

Puerto Rico Environmental Quality Board

# Puerto Rico Designation for the new 1-hour SO<sub>2</sub> NAAQS

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Validation And Data Services & Air Modeling Division  
May, 2011

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### Acronyms and Abbreviations

AIRS: Aerometric Information Retrieval System

CBSAs: Core Based Statistical Areas

CFR: Code Federal Register

EPA: Environmental Protection Agency

FRM: Federal Reference Method

FEMs: Federal Equivalent Methods

NAAQS: National Air Ambient Quality Standards

SO<sub>2</sub>: Sulfur Dioxide

ppm: parts per million

PR: Puerto Rico

PREQB: Puerto Rico Environmental Quality Board

PREPA: Puerto Rico Power Electrical Authority

PWEI: Population Weighted Emissions Index

RCPA: Regulation for the Control of Atmospheric Pollution of Puerto Rico

## Introduction

Puerto Rico Environmental Quality Board (PREQB) as representative agency of the Government of Puerto Rico submit the recommendations for the Puerto Rico area designations on the new 1-hour SO<sub>2</sub> NAAQS, as required under the Federal Clean Air Act.

The Puerto Rico Designation for the new 1-hour SO<sub>2</sub> NAAQS, 2010 serves as technical and support document of SO<sub>2</sub> designation to PR areas. The document includes the data availability for air quality and, the location of the existing monitoring stations, air dispersion model results.

## Procedure

EQB use the hybrid analytic approach that would combine the use of monitoring and modeling to assess compliance with the new 1-hour SO<sub>2</sub> NAAQS as recommended by EPA.

According with the regulation EQB use the monitoring data from the existing SO<sub>2</sub> network for the years 2007 to 2009 and the results of the air dispersion models for the areas that have the potential to cause or contribute to a NAAQS violation to classify the areas of Puerto Rico for the initial designation. The designation will be temporary until the PR SO<sub>2</sub> network complies with the new regulation. EQB will need to make some adjustments to the EQB SO<sub>2</sub> network to ensure that monitors meeting today's network design regulations for the new 1-hour. EQB expected compliance with the new NAAQS to be determined based on 3 years of complete, quality assured, certified monitoring data. EQB intended to complete designations by June 2013 based on 3 years of complete, quality assured, certified air quality monitoring data as generated from the adjusted monitoring network.

EQB further explained that PR did not expect newly-cited monitors for the proposed network to generate sufficient monitoring data for us to use in determining whether areas complied with the new NAAQS by the statutory deadline to complete initial designations. Consequently, we discussed our expectations to base initial designations on air quality data from the years 2008- 2010 or 2009-2011, from SO<sub>2</sub> monitors operating at current locations, which we expected to continue through 2011.

## Designation to the Areas:

EQB anticipate that the identification of NAAQS violations and compliance with the 1-hour SO<sub>2</sub> NAAQS would primarily be done through refined, source-oriented air quality dispersion modeling analyses, supplemented with a new, limited network of ambient air quality monitors. Under our approach EQB recommend to designate the areas as follow:

- An area that has monitoring data or refined modeling results showing a violation of the NAAQS would be designated as “*nonattainment*.”
- An area that has both monitoring data and appropriate modeling results showing no violations would be designated as “*attainment*.”
- All other areas, including those with SO<sub>2</sub> monitors showing no violations but without modeling showing no violations, would be designated as “*unclassifiable*.”
- Areas with no SO<sub>2</sub> monitors at all *i.e.*, “rest of State,” would be designated as “*unclassifiable*” as well.

## Monitoring Results:

3- Year Average of the 99 <sup>th</sup> percentile of the annual distribution of daily 1-hour average concentrations <sup>1</sup>				
Stations	2007	2008	2009	3 -year Average
Juncos: 72-033-0008		0.003	0.003	0.003
Guayama: 72-057-0009	0.003	0.004	0.004	0.004
Cataño: 72-033-0004	0.009	0.011	0.023	0.014
Salinas: 72-123-0002			0.007	0.007
Bayamón: 72-021-0006	0.006	0.008	0.029	0.014

<sup>1</sup> Source: AQS data

## **SO<sub>2</sub> Modeling Results:**

The modeling study was performed according to the recommendations presented by EPA in the memorandum, Applicability of Appendix W Modeling Guidance for the 1-hour SO<sub>2</sub> National Ambient Air Quality Standard.

The model used was AERMOD with the EPA default options. The modeling study was performed in four areas: San Juan, Guayama, Guayanilla and Barceloneta. One year of site-specific data was used in each case. The highest second highest value was used as a maximum impact result. AERMOD was not run in other areas of the island due to the lack of meteorological data.

The meteorological data used in San Juan was collected in 1994 by the National Weather Service. The data for Barceloneta and Guayama was collected on-site, in 1992 and 1994 respectively, with the upper data from the National Weather Service in San Juan. The data used in Guayanilla was collected on-site in 1993 with the upper air and cloud cover data from the National Weather Service in San Juan.

The emission source inventory was multi-source. Using the recommendations in the Appendix W of the 40 CFR Part 51, the modeled emission rate for the short-term 1-hour and 3-hour standard was computed with the source allowable emissions or the maximum design capacity. This is a conservative approach and ensures the modeling of the worst-case scenario. Copies of the emission inventory data are included in Appendix I.

### ***Industrial Areas:***

#### **Guayama - Salinas**

The modeling results for the 1-hour SO<sub>2</sub> standard were exceeded. The maximum impact was 643 µg/m<sup>3</sup>, near PREPA Aguirre and this industry had the major contribution to this concentration with 642 µg/m<sup>3</sup>. There were no violations of the 3-hour standard and the maximum impact was 354 µg/m<sup>3</sup> near PREPA Aguirre. This industry had the major contribution to the 3-hour result with 353 µg/m<sup>3</sup>. Figures 1, 2, 3 and 4 present the results.

Figure 1: AERMOD 1-hour SO<sub>2</sub> Modeling Results, Guayama

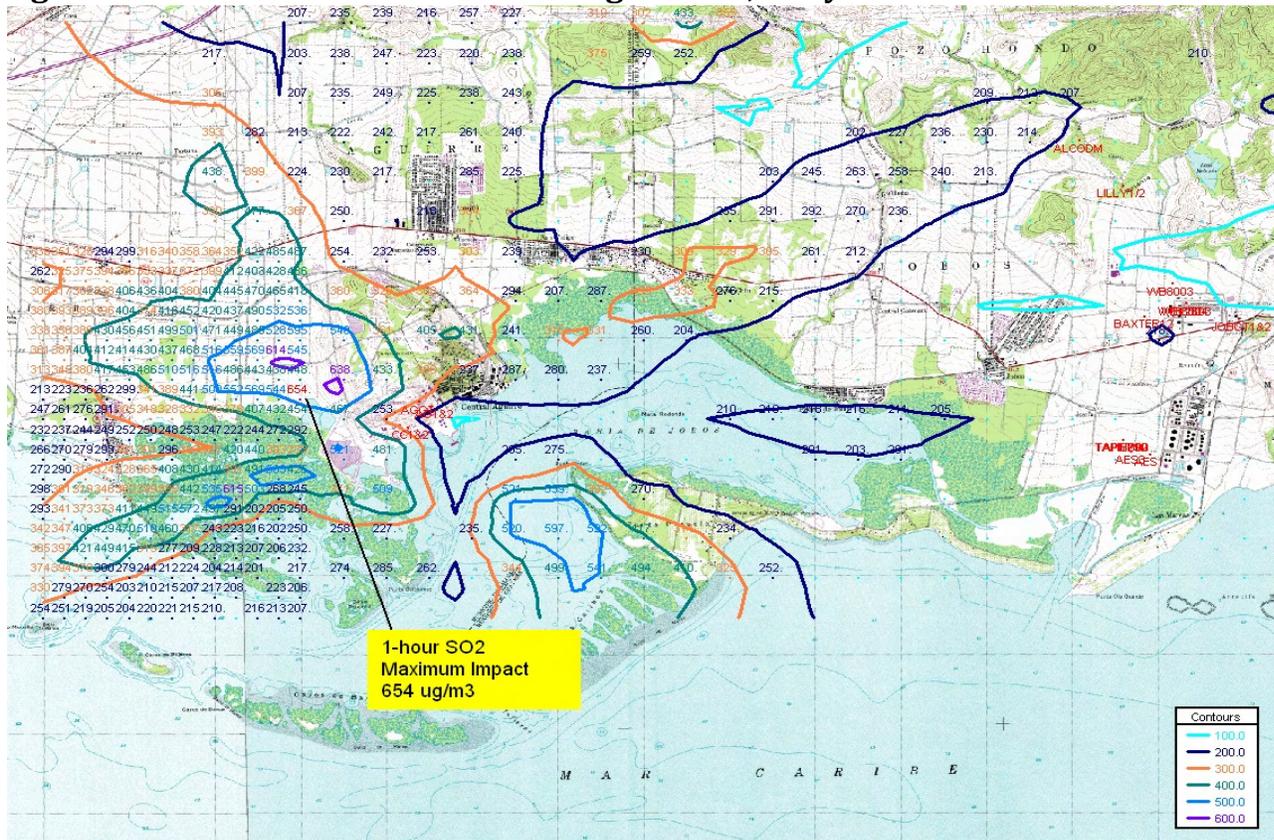
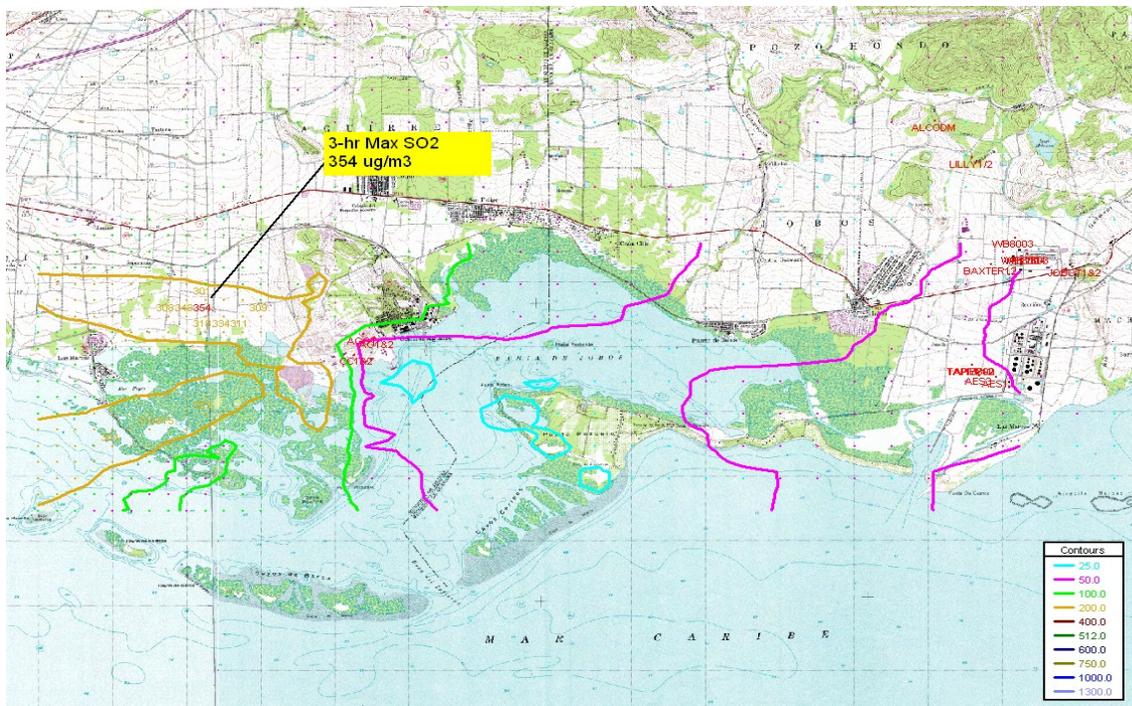


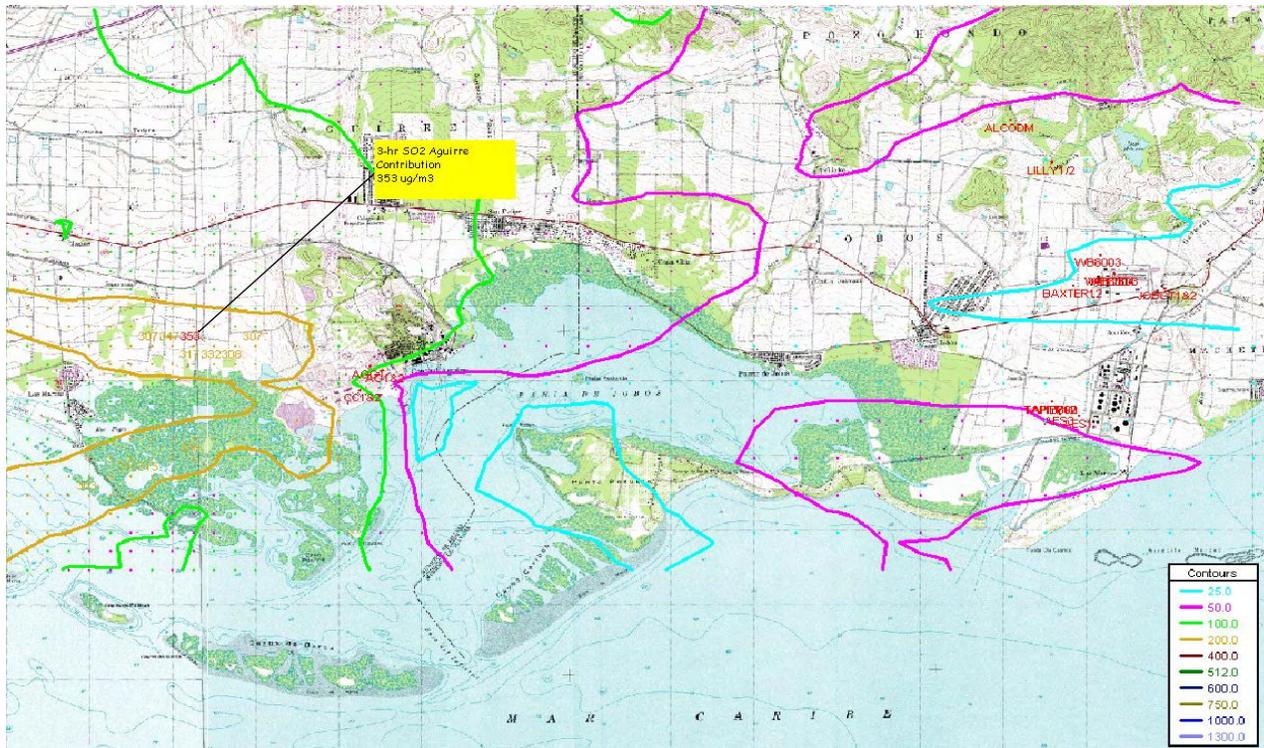
Figure 2: AERMOD 1-hour SO<sub>2</sub> Modeling Results, PREPA Aguirre



Figure 3: AERMOD 3-hour SO<sub>2</sub> Modeling Results, Guayama



**Figure 4: AERMOD 3-hour SO<sub>2</sub> Modeling Results, PREPA Aguirre**



### **Guayanilla-Ponce:**

The modeling results for the 1 and 3 hour SO<sub>2</sub> standard were exceeded. The 1-hour result was 4854 ug/m<sup>3</sup> and PREPA Costa Sur had the major contribution to this concentration with 4851 ug/m<sup>3</sup>. For the 3-hour standard the maximum impact was near PREPA Costa Sur and the concentration was 1839 ug/m<sup>3</sup>. PREPA Costa Sur had the major contribution to this result with 1837 ug/m<sup>3</sup>. In the Ponce area CEMEX has the major concentration to the 1-hour standard with 1619 ug/m<sup>3</sup>. Figures 5, 6, 7, 8 and 9 present the results.

Figure 5: AERMOD 1-hour SO<sub>2</sub> Modeling Results, Guayanilla

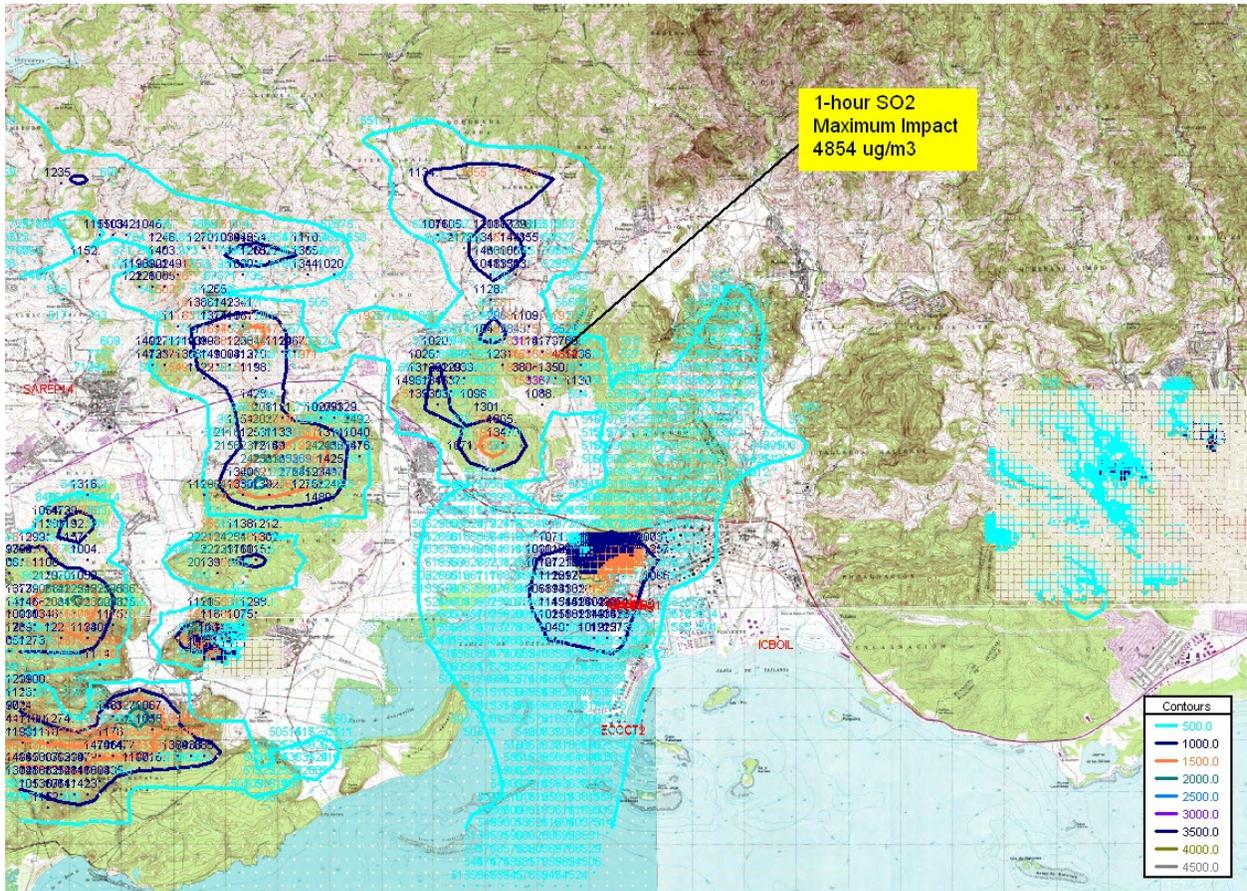


Figure 6: AERMOD 1-hour SO<sub>2</sub> Modeling Results, PREPA Costa Sur

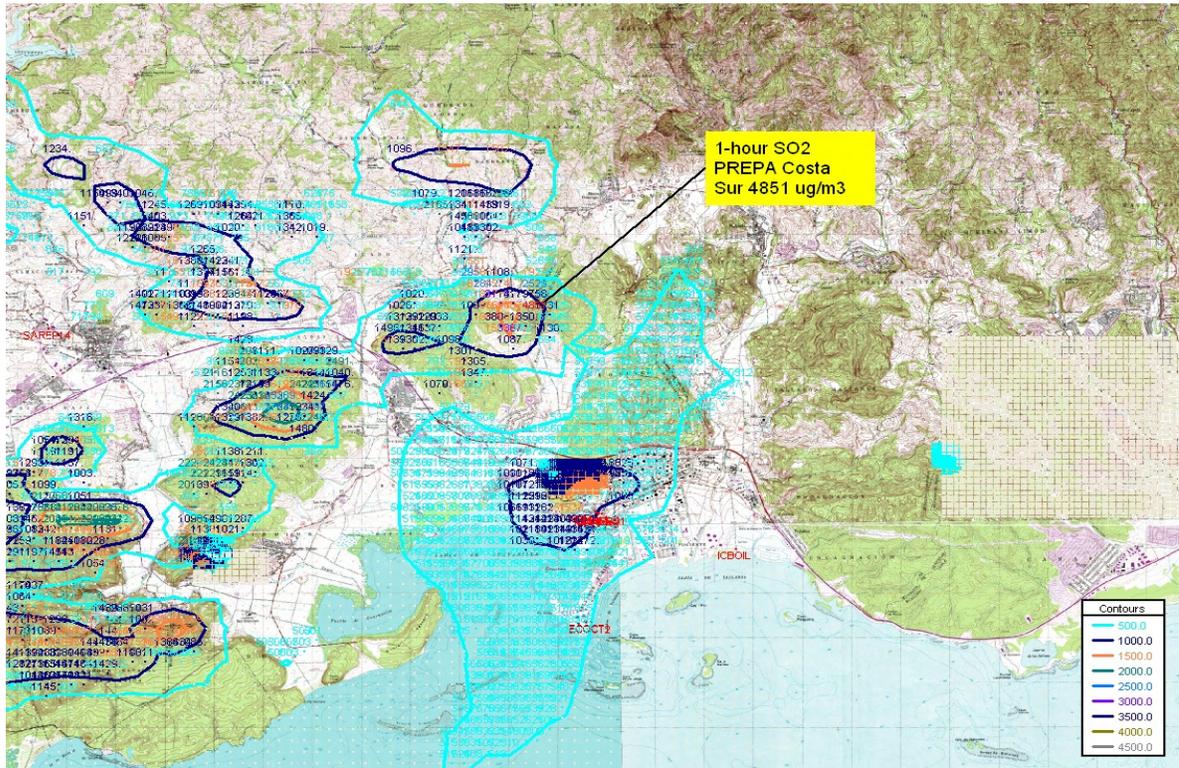
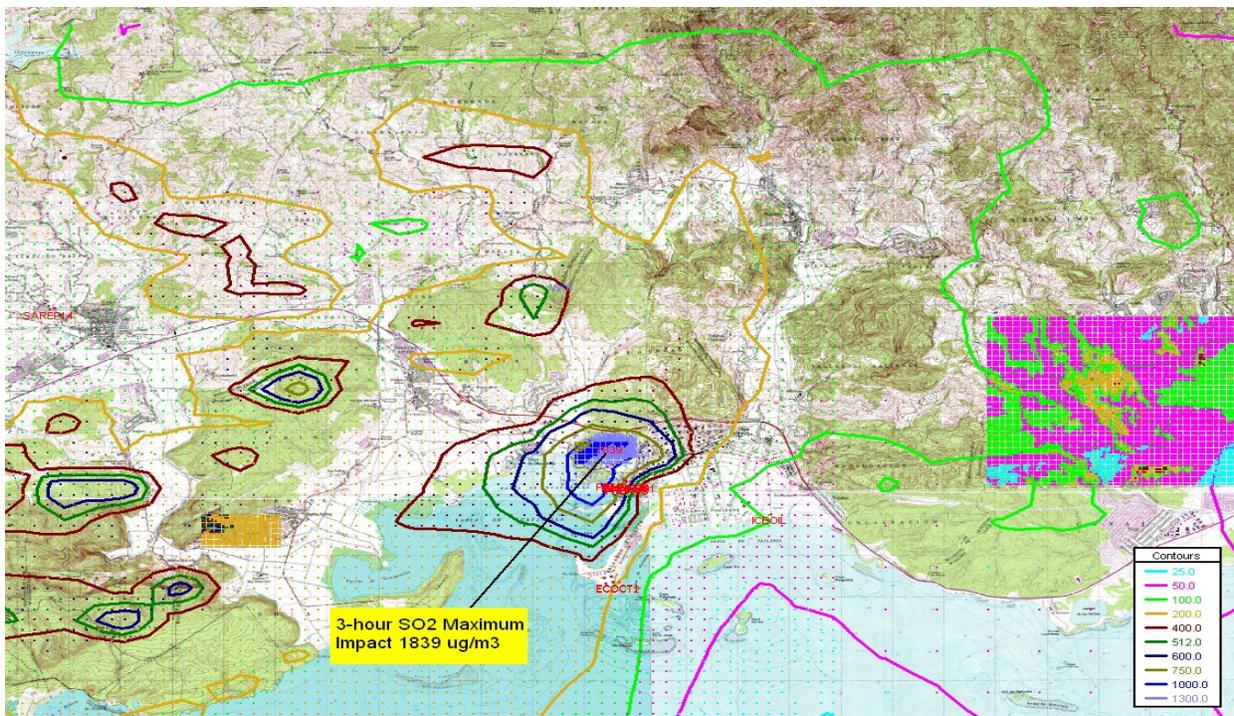
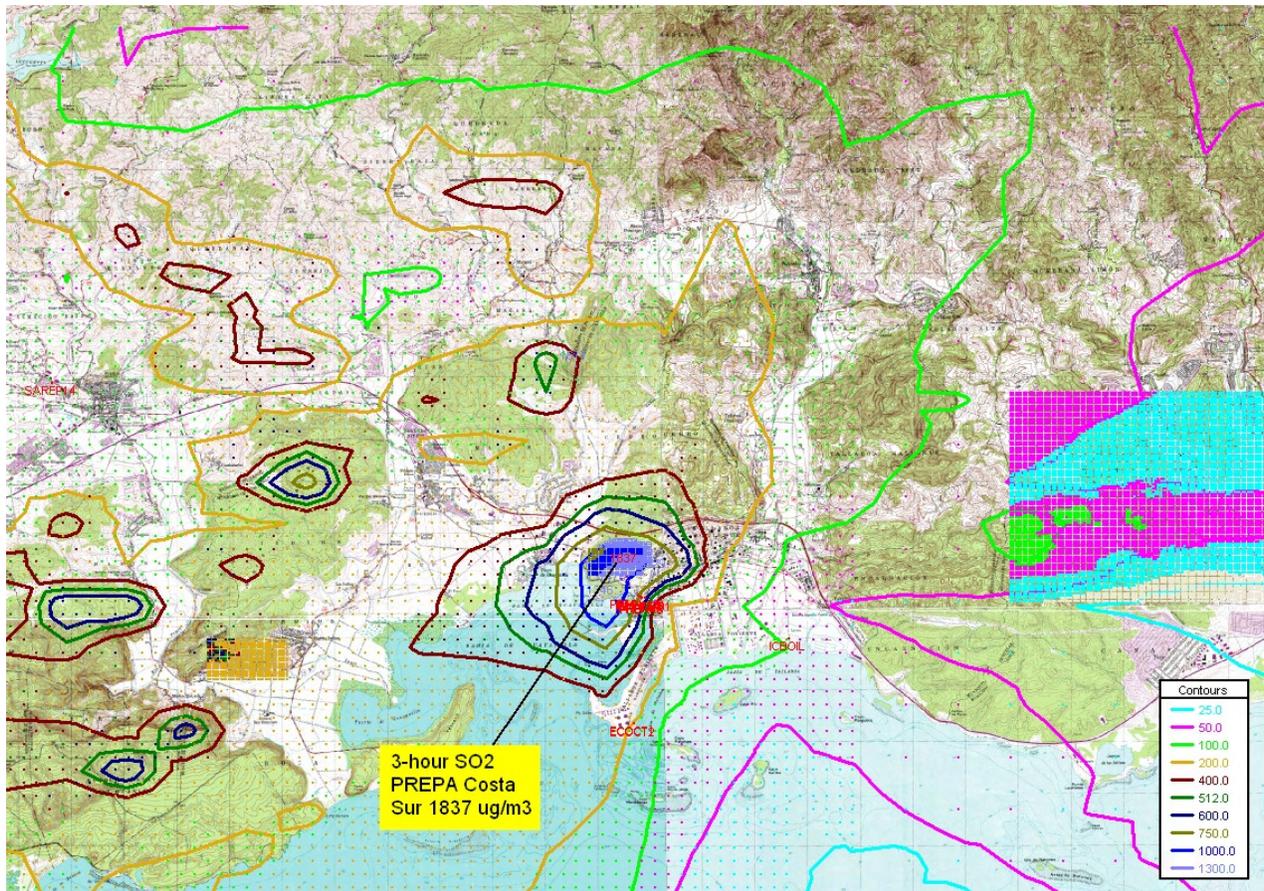


Figure 7: AERMOD 3-hour SO<sub>2</sub> Modeling Results, Guayanilla

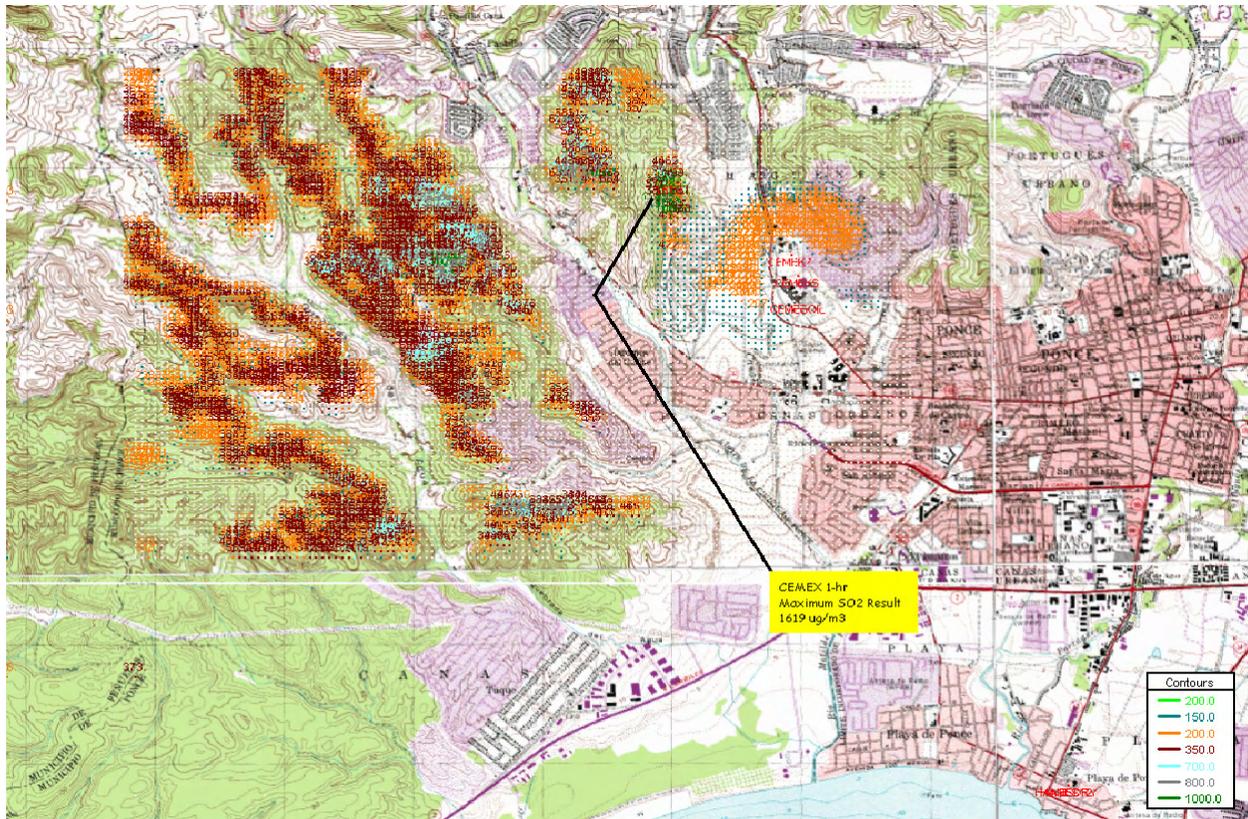


**Figure 8: AERMOD 3-hour SO<sub>2</sub> Modeling Results, Costa Sur**



Another area with SO<sub>2</sub> violations was in Ponce. The major impact was near CEMEX with 1-hour result of 1619 ug/m<sup>3</sup>. The 3-hour standard was in the same area but was not exceeded. Figure 16 show the 1-hour result.

**Figure 9: AERMOD 1-hour SO<sub>2</sub> Modeling Results, CEMEX**



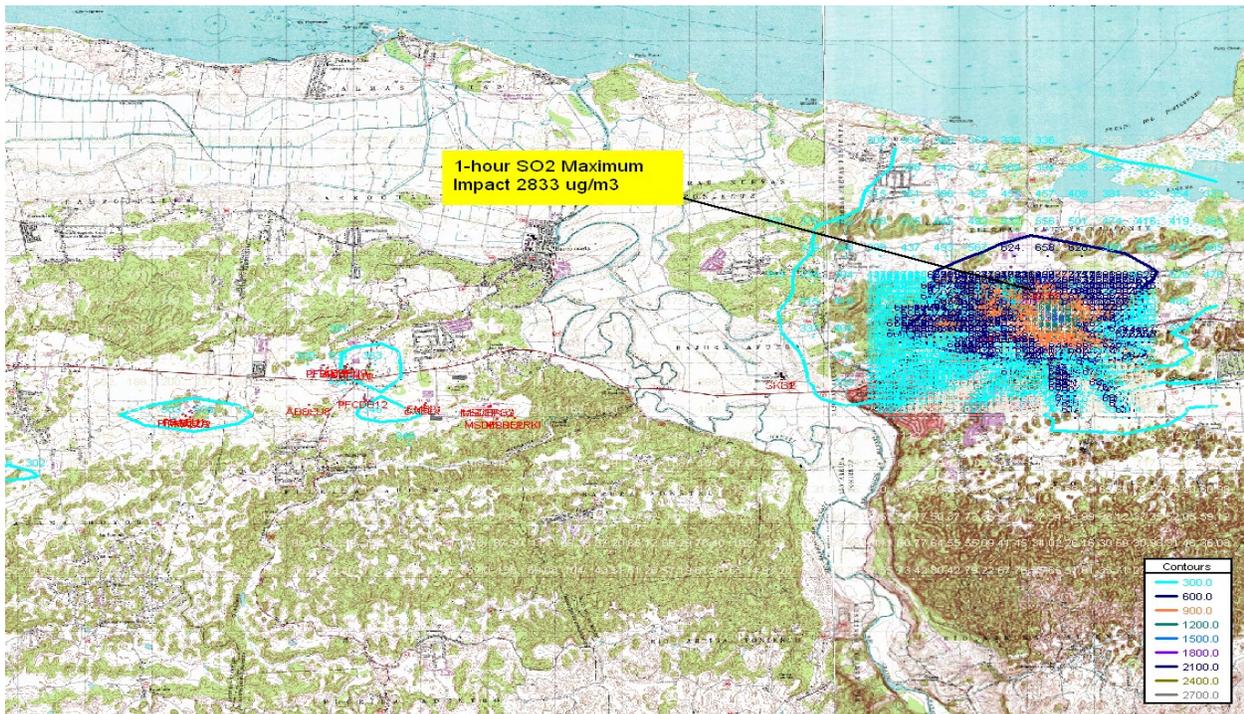
Violations of the 1-hour standard were registered in all modeled areas. The highest one hour values were registered in Guayanilla-Ponce and Barceloneta. The 3-hours standard was exceeding in Guayanilla but not in other modeled areas.

It is recommended to place air quality monitors near the areas of maximum SO<sub>2</sub> impacts to confirm the modeling results.

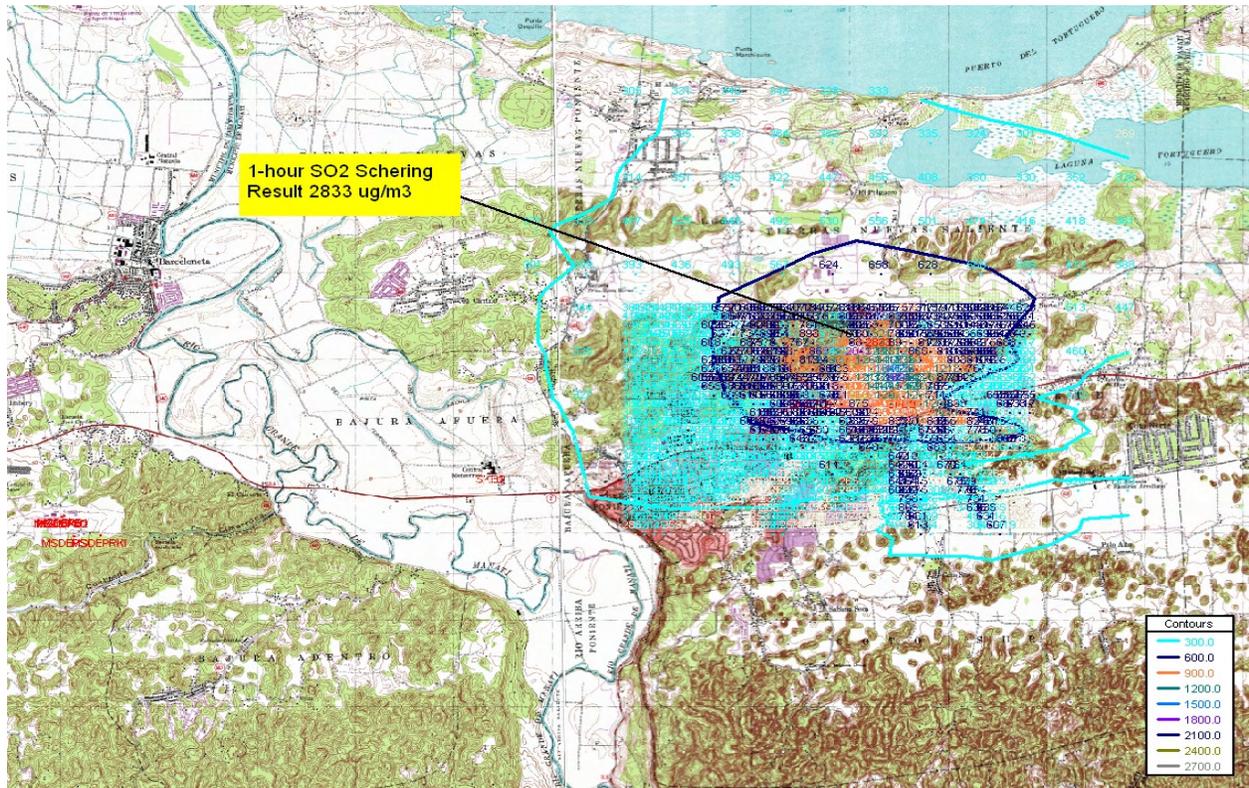
***Barceloneta***

The SO<sub>2</sub> modeling results exceeded the 1-hour standard. Maximum impact was 2833 µg/m<sup>3</sup>, registered near Schering-Plough. The industry has the major contribution to this concentration with a result of 2833 µg/m<sup>3</sup>. Figure 10 and 11 presents the Barceloneta results for 1-hour SO<sub>2</sub>.

**Figure 10: AERMOD 1-hour SO<sub>2</sub> Modeling Results, Barceloneta**

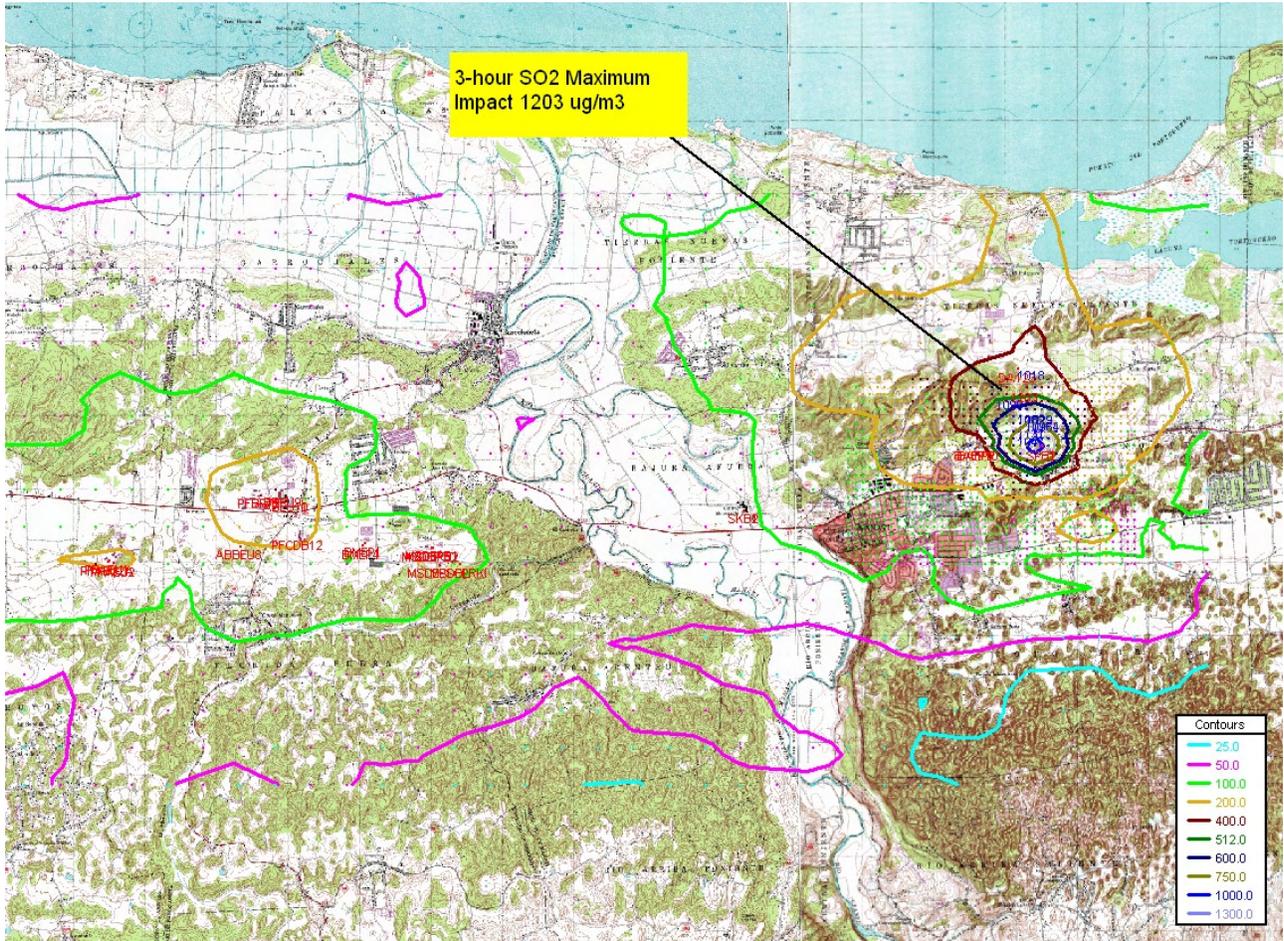


**Figure 11: AERMOD 1-hour SO<sub>2</sub> Modeling Results, Schering-Plough**



The 3-hour standard was not exceeding. The maximum impact was 1203  $\mu\text{g}/\text{m}^3$  registered in the same area as the 1-hour concentration with the major contribution of Schering-Plough. Figure 12 and 13 presents the results.

**Figure 12: AERMOD 3-hour SO<sub>2</sub> Modeling Results, Barceloneta**



**Figure 13: AERMOD 3-hour SO<sub>2</sub> Modeling Results, Schering-Plough**



### ***Metropolitan Area – San Juan***

The results in San Juan area exceed the SO<sub>2</sub> 1-hour standard. Violations of the 1-hour standard were registered in almost all modeling area. The maximum impact was near PREPA Palo Seco and it was 666 µg/m<sup>3</sup>. PREPA Palo Seco had the total contribution to this result with 666 µg/m<sup>3</sup>. Figure 14 and 15 shows the results.

Figure 14: AERMOD 1-hour SO<sub>2</sub> Modeling Results, San Juan

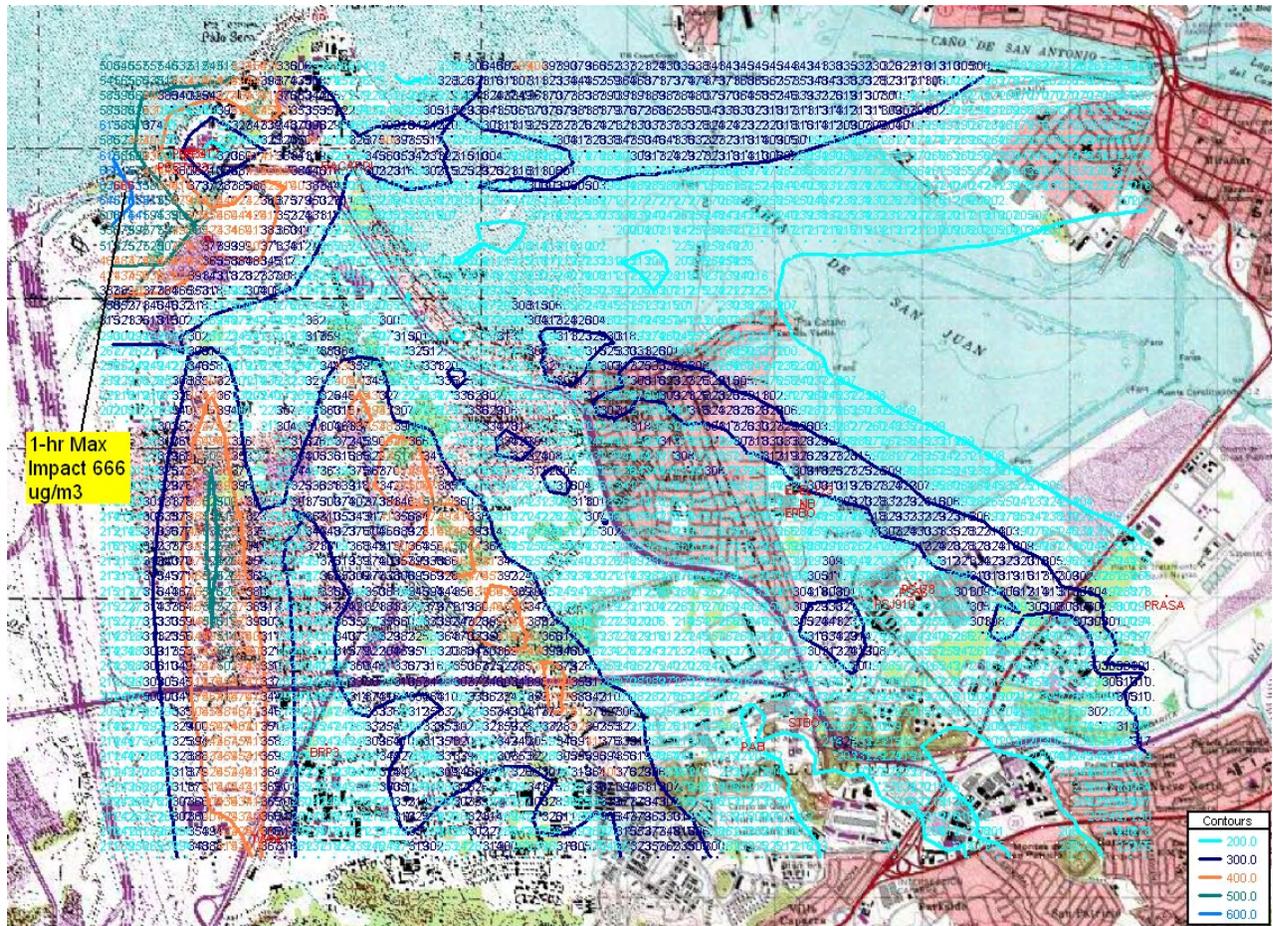
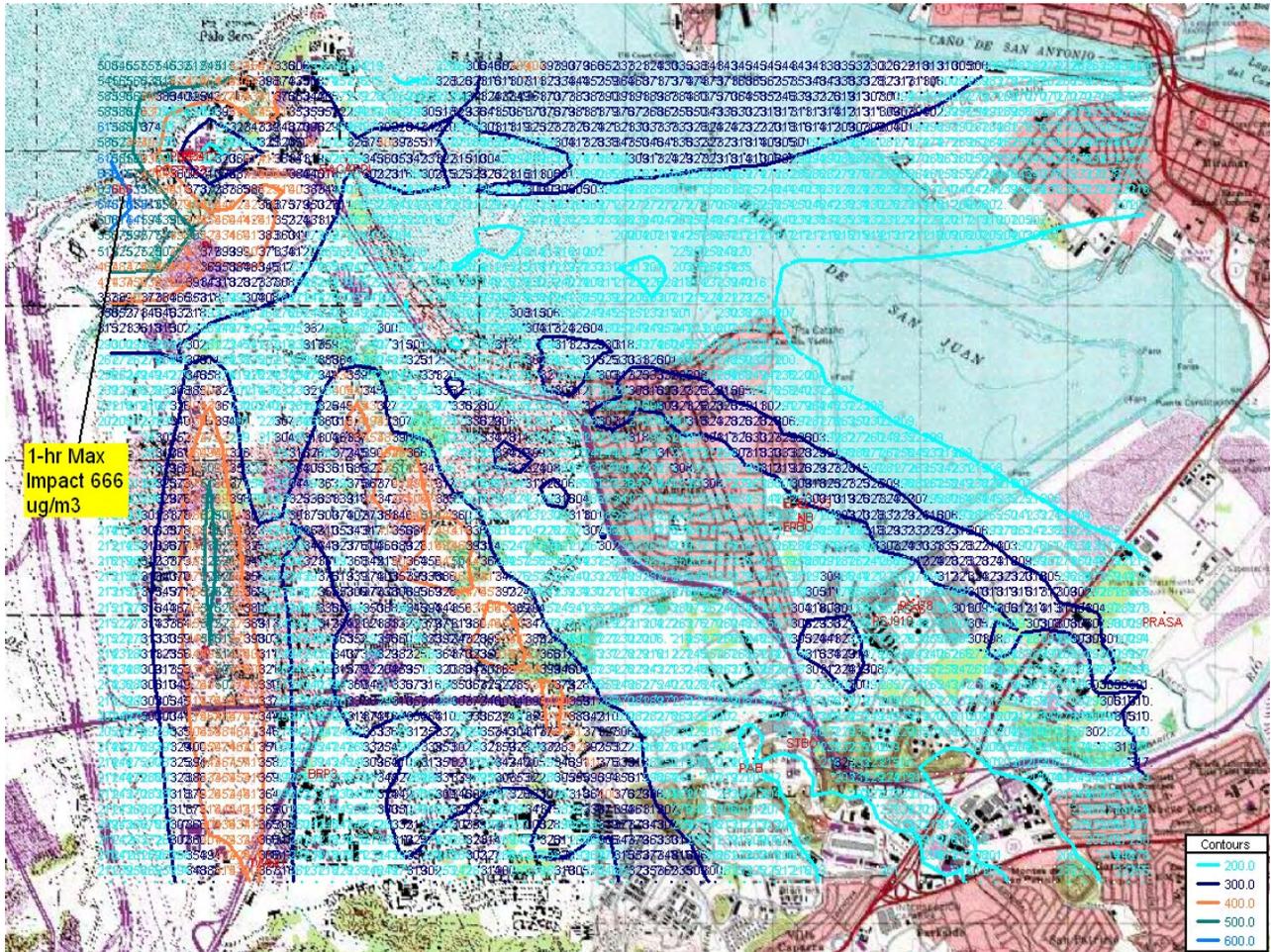
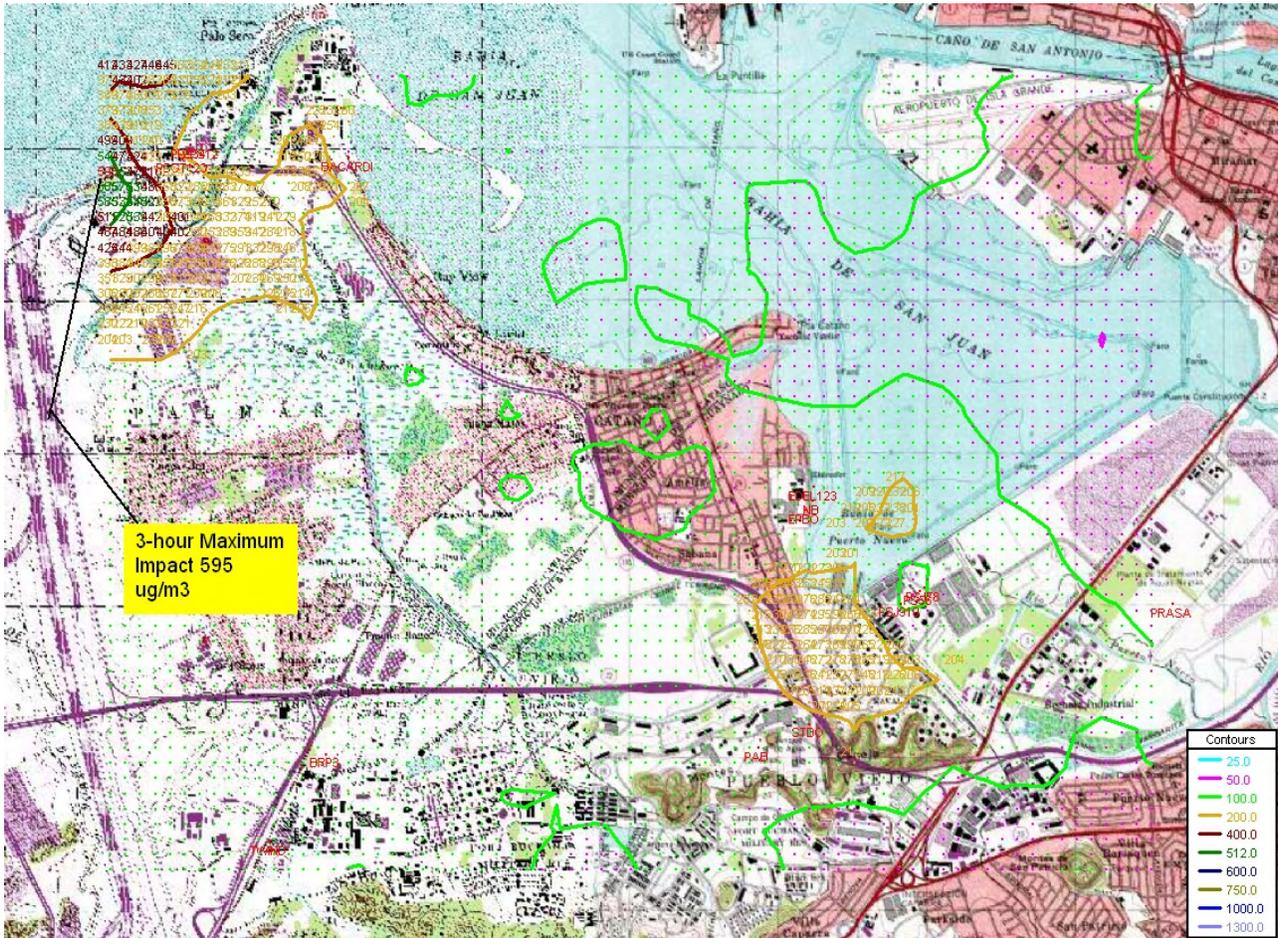


Figure 15: AERMOD 1-hour SO<sub>2</sub> Modeling Results, PREPA Palo Seco



The 3-hour standard was not exceeding. The maximum impact was 595  $\mu\text{g}/\text{m}^3$  near PREPA Palo Seco and this industry had the major contribution to the result with 592  $\mu\text{g}/\text{m}^3$ . The Figure 16 shows the results for this period.

Figure 16: AERMOD 3-hour SO<sub>2</sub> Modeling Results, San Juan



Violations of the 1-hour standard were registered in all modeled areas. The highest one hour values were registered in Guayanilla and Barceloneta. The 3-hours standard was exceeding in Guayanilla but not in other modeled areas.

It is recommended to place air quality monitors near the areas of maximum SO<sub>2</sub> impacts to confirm the modeling results.

## Conclusions

According with modeling and monitoring results for the new 1-hour SO<sub>2</sub> NAAQS the areas are designed as follow:

Non-Attainment:

- Barceloneta - Manatí Area
- Guayama Area
- San Juan Area
- Guayanilla - Ponce Area

Unclassified:

- Mayaguez Area
- Fajardo-Humacao Area