COMMONWEALTH OF
PUERTO RICO
Environmental Quality Board

PUERTO RICO ENVIRONMENTAL QUALITY BOARD
AIR QUALITY AREA

State Implementation Plan for the Lead Nonattainment Area in Arecibo, Puerto Rico

February 2016 Revision

EQB
ENVIRONMENTAL QUALITY BOARD
COMMONWEALTH OF PUERTO RICO

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I. Acronyms

AQA:	Air Quality Area
AQS:	Air Quality System
ASR:	Automotive-Shredder Residue
BACT:	Best available control technology
CAA:	Clean Air Act
CO:	Carbon monoxide
CFR:	Code of Federal Regulations
EPA:	Environmental Protection Agency
EQB:	Environmental Quality Board
FCE:	Full Compliance Evaluation
FRM:	Federal Reference Method
GPS:	Geographic Position System
HHV:	Higher Heating Value
H_2SO_4:	Sulfuric acid mist
LAER:	Lowest achievable emission rate
LHV:	Lowest Heating Value
MACT:	Maximum Available Control Technology
MMBtu:	Million British thermal unit
MSW:	Municipal solid waste
NAAQS:	National Ambient Air Quality Standards
NANSR:	Non-attainment New Source Review
NESHAP:	National Emission Standards for Hazardous Air Pollutants
NO_x:	Nitrogen oxides
NSPS:	New Sources Performance Standards
NSR:	New Source Review
Pb:	Lead
PCE:	Partial Compliance Evaluation
PM:	Particulate matter
PR:	Puerto Rico
PREPA:	Puerto Rico Energy Power Authority
PREQB:	Puerto Rico Environmental Quality Board
PREPPA:	Puerto Rico Environmental Public Policy Act
PSD:	Prevention of Significant Deterioration
PUWW:	Processed Urban Wood Waste
RCAP:	Regulation for the Control of Atmospheric Pollution
SIP:	State Implementation Plan
SLAMS:	State and Local Air Monitoring Stations
SO_2:	Sulfur dioxide
TBRCI:	The Battery Recycling Company, Inc.
TDF:	Tire-Derived Fuel
VOC:	Volatile organic compounds

II. Executive Summary

On November 22, 2011 (76 FR 72097) the United States Environmental Protection Agency (EPA) notified the designation of the 2008 National Ambient, Air Quality Standards (NAAQS) for lead. The area designation for Puerto Rico are as follows: Nonattainment for a 4 km radius around The Battery Recycling Company Inc. (TBRCI), in the Municipality of Arecibo, and unclassified/attainment for the state. These designations was effective on December 31, 2011. 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 in order to achieve compliance as soon as practicable but no later than 5 years after the nonattainment designation (i.e. December 31, 2016).

With this plan, the Puerto Rico Environmental Quality Board (PREQB) will meet all requirements to demonstrate attainment with the 2008 lead NAAQS.

Ambient air monitoring in the designated nonattainment Arecibo area is used to demonstrate that the implementation of the control measures, at the existing sources keep lead emissions below the 2008 NAAQS for lead. This SIP revision is submitted according to the requirements established in Sections 172(b) and (c) of the (CAA).

III. Legal Authority

The Puerto Rico Environmental Public Policy Act (Law No. 416-2004, as amended) created the Puerto Rico Environmental Quality Board, herein after referred as the PREQB. By means of the after mentioned Act, PREQB has the legal authority to establish state-wide environmental policy through its rule making powers to functional operations which encompass among other duties, the actual implementation of the Puerto Rico Environmental Public Policy Act (PREPPA), the issuance of cease and desist orders, the power to hold quasijudicial hearings, and review and assessment of Government programs and activities, in light of the PREPPA.

The PREPPA confers to the PREQB all the legal authority to execute the SIP required by the Clean Air Act, as amended. The legal authority granted by the PREPPA is currently and immediately available to the PREQB which is directly responsible for the development and implementation of the SIP.

The CAA, section 110(a)(2)(E) requires the state to demonstrate its authority under state law to carry out the implementation of the SIP. The elements that demonstrate the state legal

authority are set forth here, followed in each case by references to local statutory sections under Title II of PREPPA.

1. *Authority to adopt emissions standards and limitations and any other measures necessary for attainment and maintenance of national (ambient air quality) standards. – [Sections 9.B.3.e., 9.B.5., and 9.B.13.]*
2. *Authority to enforce applicable laws, regulations, and standards, and seek injunctive relief. – [Sections 9.B.1.e., 9.B.5., and 9.B.13.]*
3. *Authority to abate pollutants emissions on an emergency basis to prevent substantial endangerment to the health of persons. – [Section 9.A.7.]*
4. *Authority to prevent constructions, modifications, or operation of any stationary source in any location where emissions from such source will prevent the attainment or maintenance of national ambient air quality standards (NAAQS). – [Sections 9.A.3., 9.B.13]*
5. *Authority to obtain information necessary to determine whether air pollution sources are in compliance with applicable law, regulations, and standards, including authority to require recordkeeping and to make inspections and conduct test of air pollution sources. – [Sections 9.A.4. and 9.A.10.]*
6. *Authority to require owners or operators of stationary sources to install, maintain, and use emission monitoring devices and to make periodic reports to the State on the nature and amounts of emissions from such stationary sources; also authority for the State to make such data available to the public as reported and as correlated with any applicable emissions standards or limitations. – [Sections 9.B.3. and 9.B.13.]*

The PREQB has promulgated rules implementing statutory authority to meet the requirements of both the CAA and PREPPA. These regulations are compiled on the Regulation for the Control of Atmospheric Pollution of July 26, 1995, as amended. The RCAP was developed to establish standards and requirements for the control of atmospheric pollution.

IV. Introduction and Background

Lead can be found in all parts of our environment – the air, the soil, the water, and even inside our homes. Lead can also be emitted into the environment from industrial sources and contaminated sites. The highest air concentrations of lead are usually found near lead smelters.

Lead is one of the six criteria air pollutants identified as being particularly harmful to humans and the environment. Exposure can cause a range of adverse health effects, most notably on children. This is why reducing levels of lead pollution is an important part of are EPA's commitment to a clean, healthy environment, and the reason why PREQB work together with EPA in order to attain that commitment.

Federal and state regulatory standards have helped to reduce or eliminate the amount of lead in air, drinking water, soil, consumer products, food, and occupational settings. In particular, NAAQS have been developed for six criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution and sulfur dioxide. The CAA requires EPA to set primary standards at a level judged to be a "requisite to protect the public health with an adequate margin of safety," and establish secondary standards that are a requisite 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.

On October 15, 2008, the EPA substantially strengthened the NAAQS for lead. The new standard of 0.15 micrograms per cubic meter ($\mu g/m^3$), measured as a rolling three-month average, is at least 10 times more stringent than the previous standard of 1.5$\mu g/m^3$ measured as a quarterly average and will improve health protection for at-risk groups, especially children. To provide increased protection against lead-related environmental and other welfare effects, the EPA adjusted the secondary lead NAAQS to be identical to the revised primary standard. The EPA determined that the pre-existing ambient lead monitoring network was inadequate for determining whether many areas were meeting the revised lead standards.

As part of the implementation of the new air monitoring requirements, in January 2010 a new source oriented Federal Reference Method (FRM) monitor was established at Arecibo, near (TBRCI). On June 2010, the new lead NAAQS were exceeded in accordance with the data captured by this new lead monitor.

The PREQB developed air dispersion models in order to analyze the fate and transport of lead as an air pollutant in the Arecibo Municipality. The preliminary modeling results indicated that the primary source causing the high lead concentration was TBRCI. The contribution of other lead emission sources in the area was insignificant. The refined modeling using only the lead emissions from TBRCI showed that the facility was the major contributor to the high monitoring concentration.

After discussion with EPA and the analysis of all the lead emission sources of lead that could impact the Arecibo Municipality, on June 2011 EPA designated a 4 kilometers radius around TBRCI as non- attainment for the lead rolling 3-month average NAAQS (see Figure #1) and all other areas of Puerto Rico as unclassified/attainment.

On October 10, 2012, a public hearing was conducted to adopt the Lead Infrastructure SIP Requirements of Clean Air Act Section 110(a)(2) for Puerto Rico. The infrastructure SIP was approved by the Governing Board through Resolution R-12-22-13 dated December 21, 2012 and submitted to EPA on February 27, 2013.

On December 27, 2010, EPA also established new criteria for siting ambient lead monitors and new data collection requirements, to better assess compliance with the 2008 Lead NAAQS (75 FR 81126).

Sections 110 (a)(1)(2) of the CAA, (hereafter referred to as the (SIP) requirements), compel states to submit an implementation plan to the EPA Administrator that provides and demonstrates their states ability to implement, maintain, and enforce each NAAQS. Section 110(a)(1) of the Clean Air Act addresses the timing requirement for the submissions of any SIP revisions. Section 110(a)(2) lists the required elements for a state needs to demonstrate its authority to implementing the plan. Several elements in 110(a)(2) specifically address the need for states to demonstrate the ability to implement, maintain, and enforce the air quality standards. These elements are compiled and submitted in what is referred as a SIP, but are not limited to: air quality monitoring, data analysis, and reporting; enforcement; resources; consultation; emergency procedures; and issues related to transport.

For areas designated nonattainment, states must develop a SIP that meets the requirements of the CAA. The requirements of section 191(a) of the CAA require a revised SIP with attainment demonstration within eighteen months after the effective date of a nonattainment area designation. Because the expanded lead monitoring network provided additional data for consideration, the EPA completed the lead designations in two rounds. In the first round, established on November 16, 2010, the EPA designated some areas as nonattainment based on data from the pre-2010 monitoring network. For all other areas, the EPA extended the deadline for designations by up to one year so that data from the newly deployed monitors could be considered in making appropriate designation decisions. In our case, PREQB shall comply with the second round time frame, in which the attainment SIPs were expected to be due June 30, 2013. Moreover, areas are required to attain the revised Lead standard as expeditiously and practicable possible but no later than 5 years from the date the nonattainment designation became effective. The attainment date for the second round is expected to be December 31, 2016.

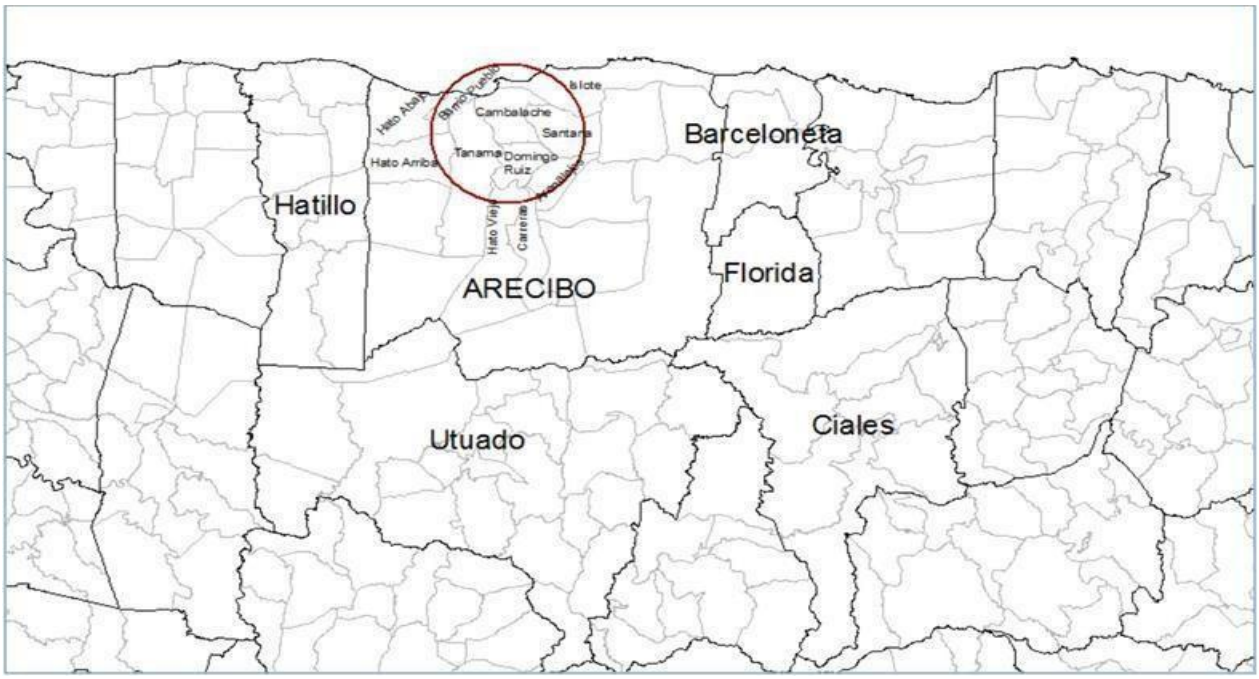

Figure #1: Arecibo Lead Impact Area

As part of this SIP to ensure attainment, PREQB prepared a new modeling plan for Arecibo that includes the facilities that emit lead in Arecibo such as Safetech Corporation and PREPA Cambalache using the year 2011 as on emission inventory baseline year. Because Energy Answers is planning to build a plant nearby TBRCI, their potential lead emissions were included in the attainment model. The air quality model is the AERMOD in atmospheric dispersion modeling systems which is currently EPA'S preferred model for air quality modeling studies.

On June 12, 2014 TBRCI notified to PREQB a temporary shutdown of its operations. On August 19, 2015 PREQB pulled out both Air Emission Construction Permit and Title V Operation Permit of TBRCI because the facility has failed to demonstrate capacity to comply with the applicable rules and regulation.

This SIP revision is submitted to provide and demonstrate that PREQB has ability to implement, maintain, and enforce each national ambient air quality standards in Puerto Rico, including the 2008 lead NAAQS.

LEAD AND HEALTH EFFECTS

The effects of lead are the same whether it enters the body through breathing or swallowing. The main target for lead toxicity is the nervous system, both in adults and children. Some tests that measure functions of the nervous system have established that long-term exposure

of adults to lead at work has resulted in decreased performance. Lead exposure may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle- aged and older people. Lead exposure may also cause anemia. At high levels of exposure, lead can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High-level exposure in men can damage the organs responsible for sperm production (ATSDR, 2007).

V. Enforceable Emission Limitations

Rules that include enforceable emission limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights), as well as schedules and timetables for compliance according to the requirements of CAA, section 110(a)(2)(A).

The PREQB 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. The following sections of the (RCAP) contain rules (Only a summary of such rules is presented in this section) relevant to these specific federal requirements:

Part I: General provisions
Rule 103 – Establish dispositions that allows the PREQB to require an air emission source to follow, as it seems necessary to control air pollutants:

- Installation, operation and maintenance of air monitoring equipment,
- Provide equipment appurtenances for sampling fuel and air emissions,
- Sample ambient air quality,
- Perform fuel analyses, establish and maintenance of records,
- Submit periodic reports,
- Provides PREQB representative right to entry any premise and access to records.

Rule 103 –Establish test methods to demonstrate compliance with the RCAP emission limitations.

Rule 107 – In case of air pollution episode this rule is designed to prevent the excessive buildup of air pollutants, thereby preventing the occurrence of an emergency.

Rule 108 – Provides the PREQB dispositions to required air pollution control equipment or control measures to reduce air pollutant emissions or demonstrate compliance of such control equipment with applicable rules and regulations.

Rule 113 – Provide the PREQB the necessary provisions to close a source that has been found not in compliance with the applicable rules and regulations

Part II: Approval and permits

Rules that establish permits requirements to construct and operate an air pollutant emission source in Puerto Rico.

Rule 201 – Establish requirements to conduct a location approval of a major source or major modification. Requirements include, but is not limited to the following:

- Air Quality review,
- Land use and planning,
- Effect on nearby ecological sensitive areas, and
- Review of emissions and NAAQS compliance demonstration.

Rule 202 – Establish PREQB requirements for the preparation of air quality impact analysis.

Rule 203 – Require air emissions sources to obtain a construction permit prior to start the construction of the source. The rule also requires that demonstration the source complies with all applicable rule and regulations prior to obtain a construction permit.

Rule 204 – Establish requirements to obtain an operation permit prior to the commence of operation of the source. As part of the permit application the source must demonstrate compliance with all applicable rules and regulations.

Rule 205 – Provides time table for compliance of air emission with new rules and regulations. Also provides dispositions to prepare compliance plans.

Part IV: Prohibitions

Rule 401 – Require sources to comply with applicable rules and regulations.

Rule 404 – Require any person to implement measures to prevent fugitive emissions from becoming airborne.

Part V: Fees

Rules that establish permit fees requirements, transfer of permit ownership dispositions. It also include excess emission fees and test fees.

Part VI: Operations Permits Rules for Title V Sources

Rules that establish provisions to obtain Title V operation permits. This part includes, but is not limited to the following:

- Describe permit application requirements,

- PREQB actions over a permit application,
- Title V permit content,
- Recordkeeping requirements
- Monitoring requirements
- Require compliance with applicable emission limitation requirements,
- Reporting requirements,
- Emission trading dispositions and
- Compliance requirements.

Any new and/or existing air emission source within the lead nonattainment area must obtain a permit to construct or permit to operate an emission source as required by Rules 203 and 204 of the RCAP, as applicable. The location or construction of any new major stationary source, or major modification or significant source of lead shall obtain a location approval from the Board prior to the construction of the source, in accordance with Rule 201 of RCAP. An ambient air quality impact analysis as part of the application for location approval (Rule 201 (D) of RCAP) is required for any proposed major source, major modification, or significant source of lead located in or significantly impacting a nonattainment area to demonstrate they do not cause or contribute significantly to air pollution violation of the 2008 lead NAAQS or exceed any other NAAQS. Also, such sources shall submit a Non-attainment New Source Review (NANSR) to PREQB or a Prevention of Significant Deterioration (PSD) permit application to EPA Region 2, since they are the permitting authority, respectively, for the after mentioned preconstruction permit programs.

For the location approval, paragraph 203(B) of the RCAP establishes the following:

(B) Standards for granting a permit to construct.

A permit to construct or modify a source shall be granted only if the applicant demonstrates the following to the satisfaction of the Board:
(1) The source shall be able to comply with all applicable rules and regulations. (2) In the case of a major stationary source, or major modification or significant source, the applicant must hold a valid location approval;
(3) In the event that the source will be affecting an emission offset, the owner or operator has:

(a) *surrendered any valid permit to construct or operate the source affecting the offset;*

(b) *propose a revision to a valid permit to construct, or proposed a compliance plan to achieve the required emission offset; and the Board has approved said revision or accepted such a compliance plan for said purpose, as part of a location approval.*

(4) *Air pollutant emissions from the source will be limited in accordance with applicable rules and regulations.*

(5) *Any agreement or certification intended to restrict the maximum capacity, the maximum annual hours of operation, an emission rate, or a percentage of sulfur content in fuels to a value lower than that allowed by applicable rules and regulations is legally binding prior to the issuance of the permit to construct and is included as an enforceable condition therein.*

(6) *That no adverse air quality impact would occur from the construction or operation of said source or modification, whenever: (a) The owner or operator of the proposed source or modification has subscribed to a legally binding document which stipulates the type or amount of materials to be burned or processed by such a source, or which limits the annual hours of operation; or (b) Such demonstration has been requested by the Board as part of the permit application.*

(7) *The requirements of this rule applicable to each major stationary source of PM10 shall also apply to each PM10 precursor for which the source is major, except that such requirements shall not apply where the EPA Administrator and the Board determines that such sources of PM10 precursors do not significantly contribute to PM10 levels which exceed the PM10 ambient standards.*

Where applicable rules and regulations are defined in the RCAP as:

All rules and regulations promulgated under the Environmental Public Policy Act (Law No.9, June 18, 1970, as amended) and the "Clean Air Act" for the control of atmospheric pollution, including but not limited to:

(1) All requirements established by these regulations or any other applicable laws or regulations of the Commonwealth of Puerto Rico;
(2) The "Standards of Performance of New Stationary Sources" (40 CFR Part 60);
(3) The "National Emission Standards for Hazardous Air Pollutants" (40 CFR Part 61);
(4) Any other requirements established by the government of the United States under the Clean Air Act as amended;
(5) Any other requirement established by the EQB to insure the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS).

On January 5, 2012 EPA published the revised the NESHAP for Secondary Lead Smelters (77FR556). The revised standard requires the implementation of new emission standards and require control for fugitive emissions. The compliance date for the new limit was January 6, 2014.

Control Measures

According to the dispersion model results, the major contributor to the lead NAAQS violations was TBRCI. On August 19, 2015 the Governing Board of PREQB denied

both Construction Permit and Title V Operation Permit of TBRCI as a control measure because this source failed to demonstrate its capacity to comply with all rules and regulations applicable to secondary lead smelters.

In addition, for any emission source the following control measures are required:

- *Rule 404: where no person shall cause or permit any materials to be handled, transported, or stored in a building, its appurtenances, or a road to be used, constructed altered, repaired, or demolished, without taking reasonable precautions to prevent particulate matter from becoming airborne including but not limited to:*
    - *Rule 404(A)(1): the use, as much as possible, of water or suitable chemicals for chemical stabilization and the control of dust in the demolition of a building or structures, construction operations, quarrying operations, the grading of roads, or the clearing of land;*
    - *Rule 404(A)(4): the covering , at all times when in motion, of open bodied trucks transporting materials likely to give rise to airborne dusts;*
    - *Rule 404(A)(3): the installation and use of hoods, fans. and fabric filters to enclose and vent dusty materials to control harmless fugitive emissions. Adequate containment methods shall also be employed during sandblasting or other similar operations;*
    - *Rule 404(A)(6): the paving of road ways and their maintenance in a clean condition.*
    - *Rule 404(B): where no person shall cause or permit the discharge of visible emissions of fugitive dust beyond the boundary line of the property on which the emissions originate.*
    - *Rule 404(C): where air pollutant escape from a building or equipment and cause a nuisance or violate any regulations, the Board may order that the building or equipment in which processing, handling, and storage are done, be tightly closed and /or ventilated so that all emissions from the building or equipment are controlled to remove or destroy such air pollutants before being discharged to the open air.*

- *Rule 404(E) where any new or modified source, the construction of which causes or may cause fugitive emissions, shall apply for a permit as required in Rule 203.*

VI. Reasonable Further Progress (RFP)

The CAA section 172(c)(2) requires nonattainment areas SIP to include reasonable further progress (RFP) provisions. As stated in EPA's final lead rule for the 2008 Lead NAAQS (73 FR 67039), effective January 12, 2009, RFP is satisfied by the strict adherence to an ambitious compliance schedule which is expected to periodically yield significant emission reductions or linear progress when appropriate. For TBRCI, the potential emissions in 2011 were 1.2 ton/yr. These potential emissions are the same for subsequent years until the end of year 2013. Nevertheless, RFP is no longer applicable because TBRCI, has ceased operations and the permits have been pulled out.

VII. Emission Sources Inventory

Lead is a naturally occurring metal found in small amounts in rock and soil. Lead has been used industrially in the production of gasoline, ceramic products, paints, metal alloys, batteries, and solder. In the past, automotive sources were the major contributors of lead emissions to the atmosphere. After leaded motor vehicle fuels were phased out in 1995, the contribution of air emissions of lead from the transportation sector, and particularly the automotive sector, greatly declined. Today, industrial processes, primarily metals processing, account for a large portion of lead emissions to the atmosphere and the highest levels of airborne lead are usually found near industrial operations that process materials containing lead, such as smelters (U.S. EPA, 2003).

Sources of lead from stationary sources are mainly from larger industrial sources including but not limited to, metals processing, particularly primary and secondary lead smelters. Lead can also be emitted from sources, industrial, commercial, and institutional boilers; waste incinerators; glass manufacturing; refineries, and cement manufacturing.

In order to evaluate the emissions in the Arecibo nonattainment area, and develop the strategy to achieve compliance with the NAAQS, the PREQB prepared the baseline emission inventory baseline based on emission during year 2011. The municipalities in the baseline emission inventory are: Arecibo, Barceloneta, Ciales, Florida, Hatillo and Utuado. (See Figure 2).

An emissions projection inventory with the lead emissions 2016 was used in the attainment modeling study. Potential lead emissions were used. The emissions projection inventory 2016 include the lead emissions of TBRCI and the background sources. Figure 2 shows the industries in the emissions projection inventory 2016. TBRCI has ceased operations and therefore no more lead process emissions will be released. The only lead emissions that are

present in TBRCI are from the slag piles, inside the main process building and outside, in the facility property. These emissions were modeled along with the lead emissions of the background sources.

Other facilities that emit lead in Arecibo are Safetech Corporation, ANJ Airport and PREPA Cambalache. Energy Answers is planning to build a waste to energy plant nearby.

Figure #2: Arecibo Lead SIP, Industry and Municipality Map

Two lead emission inventories were prepared, the 2011 Baseline Emission Inventory and the Emissions Projection Inventory 2016. The emissions projection inventory 2016 was used in the multi-source modeling scenario. See modeling protocol. Lead potential emissions or permit allowable rates were used in the emissions projection inventory. The emission inventory data are in the Appendix.

THE BATTERY RECYCLING COMPANY, INC.

This facility was located in Cambalache Ward, PR-2 km 72.2 in Arecibo, PR. During the time it was in operation, the facility was dedicated to the recycling of lead batteries for the production of lead of different specifications. TBRCI processed 145.21 tons per day of used lead batteries. Secondary lead was smelted at a rate of 83.04 tons per day. The furnaces product was placed in refining kettles to produce refined lead. TBRCI operation was 24 hour per day, 7 days per week for 12 months per year, or approximately 8,760 hours per year. Process

emissions from the kilns and each of the nine kettles were discharged to the atmosphere through two control devices. Emissions from the fuel combustion of the kilns were also discharged through the control device. The emissions from the fuel combustion at each of the nine kettles were discharged to the atmosphere through separate stacks. This facility was a minor source of emissions.

The Battery Recycling in Arecibo, PR had lead emissions over 0.5 tons/yr. In June 2010 a source oriented air quality monitor installed by PREQB near this industry, captured a lead concentration that exceeded the new standard of 0.15 ug/m^3. The area was declared as nonattainment for the new lead standard in 2011.

The projected emission inventory has all the control measures established in federally enforceable requirements. The control measures that PREQB required TBRCI were the enclosure of the main process building, use of sweepers and water sprinklers during the transport and movement of materials, a vehicle cleaning station and pavement of the roads inside the facility.

The potential emissions of lead were submitted by TBRCI as part of the source minor construction permit process and reviewed by the Air Toxics Division. In order to have more accurate coordinates for dispersion modeling, a site-visit along with PREQB geographic information system (GIS) personnel was conducted in order to take the coordinates and dimensions of the facility buildings and emission points. The construction permit was part of a strategy of the PREQB to implement control measures to achieve compliance with the Nonattainment Area of the National Ambient Air Quality Standards (NAAQs) for lead of Arecibo, as part of the Revision to the State Implementation Plan of Puerto Rico to control lead emissions.

TBRCI had three types of lead emission points the stack, the fugitive emissions from the main process building and the fugitive emissions due to the material handling and transport across the facility property.

TBRCI was also subject to the Secondary Lead Smelting NESHAP (40 CFR Part 63, Subpart X) and the NSPS for Secondary Lead Smelters (40 CFR Part 60, Subpart L).

On June 12, 2014 TBRCI notified to PREQB a temporary shutdown of its operations.

On December 4, 2014 and May 27, 2015 technical personnel from the Environmental Protection Agency (EPA) Region 2 and the PREQB Air Toxics Division visited TBRCI. During the visit, State and Federal officers found that TBRCI was not operating the lead smelter despite the fact that batteries are received in small quantities and resold to recycling

companies for export purposes. EPA and PREQB officers also found several violations of the standards established under the NESHAP and the NSPS.

On August 19, 2015 PREQB evaluated TBRCI's Air Emission Construction Permit and Title V Operation Permit application, and decided to deny both applications because the source did not demonstrate its capacity to comply with state and federal regulations applicable to Secondary Lead Smelters.

SAFETECH CORPORATION

Safetech Corporation is located at Lot #30, Santana Industrial Park, Arecibo, P.R. This facility is dedicated to the collection, temporary storage and disposal by incineration of commercial and industrial non-hazardous solid wastes.

Safetech Corporation installed and operates a thermal oxidizer Ducons Incinerator Model. The actual hourly oxidation rate is 1,000 pounds per hour, 24 hr/day, 6.46 day/week, approximate 4,032 tons/year of solid waste, type 0 and or 1. They are currently using propane as the auxiliary fuel at a rate of 21 gallons per hour. The fuel takes a maximum content of sulfur of 0.000167 per cent as a weight. The incinerator operates 8,064 hours per year.

PUERTO RICO ENERGY POWER AUTHORITY (PREPA) CAMBALACHE

PREPA Cambalache consists of three simple cycle diesel turbines with a capacity of 898 MMBtu/hr HHV and 847 MMBtu/hr LHV, each one. PREPA Cambalache operates at two levels: at base load (898 MMBtu/hr HHV and 847 MMBtu/hr LHV) and at spinning rapid reserve load (616 MMBtu/hr HHV and 581 MMBtu/hr LHV). Part of the generated heat is recovered from the production of steam that is injected to the turbines to control the nitrogen oxide emissions (NOx). The facilities include a system of unloading, transference and storage of diesel in three tanks of 4.2 million gallons, each one.

PREPA Cambalache is subject to the Regulations for the Control of Atmospheric Pollution, the New Source Performance Standards for Stationary Gas Turbines (40 CFR Part 60 Subpart GG) and the Prevention of Significant Deterioration of Air Quality Standards for NOx, SO_2 (sulfur dioxide), sulfuric acid mist (H_2SO_4), carbon monoxide (CO), particulate matter (PM), particulate matter with a diameter of 10 micrometers or less (PM_{10}) and volatile organic compounds (VOC). The applicable requirements specific to all emission units are included in Section V of the Title V permit.

PREPA-Cambalache is a major source for criteria pollutants because it has the potential to emit more than 100 tons/year of PM_{10}, SO_2, NO_x, CO and VOC. It is also a major source for hazardous air pollutants because it has the potential to emit more than 10 tons/year of nickel and formaldehyde and 25 ton/year of a combination of hazardous air pollutants.

ENERGY ANSWERS

On August 11, 2011, Energy Answers submitted a construction permit application and location approval to construct a municipal solid waste incinerator with energy recovery, also known as wastes to energy (WTE), at Bo. Cambalache, Road #2, km 72.8 Arecibo, PR. The proposed locations was the location of the former Global Fibers Paper facility. Energy Answers, proposed the installation of two boilers, which will use municipal solid waste (MSW) as primary fuel. In addition, the facility requested the capacity to use Automotive-Shredder Residue (ASR), Tire-Derived Fuel (TDF) and Processed Urban Wood Waste (PUWW) as supplementary fuel, according to the permit application. The main emission source will consist of two municipal waste combustion units.

Energy Answers prepared an air quality impact analysis as part of its location approval and construction permit applications (Rules 201 and 203 of RCAP). According to the permit application, the lead emissions from the source do not exceed the significant levels for modeling. However, given the lead sensitivity of the area, the PREQB required as part of the permit application that the facility to include the air quality impact of lead emissions from the WTE. The evaluation of the air quality impact indicate that the lead emissions from the proposed source do not have a significant air quality impact.

Energy Answers is subject to pre-construction requirements under the Prevention of Significant Deterioration (PSD), 40 CFR, Part 52.21. The EPA issue the final PSD permit on April 10, 2014. The PREQB construction permit includes the PSD permit conditions and all other applicable requirements and emission limits such as the Standards of Performance for Municipal Solid Waste Incinerators, 40 CFR Part 60 Subpart Eb; Standards of Performance for Electric Utility Steam Generating Units, 40 CFR Part 60, Subpart Da; Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, 40 CFR Part 60, Subpart IIII; and the National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines, 40 CFR Part 63, Subpart ZZZZ.

Appendixes A and B contain the 2011 Baseline emission inventory and the Emission Projections Inventory 2011-2016 for Arecibo Lead SIP.

VIII. Air Quality Monitoring, Compilation, Data Analysis, and Reporting

PREQB annually reviews the air monitoring network plan and make it available for public participation. After the public participation period, comments are reviewed and incorporated, if necessary and the final plan is submitted to EPA for final approval as required by 40 CFR, Part 58. This Air Monitoring Network Plan meets the requirements of 40 CFR 58.10(a) (1). The purpose of this plan is to provide for the establishment and maintenance of an air quality monitoring system in Puerto Rico that consists of a network of SLAMS sites.

The new standard rule requires a source oriented monitor in all areas where the lead emissions are equal or more than 0.5 tons/yr. As part of the new air quality standard for lead, PREQB operates two (2) lead (Pb) sites in the air-monitoring network for Arecibo. All Pb samplers are operated on a year-round basis and the measurements are sent quarterly to the EPA Air Quality System (AQS). The State and Local Air Monitoring Stations Pb sites use federal reference method monitors. The two sites located at Arecibo, PR are 72-013-0001, and 72-013-0002 (requested by EPA) and are used to demonstrate compliance with the 2008 lead NAAQS. Figure #3 shows the location of the monitors.

Figure #3: Lead monitors locations in Arecibo

Puerto Rico's legal authority to monitor ambient air quality is found in Law 416 for September 22, 2004, Article 9(A) Section (4), et seq.

IX. 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 PREQB Governing Board, prior to their construction in accordance with Rule 201 of RCAP. The Board shall notify the public of the location approval application. An application for location approval shall include information about alternative sites, size, production, processes, and environmental control techniques that demonstrate that benefits of the proposed source significantly outweigh the environmental and social costs imposed as a result of its location, construction, or modification. It shall also include an application for a permit to construct. The source shall submit a PSD application to the EPA, which is the permitting authority for the PSD Program in Puerto Rico. As part of a Memorandum of Understanding signed between PREQB and EPA, PREQB will not issue a construction permit for a major source if EPA has not made a PSD applicability determination and has not issue the PSD pre-construction permit. PSD permit conditions must be included as part of PREQB construction air permit. The source shall submit a NANSR to the PREQB.

The requirements for location approval are in this Rule 201. Rule 201 also requires that emission sources locating in or significantly impacting a nonattainment area have to be limited

by means of the lowest achievable emission rate (LAER) for the relevant criteria pollutant. For emissions sources located in attainment areas, air pollutants emissions from the new major source, major modification, or significant source have to be limited by means of the best available control technology (BACT).

X. Enforcement and Stationary Source Permits

The PREQB RCAP established rules governing the enforcement of control measures, including attainment plans and permitting programs that regulate construction and modification of stationary sources. Additionally, EPA Region 2 is responsible for the PSD permitting program that contains requirements for sources of air pollutants in Puerto Rico. The sources affected by PSD Program are subject to the Federal Implementation Plan PSD requirements in 40 CFR section 52.21. PREQB is responsible for the NANSR permitting program.

The following parts of the RCAP contain rules relevant for these federal requirements:

Part I: General Provisions

Rule103: Source Monitoring, Record Keeping, Reporting, Sampling and Testing Methods;
Rule 105: Malfunction;
Rule 106: Test Method;
Rule 107: Air Pollution Emergencies;
Rule 108: Air Pollution Control Equipment;
Rule 109: Notice of Violation;
Rule 111: Applications, Hearings, Public Notice;
Rule 112: Compliance Determination/Certification;
Rule 115: Punishment;
Rule 119: Derogation;

Part II: Approval and Permits

Rule 201: Location Approval;
Rule 202: Air Quality Impact Analysis;
Rule 203: Permit to Construct a Source;
Rule 204: Permit to Operate a
Source;
Rule 207: Continuing Responsibility for Compliance

Part IV: Prohibitions,
Part V: Fees

Rule 501: Permit Fees;
Rule 502: Excess Emissions Fees;
Rule 503: Test Fees;
Rule 504: Modification, and

Part VI: Operations Permits Rules for Title V Sources.

On March 23, 1990, the PREQB received the delegation of several NSPS and NESHAP standards. The delegation of the NSPS standards are codified in 40 CFR, Part 60 section 60.4(b)(FF)(1). The delegation of the NESHAP standards are codified under 40 CFR Part 61, section 61.04(b)(BBB). Full approval of the state operating programs required under Title V of the CAA and 40 CFR, Part 70, and the delegation of the promulgated Section 112[1] standards and programs was effective on March 27, 1996[2] (61 FR7073).

Enforcement is conducted at any stationary source affected by the PREPP[3], the RCAP and, once an enforcement action is initiated, the PREPPA authorizes PREQB to initiate and carry out until its resolution, any administrative or judicial action, to enforce the provisions of PREPPA or any regulation adopted[4].

PREQB conduct Full Compliance Evaluations (FCE) and/or a Partial Compliance Evaluations (PCE), inspections, investigations, and request for information (RFI) to determine compliance with the PREPPA, the CAA, the RCAP, and/or the permit conditions of any stationary emission source. The enforcement is conducted in accordance with the Enforcement Guidance for Air Emissions Sources.

TRBCI applied and obtained a Title V operating permit shield (PFE-TV-3341-07-1005-1692), which covers the operations of one furnace of 5 cubic meters (m^3) capacity and five refining kettles. This permit shield was issued on December 29, 2008. This facility has emission limitations in accordance with the MACT, NSPS and RCAP that are included in the original construction permit PFE-RA-07-0104-0018-I-II-C, issued on September 24, 2008.

PREQB issued a modification to the construction permit PFE-RA-07-0104-0018-I-II-C to include a new furnace with a capacity 10 cubic meters (m^3) and four additional refining kettles

[1] Include all standards under Part 63, and the Risk Management Program of Part 68 of 40 CFR.
[2] As promulgated in the Federal Register, Vol. 61, No 38; Monday, February 26, 1996.
[3] Law #416, from September 22, 2004.
[4] Article 9, paragraph 5 of PREPPA

for this kiln containing emissions limitation in accordance with the MACT, NSPS and RCAP. The modification was approved on October 8th 2013. The control measures include fugitive emission control using total enclosure of the process building, and stringent standards operating procedures for the control of fugitive dust (containing lead bearing material) according to MACT.

Nevertheless, on August 19 2015, PREQB pulled out both Air Emission Source Construction Permit and Title V Operation Permit of TBRCI because the facility has failed to demonstrate capacity to comply with the rules and regulation applicable.

XI. Interstate Transport

The PREQB hereby certifies that our emissions do not contribute to lead nonattainment in another state or interfere with maintenance of the NAAQS in another state. Puerto Rico is not located within the continental United States. There are no adjacent or nearby states or territories which have lead nonattainment areas. In addition, the physical properties of Pb prevent Pb emissions from experiencing the same travel or formation phenomena as $PM_{2.5}$ or ozone. More specifically, there is a sharp decrease in Pb concentrations, at least in the coarse fraction, as the distance from Pb source increases.

XII. Stationary Source Emissions Monitoring and Reporting

In general, the monitoring and reporting requirements for stationary sources depends on applicable federal standards including General Provisions in existing NSPS and amended MACT and on the RCAP, as amended.

Rule 103 of the RCAP provides the authority to require monitoring for air pollutants as part of its emission sources permit program. Certain emission sources are required to submit annual emission inventories and periodic reporting of emissions, providing data that is used in air quality modeling to help the PREQB prepare its SIP revisions. Emissions data are available at reasonable times for public review.

PREQB may require the owner or operator of any source to install, operate, and maintain monitoring equipment; provide the necessary equipment and appurtenances for the sampling of fuels and emissions; sample ambient air quality; perform fuel analyses; establish and maintain records required to demonstrate compliance; and prepare periodic reports as the PREQB shall deem necessary. In order to demonstrate compliance with air emission limits, the PREQB may, at a minimum, require the owner or operator of the source, at his own expense, to sample emissions from each stack or provide an equivalent alternative method, to monitor air emissions discharged to the atmosphere.

The following parts of the RCAP contain rules relevant to these federal requirements:

Part I: General Provisions

Rule103: Source Monitoring, record keeping, reporting, sampling and testing Methods
Rule 104: Emission data Available for Public Participation
Rule 106: Test Methods
Rule 108: Air Pollution Control Equipment
Rule 109: Notice of Violation
Rule 111: Applications, Hearings, Public Notice
Rule 112: Compliance Determination/Certification

Part II: Approval and Permits

Rule 201: Location Approval
Rule 202: Air Limits Impact Analysis
Rule 203: Permit to Construct a Source

TBRCI was required by the Secondary Lead MACT to measure process emissions using yearly performance test (to determine lead compounds emission limitation), process fugitive emission sources by ensuring differential pressure in the process building, and fugitive dust emissions according to standard operating procedures manual, which includes measures to control dust sources. All monitoring data shall be included as part of the required yearly performance test report, the annual compliance certification, and periodic reporting required by applicable reporting requirements. The facility shall retain records of all required monitoring data and support information for a period of 5 years from the date of the monitoring sample, measurement, report, or application. TBRCI shall retain at the facility, the copies of all the records of required monitoring information including the following: the date, place as defined in the permit, and time of sampling or measurements; the date(s) analyses were performed; the company or entity that performed the analyses; the analytical techniques or methods used; the results of such analyses; and the operating conditions as existing at the time of sampling or measurement.

XIII. Contingency Measures

Section 172(c)(9) of CAA requires that state implementation plans include specific contingency measures to be undertaken if the area fails to make reasonable further progress or to attain the 2008 lead NAAQS by the attainment date of December 31, 2016.

Upon determination by EPA that the area has failed to achieve, or maintain RFP, or attain the lead NAAQS by the statutory attainment date, these contingency measures will take effect without further action by the State or the Administrator. The EPA interprets this provision to allow states to meet this requirement with control measures that have already been implemented but are not needed for attainment, and to allow for "minimal action" to be necessary prior to implementation of the measures see (73 FR 66964, at 67039). It should also contain trigger mechanisms with a specific schedule for implementation. The amount of reductions yielded by implementation of contingency measures should be quantified, and for a five-year plan, the measures should reduce emissions by 20 percent of the total amount needed for attainment. Under certain circumstances, this amount may be derived by reference to reductions in ambient air concentrations (2008 lead NAAQS Implementation Q&A, July 8, 2011, EPA).

Contingency is to help pinpoint the source of the errant fugitive emissions leading to a NAAQS exceedance and implement the most effective remedy available in the future as close as possible to the time the exceedance event occurs. PREQB asserts that a comprehensive evaluation of all known lead emissions sources has already been accomplished and that RACT (or greater) levels of controls have been implemented in the control measures section of this document.

However, any ongoing exceedances of the NAAQS (triggering this contingency measure) would indicate that another evaluation of measures to reduce fugitive emissions would be needed. This contingency will allow the most effective control strategies to be identified in light of the new conditions created after the implementation of all required controls as part of the future attainment demonstration.

PREQB will coordinate with EPA to verify the validity of the data, evaluate whether the data should be excluded based on an exceptional event and analyze available data regarding the air quality, meteorology, and related activities in the area to determine the cause of the exceedance.

Exceedance of NAAQS.

If any single sample result at a monitor in the Arecibo Nonattainment Area is reported to exceed 0.15 µg/m3, Air Quality Area will inform enforcement within five working days of receiving the report. Within five working days of being notified of an exceedance of the lead NAAQS by Air, the enforcement would investigate to determine what specific activities in the nonattainment area on or about the date of the exceedance could have caused the increased concentration level. If the source of the exceedance is shown to be from the fugitive pile(s) emissions of TBRCI, as required by Rule 404(A)(7), TBRCI and/or the owner of the property

will promptly conduct a complete removal of all lead containing earth/material from the following sources:

All facility processes;

All sources within the boundaries of TBRCI property; and,

All paved streets onto which earth or other material has been transported by trucking or earth moving equipment, by erosion by water, or by other means.

This concentration criterion was chosen because the only continuing significant stationary source of lead emissions in the nonattainment area (TBRCI) is no longer in operation. The PREQB does not expect that there will be a significant stationary source of lead emissions operating at the site in the future. Therefore, a single sample result above 0.15 µg/m3 would be unusual.

- In addition, if during any 3-month rolling period, two samples at the same monitor in the Arecibo Nonattainment Area are reported to exceed 0.15 µg/m3, along with the activities above, PREQB will double the sampling frequency at that monitor to once every three days.

- In addition, if during any 3-month rolling period, three samples at the same monitor in the Arecibo Nonattainment Area are reported to exceed 0.15 µg/m3, along with the activities above, PREQB will conduct daily sampling at that monitor for a period of 30 days.

Although contingency measures are also required to be implemented if an RFP milestone is missed, RFP is no longer applicable because the owner of the only lead source in the area that emitted more than 0.5 tons per year of lead, TBRCI, has ceased lead smelting and battery cracking operations.

The emission inventory and dispersion models results submitted in the past identify TBRCI as the facility responsible for the violations to the NAAQS. Other facilities in the inventory has insignificant impact. Therefore a source specific contingency plan is required. Article 9(a)(7) of PREPPA provides 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.

Also, PREQB 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 Board will order persons causing or contributing to the atmospheric pollution to

reduce their emissions in order to eliminate such condition, or to immediately discontinue the emission of pollutants. In addition, the PREQB also maintains air pollution information in a form readily available to the public on the PREQB Website (www.jca.pr.gov).

The following parts of RCAP contain rules relevant for this federal notification requirement under air emergencies:

Part I: General Provisions

Rule 107: Air Pollution Emergencies.

XIV. Air Quality Modeling and Reporting

PREQB has the authority to perform air modeling analyses to demonstrate attainment and to meet the NAAQS as required under the CAA. Air quality modeling data is submitted as part of Puerto Rico's relevant SIP submissions and through federal grant commitments. PREQB have the technical and human resources to conduct air quality modeling in order to assess the effect on ambient air quality of relevant pollutants emissions, and can provide relevant data as part of the permitting and NAAQS implementation process. PREQB already prepared the air quality modeling for the lead designation for Puerto Rico. This modeling was approved by the EPA's modeling personnel.

In January of 2010 a new source oriented lead air quality monitor was establish at Arecibo PR as part of the new air quality standard for lead of 0.15µg/m^3. According with the data capture by this new lead monitor on June of 2010, the new NAAQS was exceeded. On June of 2011, EPA designated the Arecibo area as non-attainment for the lead rolling 3-month average NAAQS.

The preliminary modeling results indicated that the primary source causing the high lead concentration was TBRCI. The contribution of other lead emission sources in the area was insignificant. The multi-source modeling showed that TBRCI had the major contribution to the high monitoring concentration.

Since part of this SIP to ensure attainment, PREQB prepared a multi-source modeling plan for Arecibo PR that includes the facilities that emit lead in the area such as TBRCI, PREPA Cambalache and other background sources included in the emission projections inventory 2016. Also, because Energy Answers is planning to build a waste to energy plant nearby Battery Recycling and their potential lead emissions were included in the attainment model. The air quality model is AERMOD and this is the current preferred EPA model for air quality modeling studies.

Since TBRCI ceased operations and both construction permit and Title V operation permit were pulled out, the 2016 emission projections inventory did not include their process emissions. For this reason, the 2016 projection for TBRCI only includes the fugitive emission of the remaining slag piles.

XV. Major Stationary Source Permitting Fees

The PREQB assesses annual fees that are sufficient to cover the Puerto Rico major source permit program costs. The PREQB shall ensure that any fee required by this chapter will be used solely for permit program costs. When a source applies for a modification, administrative change or minor modification to the Title V permit, the source will pay per tonnage. The Governing Board of PREQB has issued several Resolutions (R-97-47-1; R-0313-23; RI-06-02; R-06-17-8) that provides for the annual payment of actual emissions based on a fixed rate by tonnage.

The following parts of the RCAP contain rules relevant for these federal requirements: Part VI: Operations Permits Rules for Title V Sources, Rule 610: Fee Determination and Certification. This Part VI of the RCAP was approved by EPA on February 26, 1996 (62 FR7073).

XVI. References

Clean Air Act, State implementation plans for national primary and secondary ambient air quality standards, Title 42, Chapter 85, Subchapter I, Part A, section 7410.

Puerto Rico Environmental Public Policy Act, Law 416, September 22, 2004.

Regulation for the Control of Atmospheric Pollution, Environmental Quality Board, July 26, 1995.

Clean Air Act Final Full Approval of Operating Permits Program: The Commonwealth of Puerto Rico, Environmental Protection Agency (EPA), February 26, 1996, and 62FR7073.

U.S. EPA. 2003. National air quality and emissions trends report—2003 special studies edition. EPA/454/R-03/005. Research Triangle Park, NC. http://www.epa.gov/air/airtrends/aqtrnd03/

Guidance for the Infrastructure State Implementation Plan (SIP) Elements Required Under Section 110(a)(1) and 110(a)(2) for the 2008 lead (Pb) National Ambient Air Quality Standard (NAAQS). U.S. EPA, October 14, 2011.

Toxicological Profile for Lead. Agency for Toxic Substances and Disease Registry (ATSDR), August 2007

Memorandum 2008 Lead (Pb) National Ambient Air Quality Standards (NAAQS) Implementation Questions and Answers. EPA. July 8, 2011.

XVII. APPENDIX

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XVIII. APPENDIX A: 2011 Baseline Emission Inventory for Arecibo Lead SIP

BASELINE EMISSION INVENTORY 2011 FOR ARECIBO LEAD SIP

The Appendix A presents the Baseline Emission Inventory 2011 (BEI2011) for the Arecibo Lead SIP. In June 2010, a source oriented air quality monitor, capture a lead concentration over the new standard of 0.15 ug/m^3. The PREQB Air Quality Area created a group to attend the permits, emissions controls measures and prepare the revision to the State Implementation Plan of the non-attainment area according to the new lead standard.

The BEI2011 includes potential and annual actual lead emissions of the facilities in Arecibo, Barceloneta, Ciales, Florida, Hatillo and Utuado municipalities. The 2011 actual annual emissions were calculated using the industry Rule 410 reports. In the case that Rule 410 reports were not available, the unit maximum capacity or permit limit was used to calculate the emissions. The potential emissions were calculated using the maximum capacity or the permit limit. The BEI2011 also includes lead emissions from area, nonroad and onroad sources. These emissions were submitted by EPA. The industries included in the BEI2011 are presented in the Table A1.

The emission factors used in the BEI2011 were from AP-42 and from the facility permits. Emission factors, calculating data and references used for the emissions calculation is provided in the Appendix A-1. The ANJ airport emissions are from EPA EIS/NEI System. The Battery Recycling lead emissions and the data used for calculating it was submitted by the industry and reviewed by the PREQB Permit Division. Figure A1 shows the map of the BEI2011 facilities.

Table A1: Arecibo Lead SIP, Facilities in the Baseline Emission Inventory 2011

Industry	Municipality	Classification	Potential Lead Emissions Tons/yr	Actual Lead Emissions Tons/yr
PREPA Cambalache	Arecibo	Title V	0.17	0.011
Battery Recycling	Arecibo	Title V	1.21	-
Safetech Corporation	Arecibo	Title V	0.009	0.009
Eaton	Arecibo	Synthetic Minor	0.0075	6.20e-5
ANJ Airport	Arecibo	-	-	0.00364
Abbott	Barceloneta	Title V	0.012	0.0088
Pfizer Pharmaceuticals LLC	Barceloneta	Synthetic Minor	0.0035	0.001
Merck Sharp & Dohme	Barceloneta	Title V	0.018	0.00037
Total	-	-	**1.43**	**0.03387**

Figure A1: 2011 Baseline Emission Inventory Facilities, Arecibo Lead SIP

The following tables present the BEI2011 data. Table A2 has the facilities and their potential and actual lead emissions. The Table A 3 present the lead emissions for area, onroad and nonroad emissions sources, provided by EPA. The emissions calculation procedure for the facility emission inventory and related data is presented in the Appendix A-1.

Table A2: Baseline Emission Inventory 2011 for Arecibo Lead SIP

BASELINE EMISSION INVENTORY 2011 FOR ARECIBO LEAD SIP

Abbott Laboratories

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)		Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
						East	North			Allowable	Actual				
Boiler 101	Road 2, Km 59, Barceloneta/PO BOX 278 BARCELONETA, PR 00617	Barceloneta	325412	10200501		756337	2039233	-	-	0.000758	0.00022	60.3504	0.762	11.31722	415.3722
Boiler 102				10200501	EU8-P2	756337	2039233	-	-	0.000758	0.00093	60.3504	0.762	11.31722	415.3722
Cogeneration Unit				10100401	EU9-P1	756885	2039967	-	-	0.007517	0.006538	53.34	1.8288	24.9936	449.8167
Boiler 1				10200501						0.000855	6.46E-05				
				10200401	EU11-P2	756993	2039914	-	-	0.000209	0.000968	24.384	0.9144	10.0584	433.15
				10100501						0.000855	0.000138				
Boiler 4				10200401	EU11-P2	756993	2039914	-	-	0.000209	0	24.384	0.9144	13.42034	425.3722
				10100501						0.000855	0				
Boiler 6				10200401	EU11-P3	756999	2039878	-	-	0.000209	0	24.384	0.762	16.48663	416.4833
									Total	0.012	0.0088				

Merck Sharp & Dohme, Puerto Rico Branch

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)		Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
						East	North			Allowable	Actual				
Boiler A, Serial: 02968	ROAD 2 KM 56.7 BARCELONETA PO BOX 601 BARCELONETA	Barceloneta	325412	10200401	EP-BOILER 1	759030	2039239	-	-	0.001029	0.000199	27.5	0.91	16.2	450
				10100501						-					
Boiler B, Serial: 06256				10200401	EP-BOILER 1	759030	2039239	-	-	0.001029		27.5	0.91	16.2	450
				10100501						-					
Boiler C, Serial: 04043				10200401	EP-BOILER 2	759029	2039229	-	-	0.001029		27.5	0.91	16.2	450
				10100501						-	0.000168				
Boiler Cleaver Brook CB				10200401	EP-BOILER 2	759029	2039229	-	-	0.000476		27.432	1.2192	22.86	449.8167
Co-Generation Turbine, Serial: 83306				10100501											
				10100501	COGEN 1	759007	2039228	-	-	0.011287	1.14E-05	22.9	1.22	19.8	470
Rotary Kiln Incinerator				50300113				Wet & Collision Scrubber	99	0.00069		27.5	0.91	9.2	390
				50300113						0.002135					
				50300113	EP-RKI 1	759402	2039008			0.000281					
Solvent Incinerator				50300113	EP-SOLV 1	759126	2039002	Caustic Wet Scrubber	-	0.000195		14.48	0.36	12.29	361
Thermal Oxidation Units (2)				10100501	TOU	759129	2039148	Scrubber	95	0.000532		6.096	0.4064	18.288	1255.372
									Total	0.018	0.00037				

Pfizer Pharmaceuticals LLC (Barceloneta)

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)		Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
						East	North			Allowable	Actual				
HRSG Cogeneration Unit (CU01)	Road 140, Km 64.4, Barceloneta/PO BOX 11247 BARCELONETA, PR 00617	Barceloneta	325412	10100501	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183		57.912	1.0668	7.9248	422.0389
5 Electric Generation Engines				20200102	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183	0.001045	57.912	0.762	15.5448	422.0389
Package Boiler (CU02)				10100501	PT02	756618	2039949	-	-	0.001183	0	57.912	1.0668	7.9248	422.0389
									Total	0.0035	0.00105				

PREPA Cambalache

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)		Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
						East	North			Allowable	Actual				
Gas Turbine 1	Road 681, Km 0.5, Arecibo/PO BOX 364267 SAN JUAN, PR 00936-4267	Arecibo	221112	20100101	1s	742887	2043963	-	-	0.055065	0.001753	30.48	4.7	34.4	654
Gas Turbine 2				20100101	2s	742907	2043974	-	-	0.055065	0.006938	30.48	4.7	34.4	654
Gas Turbine 3				20100101	3s	742917	2043994	-	-	0.055065	0.003103	30.48	4.7	34.4	654
									Total	0.17	0.011				

Table A2: Baseline Emission Inventory 2011 for Arecibo Lead SIP (Continued)

BASELINE EMISSION INVENTORY 2011 FOR ARECIBO LEAD SIP

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Exit Temperature (K)
Battery Recycling															
Lead Smelting Furnace, 5.0 m^3 (EU-1)	Road 2, Km 72.2, Cambalache Ward/PO BOX 1016 Arecibo, PR 00613-1016	Arecibo	331419	30301002	EP-1	743546	2042005	Baghouse	99.5	0.59	-	20.6	1.58115	9.38	351.8
5 Molten Lead Refining Kettles Burners (EU2-6)				30400426	EP2-6	743541	2041976	-	-	0.35	-	-	-	-	-
Main Building Fugitive Emissions					1	743386	2042067	Water Sprinklers, Sweeper Machine	30	0.27	-	-	-	-	-
Material Transport and Handling					2				Total	1.21	-				
Eaton (Cutler-Hammer Electrical Company)															
Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Exit Temperature (K)
Boiler 1	PO Box 709 Arecibo, PR 00613-0709/Road 2, Km 67.6, Santana Industrial Park, Arecibo	Arecibo	335311	10300501	Eaton1	746475	2041401	-	-	0.000376	4.3E-05	11.3824	0.4572	14.6304	802.5944
Boiler 2				10300501	Eaton2	746475	2041401	-	-	0.000376	2.0E-05	11.3824	0.4572	14.6304	802.5944
									Total	0.00075	6.20E-05				
Safetech Corporation															
Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Exit Temperature (K)
Ducon Incinerator, HC96-10P Model Two Chambers	PO Box 140909 Arecibo, PR 00634/Lote 30, Santana Industrial Park, Arecibo	Arecibo	562211	50100103	Ducon	746938	2042285	Wet Scrubber	98	0.009	0.009	27.4	1.2	29.6	1276
									Total	0.009	0.009				
Antonio Nery Juarbe Airport															
Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Exit Temperature (K)
Airport	1079 Santana Arecibo, PR 00612-6614	Arecibo	48811	ANJ	783844	2041395	-	-	-	-	0.00364	-	-	-	-
									Total	-	0.00364				

Table A3: 2011 Baseline Emission Inventory for the Arecibo SIP. Lead Emissions for Area Sources.

Area Source	SCC	Emissions (ton/yr)
Human Cremation	2810060100	0.00012

[a]Emissions provided by EPA.

XIX. APPENDIX A-1: Facility Emission Calculations for Baseline Emission Inventory

FACILITY LEAD EMISSIONS CALCULATIONS

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Abbott

SCC: 10200501

Unit: Boiler 101

Model Id: EU 8 - P2

Emission Factor Reference: AP-42, Chapter 1.3, Tables 1.3-10 & 1.3-11
Fuel oil Heat Content from emission Permit

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2011 = NO.2	5933200 Btu/hr	x 9 lb/10^{12} Btu	x 7416 hrs/yr / 2000 lb/ton	x (1 − 0.0) = $1.98e^{-4}$ tn/yr
Kerosene	92.46 gal/hr	x $1.51e^{-3}$ lb/1000 gal	x 456 hrs/yr / 2000 lb/ton	x (1 − 0) = $3.18e^{-5}$ tn/yr

Comments:
fuel oil NO 2 = 140,000 Btu/gal , Ef = 9 lb/10^{12} Btu
Kerosene = $1.51e^{-3}$ lb/1000 gal
2011 actual fuel NO.2 = 42.38 gal/hr , 7416 hrs/yr
2011 actual fuel Kerosene = 92.46 gal/hr , 456 hrs/yr

= 42.38 gal/hr x 140,000 Btu/gal = 5933200 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Cabot

SCC: 10200501

Unit: Boiler 102

Model Id: EU8-P1

Emission Factor Reference: AP-42, Chapter 1.3, Tables 1.3-10 & 1.3-11
Fuel oil Heat content form our emission permit.

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2011 = ^{NO2}	5560800 Btu/hr	X 9 lb/10^{12} Btu	X 4872 hrs/yr / 2000 lb/ton	X (1 − 0.0) = 1.22e-4 ton/yr
Kerosene	196.12 gal/hr	X 1.51e-3 lb/1000 gal	X 5472 hrs/yr / 2000 lb/ton	X (1−0) = 8.1e-4 ton/yr

Comments:
Fuel oil NO2 = 140,000 Btu/gal, Ef = 9 lb/10^{12} Btu
Kerosene ⇒ Ef = 1.51e-3 lb/1000 gal
2011 NO.2 Actual rate = 39.72 gal/hr, 4872 hrs/yr
2011 Kerosene actual rate = 196.12 gal/hr, 5472 hrs/yr

39.72 gal/hr x 140,000 Btu/gal = 5560800 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Abbott

SCC: 10100401

Unit: Cogeneration Unit

Model Id: EU9-P1

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-11

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2011 =	1005.29 gal/hr	x 1.51e-3 lb / 1000 gal	x 8640 hrs/yr / 2000 lb/ton	x (1 − 0.0) = 6.5e-3 ton/yr

Comments:
NO.6 Ef = 1.51 e−3 lb/1000 gal
2011 NO.6 Actual rate = 1005.29 gal/hr, 8640 hrs/yr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Abbott

SCC: 10200501, 10200401

Unit: Boiler 1

Model Id: EU10-P1

Emission Factor Reference: AP-42, chapter 1.3 Tables 1.3-10 & 1.3-11
fuel oil Heat content from air emission permit.

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2011 NO.2 =	2524200 Btu/hr	x 91b/10^{12} Btu	x 5088 hrs/yr / 2000 lb/ton	x (1 − 0.0) = $6.46e^{-5}$ ton/yr
NO.6	168.57 gal/hr x $1.51e^{-3}$ lb/1000 gal	x 7608 hrs/yr / 2000 lb/ton		x (1-0) = $9.68e^{-4}$ ton/yr

Comments:
NO6 Ef = $1.51e^{-3}$ lb/1000 gal
NO.2 = 140,000 Btu/gal, Ef = 91b/10^{12} Btu
2011 actual NO.6 rate = 168.57 gal/hr > 7608 hrs/yr
2011 actual NO.2 rate = 18.03 gal/hr, 5088 hrs/yr
= 18.03 gal/hr x 140,000 Btu/gal = 2524200 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: MERCK

SCC: 10100501

Unit: Boiler C

Model Id: EP-Boiler 2

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10 Heat Content from an emission permit.

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2011 =	470 8800 Btu/hr	x 9 lb/10^{12} Btu	x 7944 hrs/yr x 2000 lb/ton	(1 − 0.0) =

$1.68e^{-4}$ ton/yr = e^{-4} ton/yr

Comments:
Kerosene EF = 9 lb/10^{12} Btu, 135,000 Btu/gal
2011 actual fuel rate = 34.88 gal/hr, 7944 hrs/yr
= 34.88 gal/hr x 135,000 Btu/gal
= 470 8800 Btu/hr

Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Eaton

SCC: 10300501

Unit: Boilers 1 & 2

Model Id: EATON 1 , EATON 2

Emission Factor Reference: ~~AP-42~~, chapter 1.3, table 1.3-10, fuel oil Heat content from any emission permit.

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2011 = EATON1	144500 Btu/hr	x 9 lb/10^{12} Btu	x 6552 hrs/yr / 2000 lb/ton	x (1 − 0.0) = $4.2e^{-5}$ ton/yr
EATON2	159300 Btu/hr	x 9 lb/10^{12} Btu	x 2712 hrs/yr / 2000 lb/ton	x (1−0) = 1.195 ton/yr

Comments:

2011 No.2 fuel Rate EATON 1 = 10.1 gal/hr, 6552 hrs/yr
2011 No.2 fuel Rate EATON 2 = 11.8 gal/hr, 2712 hrs/yr
No 2 = 135,000 Btu/gal, Ef = 9 lb/10^{12} Btu

EATON1 = 10.1 gal/hr x 135,000 Btu/gal = 1444500 Btu/hr

EATON2 = 11.8 gal/hr x 135,000 Btu/gal = 1593000 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Safetech

SCC: 5 0 1 0 0 1 0 3

Unit: Ducon Incinerator

Model Id: Ducon

Emission Factor Reference: AP-42, Chapter 2.1, Table 2.1-8

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
2011 =	0.5 tons/hr	X	2.01 e^{-1} lb/ton	X	8604 hrs/yr / 2000 lb/ton	X	(1 – 0.98 = 0.009 tons/yr

Comments:

Ef = 2.01e-1 lb/ton
Raw Natural = 0.5 tons/hr
hrs/yr 8604

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Abbott

SCC: 10200501

Unit: Boiler 101 & Boiler 102

Model Id: EU 8-82

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, Fuel oil heat Content from our emission permit.

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
Potential Emissions 2011 =	19 222000 Btu/hr	X	9 lb/10^{12} Btu	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) = 7.5 e-4 ton/yr

Comments:
NO.2 fuel Rate - 137.3 gal/hr, 140,000 Btu/gal, Ef = 9 lb/10^{12} Btu,
8760 hrs/yr
= 137.3 gal/hr × 140,000 Btu/gal = 19 22000 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Abbott

SCC: 10200501, 10200401

Unit: Boils 1, 4, 6

Model Id: EU-10-P1, EU11-P2, EU11-P3

Emission Factor Reference: AP-42, Chapter 1.3, Tables 1.3-10, 1.3-11
fuel oil Heat content from cw emission permit

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
Potential Emission 2011 = NO.2	21700000 Btu/hr	X 9 lb/10^{12} Btu	X 8760 hrs/yr / 2000 lb/ton	X (1 − 0.0) = $8.5e^{-4}$ ton/yr
NO.6	31.6 gal/hr	× 1.51e^{-3} lb/1000 gal	× 8760 hrs/yr / 2000 lb/ton	× (1−0) = $2.0e^{-4}$ ton/yr

Comments:

2011 Potential Fuel Rate NO.6 = 31.6 gal/hr, NO.2 = 155 gal/hr
Ef NO.6 = 1.51 e^{-3}
Ef NO.2 = 9 lb/10^{12} Btu, 140000 Btu/gal } 8760 hr/yr

= 155 gal/hr × 140,000 gal/hr = 21700000 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Merck

SCC: 10200401

Unit: Boiler A, B, C

Model Id: EP-BOILER 1, EP-BOILER 2

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-11

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
Potential Emissions 2011 =	155.5 gal/hr	X	$1.51e^{-3}$ lb / 1000 gal	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) = $1.02e^{-3}$ ton/yr

Comments:
2011 fuel Rate NO.6 = 155.5 gal/hr, EF = $1.51e^{-3}$ lb/1000gal)
8760 hrs/yr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: MERCK

SCC: 10100501

Unit: Cogeneration Unit

Model Id: EP_COGEN

Emission Factor Reference: Air Permit

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
Potential Emissions 2011 =	330 gal/hr	X	$7.8e^{-3}$ lb / 1000 gal	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) = 0.011 ton/yr

Comments:
2011 Kerosene Rate = 330 gal/hr, 8760 hrs/yr
Ef = $7.80\ e^{-3}$ lb/1000 gal

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: MERCK

SCC: 50300113

Unit: Rotary Kiln Incinerator

Model Id: EP-RKI1

Emission Factor Reference: Our Permit

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
Potential Emission				
2011 = SW	2.5 ton/hr	X 0.000063 lb/ton	X 8760 hrs/yr / 2000 lb/ton	(1 − 0.0) = 6.8 e-4 ton/yr
LW	0.375 ton/hr	0.0013 lb/ton	8760 hrs/yr / 2000 lb/ton	× (1-0) = 2.1 e-3 ton/yr
Kerosene	53.4 gal/hr	0.0012 lb/1000 gal	8760 hrs/yr / 2000 lb/ton	× (1-0) = 2.8 e-4 ton/yr

Comments:
Solid Waste – 2.5 ton/hr, Ef = 0.000063 lb/ton
Liquid Waste – 0.375 ton/hr, Ef = 0.0013 lb/ton
Kerosene – 53.40 gal/hr, Ef = 0.0012 lb/1000 gal
} 8760 hrs/yr

= 89.5 gal/hr × 135,000 [illegible]/gal = [illegible]

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: MERCK

SCC: 50300113

Unit: Solvent Incinerator

Model Id: EP-SOLV 1

Emission Factor Reference: Our Permit

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
Potential Emissions 2011 =	37.03 gal/hr	X	0.0012 lb / 1000 gal	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) = 1.9e-4 ton/yr

Comments:
2011 Kerosene fuel Rate = 37.03 gal/hr
Ef = 0.0012 lb/1000 gal ; 8760 hrs/yr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Pfizer

SCC: 10100501

Unit: Cogeneration, 5 Electric Generating Turbine, Package Boiler

Model Id: PT01, PT02

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, Fuel Oil Heat Content from an emission permit.

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency	
Potential Emissions								
2011 =	30013200 Btu/hr	X	9 lb / 10^{12} Btu	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.5) =	$1.18e^{-3}$ ton/yr

Comments:

2011 No. 2 Fuel usage = 214.38 gal/hr (Ef = 9 lb/10^{12} Btu, 140,000 Btu/gal, 8760 hrs/yr

= 214.38 gal/hr × 140,000 Btu/gal = 30013200 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: PREPA CAMBALACHE

SCC: 20 100 101

Unit: Gas Turbine 1, 2, 3

Model Id: 1S, 2S, 3S

Emission Factor Reference: AP-42, Chapter 3.1, Table 3.1-2a

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency	
Potential Emissions 2011 =	898 MMBtu / hr	X	1.4e-5 lb / MMBtu	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) =	0.055 tpy

Comments:
Gas Turbine = 898 MMBtu/hr
Ef = 1.4e-5 lb/MMBtu
8760 hrs/yr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Eaton

SCC: 10300504

Unit: Eaton 1&2

Model Id: EATON1, EATON2

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, fuel oil Heat Content from our emission permit

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
Potential Emissions 2011 =	95 44500 Btu/hr	x 9lb/10^{12} Btu	x 8760 hrs/yr / 2000 lb/ton	x (1 − 0.0) = 3.76 E^{-4} ton/yr

Comments:

2011 No2 fuel rate = 70.75 gal/hr, 135000 Btu/gal, 8760 hrs/yr, 9lb/10^{12} Btu

= 70.75 gal/hr x 135,000 Btu/gal = 95 44500 Btu/hr

ARECIBO LEAD SIP
Baseline Emission Inventory 2011: Emissions Calculations

Industry: Scaptech

SCC: 50100103

Unit: Ducon Incinerator

Model Id: DUCON

Emission Factor Reference: AP-42 Chapter 2.1, Table 2.1-8

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
Potential Emissions 2011 =	0.5 ton/yr	X $2.01e^{-1}$ lb/ton	X 8604 hrs/yr / 2000 lb/ton	X (1 − 0.98) = 0.009 ton/yr

Comments:
Ef = $2.01e^{-1}$ lb/ton
Raw material = 0.5 ton/hr
hrs/yr = 8604

XX. APPENDIX B: 2016 Emissions Projection Year Inventory, Arecibo Lead SIP

OVERVIEW

This is the Emissions Projection Inventory 2016 (EPI2016) for the State Implementation Plan for the Lead Nonattainment Area in Arecibo, Puerto Rico in accordance with Clean Air Act Section 110(a)(2) - Arecibo Lead Nonattainment Area (Arecibo Lead SIP). In 2008 EPA promulgated the new National Ambient Air Quality Standard (NAAQS) for the lead rolling 3-month average of 0.15 ug/m^3. The new standard implementation rule required a source oriented monitor in all areas where the lead emissions are equal or more than 0.5 tons/yr.

The Battery Recycling Company Inc. (TBRCI) in Arecibo has potential lead emissions over 0.5 tons/yr. In June 2010, EQB installed a source oriented air quality monitor near this industry and captured a lead concentration over the new standard of 0.15 ug/m^3. The area was declared as non-attainment for the new lead standard in 2011. EQB Air Quality Area creates a task group to review the permit emissions, controls measures and prepare the state implementation plan for the lead non-attainment area according to the new lead standard.

EQB prepared and submitted to EPA, the Arecibo Lead SIP Baseline Emission Inventory 2011 (BEI2011). The facilities inventoried in the BEI2011 were included in the EPI2016 with the exception of TBRCI, which ceased lead smelting and battery cracking operations[5] and the only projected emissions for the EPI2016 are the lead fugitive emissions of the remaining slag piles.

The EPI2016 includes the following Facilities: TBRCI, Safetech Corporation, Energy Answers, PREPA Cambalache, Antonio Nery Juarbe Airport (ANJ), Eaton, Pfizer Pharmaceuticals, LLC, Merck Sharp & Dohme, Abbvie Ltd (Formerly, Abbott Laboratories) and Sunbeam Synergy. EQB is using the industry potential emissions or permit limit for the EPI2016. In the case of the airport the baseline lead emissions are from EPA EIS/NEI system and the projections were made using the procedure recommended by the Office of Transportation and Air Quality (OTAQ). No future expansion or emissions growth is projected to any of the emission sources, then the lead emissions will remain constant in the EPI2016. The Arecibo Lead SIP attainment year will be 2016.

TBRCI was a secondary lead smelter facility, dedicated to recycle lead-acid batteries and had potential lead emissions over 0.5 tons/yr. Safetech Corporation is a nearby source dedicated to the incineration of commercial and industrial non-hazardous solid waste. Energy Answers and Sunbeam Synergy are renewable energy sources under construction permit and they are planned to start in the next years, their potential lead emissions were used for projections. PREPA Cambalache is an electric power

[5] See Appendix E.

facility. The Antonio Nery Juarbe is a general aviation airport located near TBRCI. The other facilities are Eaton, dedicated to power and transformer manufacturing and Abbvie Ltd, Merck Sharp & Dohme and Pfizer with pharmaceuticals processes.

EMISSIONS PROJECTION INVENTORY

EQB used the facilities lead potential emissions or permit limit to prepare the EPI2016. EQB understand that the emission sources potential lead emissions will be lower or remain constant during the emission projections period and afterwards. Therefore no lead emissions increase is expected in the area. For the EPI2016 of the ANJ airport, EQB used the information provided by the Puerto Rico Ports Authority[6] and the information presented in the EPA technical support documents, Lead Emissions from the Use of Leaded Aviation Gasoline in the United States[7] and Calculating Piston- Engine Aircraft Airport Inventories for Lead for the 2008 National Emissions Inventory[8]. The procedure and calculation is presented in Appendix B-1.

The previous modeling studies indicated that TBRCI was the major lead emissions contributor in the area. This facility ceased operations and therefore no more lead process emissions will be released. PREQB performed several inspections of the TBRCI area[9]. According to these inspections, the only lead emissions that are present in the facility are from the slag piles inside the main process building, in the new storage building and outside, in the old storage building and in the iron storage area. EPA-Region 2 measured volume of material in each slag pile and shared the data with PREQB. The TBRCI slag piles emissions were modeled along with the lead emissions of the background sources.

The Table B1 presents the industries in the Emissions Projection Inventory and their projected potential lead emissions for 2016.

TABLE B1: ARECIBO LEAD SIP, INDUSTRIES IN 2016 EMISSIONS PROJECTION YEAR INVENTORY

Industry	Municipality	Classification	Potential Lead Emissions tons/yr
PREPA Cambalache	Arecibo	Title V	0.28

[6] Puerto Rico Ports Authority. Planning Division, July, 2013.
[7] Lead Emissions from the Use of Leaded Aviation Gasoline in the United States. EPA420-R-08-020, October 2008
[8] Calculating Piston-Engine Aircraft Airport Inventories for Lead for the 2008, National Emissions Inventory, EPA420-B-10-044, December 2010.
[9] Appendix F. PREQB Inspection Report.

TBRCI	Arecibo	Title V	1.0 e^{-2}
Safetech Corporation	Arecibo	Title V	0.009
Energy Answers	Arecibo	Title V	0.3059
ANJ	Arecibo	-	0.037
Abbvie Ltd	Barceloneta	Title V	0.0161
Merck-Sharp & Dohme	Barceloneta	Title V	0.018
Pfizer Pharmaceuticals, LLC	Barceloneta	Minor Source	0.0035
Eaton	Barceloneta	Synthetic Minor	0.00075
Sunbeam Synergy	Barceloneta	Minor Source	0.11

The emission factors used in the emissions projection inventory were from AP-42 and from the industry permits[10]. Emission factors, calculating data, and references used for the emissions calculation are provided in the Appendix B-1. The TBRCI slag piles lead fugitive emissions were calculated using AP-42 emission factors and the data provided by EPA-Region 2[11]. The Energy Answers lead emissions were from the PSD permit. Sunbeam Synergy potential lead emissions were from the construction permit. Figure B1 shows a map with the industries in the EPI2016. Figure B2 present the Arecibo Lead SIP Area.

[10]TBCRI: Construction Permit

[11]See Appendix H.

FIGURE B1: ARECIBO LEAD SIP, EMISSIONS PROJECTION INVENTORY INDUSTRIES 2016

FIGURE B2: ARECIBO LEAD SIP IMPACT AREA

The emissions projection for Arecibo is presented in Table B2. This data will be used in the model to determine compliance with the new lead standard.

Table B2: Arecibo Lead SIP, 2016 Emissions Projection Year Inventory

2016 EMISSIONS PROJECTION YEAR INVENTORY, ARECIBO LEAD SIP

Battery Recycling

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Fugitive Emissions of Slag Pile Inside Main Process Building	Road 2, Km 72.2, Cambalache Ward/PO BOX 1016 Arecibo, PR 00613-1016			MAINB	743541	2041976	-	-	1.369E-03	0.000312557	-	-	-	-
Old Storage Slag Piles Fugitive Emissions				SLAGPILES	743386	2042067	-	-	2.507E-03	0.000572374	-	-	-	-
Iron Storage Area				IRONSTO	743477	2042039			6.203E-04	0.000141621				
New Storage Building				NEWSTOB	743529	2042108			5.513E-03	0.001258676				
								Total	**1.00E-02**	**2.28E-03**				

Energy Answers

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
2 Riley Spreader-Stoker Boilers	Road 2, Cambalache Ward, Arecibo	Arecibo		EA1	742631	2042526	Fabric Filters		0.3059	0.069840183	95.5	3.017	29.09	429.8
Diesel Powered Emergency Generator[1]				EA2	742611.8	2042599			2.30E-08	9.20E-08	10	0.152	99.4	779
								Total	**0.3059**	**0.0698**				

PREPA Cambalache

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Gas Turbine 1	Road 681, Km 0.5, Arecibo/PO BOX 364267 SAN JUAN, PR 00936-4267	Arecibo	20100101	1s	742887	2043963	-	-	0.09374	0.021401826	30.48	4.7	34.4	654
Gas Turbine 2			20100101	2s	742907	2043974	-	-	0.09374	0.021401826	30.48	4.7	34.4	654
Gas Turbine 3			20100101	3s	742917	2043994	-	-	0.09374	0.021401826	30.48	4.7	34.4	654
								Total	**0.28**	**6.40E-02**				

Safetech Corporation

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Ducon Incinerator, HC96-10P Model Two Chambers	PO Box 140909 Arecibo, PR 00634/Lote 30, Santana Industrial Park, Arecibo	Arecibo	50100103	Ducon	746938	2042285	Wet Scrubber	98	0.009	2.01E-03	27.4	1.2	29.6	1276
								Total	**0.009**	**2.01E-03**				

[1]Lead emissions for the emergency generator based on 500 hrs/yr.

Table B2: Arecibo Lead SIP, 2016 Emissions Projection Year Inventory, (Continued)

2016 EMISSIONS PROJECTION YEAR INVENTORY, ARECIBO LEAD SIP														
Antonio Nery Juarbe Airport														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
Airport	1079 Santana Arecibo, PR 00612-6614	Arecibo		ANJ	785844	2041395	-	-	0.037	0.008447	-	-	-	-
								Total	**0.037**	**8.45E-03**				
Abbvie Ltd (Abbott Laboratories)														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
Boiler 101	Road 2, Km 59, Barceloneta/PO BOX 278 BARCELONETA, PR 00617	Barceloneta	10200501		756337	2039253	-	-	0.00199	0.000454	60.3504	0.762	11.31722	415.3722
Boiler 102			10200501	EU8-P2	756337	2039253	-	-	0.00199	0.000454	60.3504	0.762	11.31722	415.3722
Cogeneration Unit			10100401	EU9-P1	756885	2039967	-	-	0.007517	0.001812	53.34	1.8288	24.9936	449.8167
Boiler 1			10200401	EU10-P1	756993	2039914	-	-	0.002513	0.000574	24.384	0.9144	10.0584	433.15
Boiler 4			10100501	EU11-P2	756993	2039914	-	-	0.002097	0.000479	24.384	0.9144	13.42034	425.3722
								Total	**0.0161**	**0.00377**				
Merck-Sharp & Dohme, Puerto Rico Branch														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
Boiler A, Serial: 02968	ROAD 2 KM 56.7 BARCELONETA/PO BOX 601 BARCELONETA	Barceloneta	10200401	EP-BOILER 1	759030	2039239	-	-	0.001029	0.000235	27.5	0.91	16.2	450
Boiler B, Serial: 06256			10200401	EP-BOILER 1	759030	2039239	-	-	0.001029	0.000235	27.5	0.91	16.2	450
Boiler C, Serial: 04043			10200401	EP-BOILER 2	759029	2039229	-	-	0.001029	0.000235	27.5	0.91	16.2	450
Boiler Cleaver Brook CB (Stand-by)			10100501	EP-BOILER 2	759029	2039229	-	-	0	0	27.432	1.2192	22.86	449.8167
Co-Generation Turbine, Serial: 83-			10100501	COGEN 1	759007	2039228	-	-	0.011286	0.002577	22.9	1.22	19.8	470
Rotary Kiln Incinerator			50300113						0.00069	0.000158				
			50300113				Wet & Collision Scrubber		0.002135	0.000488				
			50300113	EP-RKI 1	759402	2039008		99	0.000281	6.41E-05	27.5	0.91	9.2	390
Solvent Incinerator			50300113	EP-SOLV 1	759126	2039002	Caustic Wet Scrubber	-	0.000195	4.44E-05	14.48	0.36	12.29	361
Thermal Oxidation Units (2)			10100501	TOU	759129	2039148	Scrubber	95	0.000532	0.000122	6.096	0.4064	18.288	1255.372
								Total	**0.018**	**0.004156**				
Pfizer Pharmaceuticals LLC (Barceloneta)														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
HRSG Cogeneration Unit (CU01)	Road 140, Km 64.4, Barceloneta/PO BOX 11247 BARCELONETA, PR 00617	Barceloneta	10100501	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183	0.00027	57.912	1.0668	7.9248	422.0389
5 Electric Generation Engines			20200102	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183	0.00027	57.912	0.762	15.5448	422.0389
Package Boiler (CU02)			10100501	PT02	756618	2039949	-		0.001183	0.00027	57.912	1.0668	7.9248	422.0389
								Total	**0.0035**	**0.00081**				

Table B2: Arecibo Lead SIP, 2016 Emissions Projection Year Inventory (Continued)

2016 EMISSIONS PROJECTION YEAR INVENTORY, ARECIBO LEAD SIP														
Eaton (Cutler-Hammer Electrical Company)														
Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
					East	North			Allowable					
Boiler 1	Road 681, Km 0.5, Arecibo/PO BOX	Arecibo	10300501	Eaton1	746475	2041401	-	-	0.000376	8.59E-05	11.5824	0.4572	14.6304	802.5944
Boiler 2			10300501	Eaton2	746475	2041401	-	-	0.000376	8.59E-05	11.5824	0.4572	14.6304	802.5944
								Total	0.00075	0.000171				
Sunbeam Synergy														
Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
					East	North			Allowable					
MSW Gasifier	PR 140, Km 64.4 Barceloneta, PR	Barceloneta		MSW	757473	2038739	Baghouse	98	0.11	0.025114	30.48	0.914	60.12	394
								Total	0.11	0.02511				

XXI. APPENDIX B-1: Emissions Calculation - 2016 Emissions Projection Year Inventory

PREPA Cambalache Emissions Calculation

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: PREPA CAMBALACHE

SCC: 20100101

Unit: Gas turbines 1, 2, 3

Model Id: 15, 25, 35

Emission Factor Reference: PSD permit

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2016 = 100% load	0.023 lb/hr	x 6760 hrs/yr	x 1 ton/2000 lb	x (1 − 0.0) = 0.07774 ton/yr
60% load 2016 =	0.016 lb/hr	x 2000 hrs/yr	x 1 ton/lb	x (1−0) = 0.016 ton/yr

total = 0.07774 + 0.016 = 0.09374 ton/yr

Comments:
Each Gas turbine
100% load = 6,760 hrs/yr
60% load = 2000 hrs/yr
Ef = 0.023 lb/hr, 100 % load
Ef = 0.016 lb/hr, 60 % load

Safetech Emissions Calculation

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Safetech

SCC: 50100103

Unit: Ducon Incinerator

Model Id: Ducon

Emission Factor Reference: AP-42, Chapter 2.1, Table 2.1-8

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
2016 =	0.5 ton/hr	X	2.01e-1 lb/ton	X	8604 hrs/yr / 2000 lb/ton	X	(1 – 0.98) =

0.009 ton/yr

Comments:

Ef = 2.01e-1 lb/ton
Raw Material = 0.5 ton/hr
8604 hrs/yr

Abbvie Ltd Emissions Calculation

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Abbvie Ltd

SCC: 10200301

Unit: Boiler 101 , Boiler 102

Model Id: EU 8- P1

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, fuel oil
Heat content from permit.

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2016 =	50490000 Btu/hr	X 9 lb/10^{12} Btu	X 8760 hrs/yr / 2000 lb/ton	X (1 − 0.9 = 1.99e-3 ton/yr (each Boiler)

Comments:
fuel oil = 90,000 Btu/gal , 561 gal/hr , 8760 hrs/yr
Ef = 9 lb/10^{12} Btu

= 561 gal/hr × 90,000 Btu/gal
= 50490000 Btu/hr

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Abbvie Ltd

SCC: 10100401

Unit: Cogeneration Turbine

Model Id: EU9-P1

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-11

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency	
2016 =	1200 gal/hr	X	$1.51e^{-3}$ lb / 1000 gal	X	8297 hrs/yr / 2000 lb/ton	X	(1 − 0.0) =	$7.51e^{-3}$ ton/yr

Comments:
NO6. = 1200 gal/hr , 8297 hrs/yr
Ef = $1.51e^{-3}$ lb/1000 gal

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Abbvie Ltd

SCC: 10200401

Unit: Boiler 1

Model Id: EU10-P1

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-11

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency	
2016 =	380 gal/hr	X	1.51e-3 lb / 1000 gal	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) =	2.51e-3 ton/yr

Comments:

NO6. = 380 gal/hr, 8760 hrs/yr

Ef = 1.51e-3 lb/1000 gal

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Abbvie Ltd

SCC: 10100501

Unit: Boiler 4

Model Id: EU11-P1

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, Fuel oil Lead content from permit.

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency	
2016 =	53200000 Btu/hr	X	9 lb/10^{12} Btu	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) =	2.097 e^{-3} ton/yr

Comments:

Diesel = 380 gal/hr, 8760 hrs/yr, 140,000 Btu/gal

Ef = 9 lb/10^{12} Btu

= 380 gal/hr × 140,000 Btu/gal

= 53200000 Btu/hr

Merck Sharp & Dohme Emissions Calculation

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Merck-Sharp & Dohme

SCC: 10200401

Unit: Boiler A, B, C

Model Id: EP Boiler 1, EP Boiler 2

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-11

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency	
2016 =	155.5 gal/hr	X	1.51e-3 lb / 1000 gal	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) =	1.028 e-3 ton/yr

Comments:
NO.6 = 155.5 gal/hr, 8760 hrs/yr
Ef = 1.51 e-3 lb/1000 gal

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Merck-Sharp & Dohme

SCC: 10100501

Unit: Cogeneration Turbine

Model Id: EP-Cogen 1

Emission Factor Reference: From permit data.

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
2016 =	330 gal/hr X	7.8 e^{-3} lb / 1000 gal X	8760 hrs/yr / 2000 lb/ton X	(1 − 0.0) = 0.01127 ton/yr

Comments:
Kerosene = 330 gal/hr, 8760 hrs/yr
Ef = 7.8 e^{-3} lb/1000 gal

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Merck Sharp & Dohme

SCC: 50300113

Unit: Rotary Kiln Incinerator

Model Id: EP-RKI1

Emission Factor Reference: Our permit

Pollutant: Lead

Calculations:

	Operating Rate	Emission Factor	Conversion Factor	Control Efficiency
Solid waste 2016 =	2.5 ton/hr	X 0.000063 lb/ton	X 8760 hrs/yr / 2000 lb/ton	X (1 − 0.) = 6.89 e-4 ton/yr
Liquid waste =	0.375 ton/hr	× 0.0013 lb/ton	× 8760 hrs/yr / 2000 lb/ton	× (1-0) = 2.13 e-3 ton/yr
Kerosene =	53.4 Gal/hr	× 0.0012 lb/1000 Gal	× 8760 hrs/yr / 2000 lb/ton	× (1-0) = 2.8 e-4 ton/yr

Comments:
Solid waste = 2.5 ton/hr, Ef = 0.000063 lb/ton
Liquid waste = 0.375 ton/hr, Ef = 0.0013 lb/ton
Kerosene = 53.4 Gal/hr, Ef = 0.0012 lb/1000 Gal
8760 hr/yr

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Merck Sharp & Dohme

SCC: 50300113

Unit: Solvent Incinerator

Model Id: ER SOLV1

Emission Factor Reference: Our permit

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
2016 =	37 gal/hr	X	0.0012 lb / 1000 gal	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) = 1.944 e⁻⁴ ton/yr

Comments:
Kerosene = 37 gal/hr, 8760 hrs/yr
Ef = 0.0012 lb/1000 gal

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Merck-Sharp & Dohme

SCC: 10100501

Unit: Thermal Oxidation Units

Model Id: TOU

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, Fuel oil Lead content from permit

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
2016 =	135000000 Btu/hr	X	9 lb / 10^{12} Btu	X	8760 hr/yr / 2000 lb/ton	X	(1 − 0.0) = 5.3 e^{-4} ton/yr

Comments:
Kerosene: 100 gal/hr, 8760 hrs/yr, 135,000 Btu/gal
Ef = 9 lb / 10^{12} Btu

= 100 gal/hr × 135000 Btu/gal
= 13500000 Btu/hr

Pfizer Pharmaceuticals, LLC Emissions Calculation

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Pfizer Pharmaceuticals LLC

SCC: 10100501

Unit: HRSG Cogeneration Unit, 5 Electric Generation Engines, Boiler

Model Id: PTO1, PTO2

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, Fuel and Heat Content from permit

Pollutant:

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency
2016 =	30013200 Btu/hr	X	9 lb/10^{12} Btu	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) = 1.18 e^{-3} ton/yr

Comments:
NO.2 = 214.38 gal/hr, 140,000 Btu/gal, 8760 hrs/yr
Ef = 9 lb/10^{12} Btu

= 214.38 gal/hr × 140,000 Btu/gal
= 30013200 Btu/hr

Eaton Emissions Calculation

ARECIBO LEAD SIP
Emission Projections 2016: Emissions Calculations

Industry: Eaton

SCC: 10300501

Unit: Boiler 1 & 2

Model Id: Eaton 1, Eaton 2

Emission Factor Reference: AP-42, Chapter 1.3, Table 1.3-10, Fuel oil heat content from permit.

Pollutant: Lead

Calculations:

	Operating Rate		Emission Factor		Conversion Factor		Control Efficiency	
2016 =	9544500 Btu/hr	X	9 lb/10^{12} Btu	X	8760 hrs/yr / 2000 lb/ton	X	(1 − 0.0) =	$3.76E^{-4}$ ton/yr

Comments:
NO 2. = 70.7 gal/hr, 135,000 Btu/gal, 8760 hrs/yr
Ef = 9 lb/10^{12} Btu
= 70.7 gal/hr × 135,000 Btu/gal
= 95 44 500 Btu/hr

ANTONIO NERY JUARBE AIRPORT (ANJ) 2016 PROJECTED LEAD EMISSIONS

To calculate the projected lead emissions at the ANJ airport, the EPA technical document Calculating Piston-Engine Aircraft Airport Inventories for Lead for the 2008 National Emissions Inventory[1] (EPA 2008) was used. According to the Planning Division of the Puerto Rico Ports Authority[2], the projected operations for 2016 at the ANJ airport will be 1836 aircrafts. The lead emissions calculation uses the landing and takeoff cycle (LTO), then 1836 LTO/year will be projected for 2016 in the ANJ airport. This airport does not have an aircraft fuel record because they do not supply it. The information about the aircrafts fuel type and usage is not available. EQB used a conservative approach to calculate the projected lead emissions and is explained below.

The EPA 2008 document establish that the piston engine aircrafts uses the 100LL avgas which contain lead, instead of jet-fuel that do not have the lead additive. The document also mentioned that commercial, military and other turbine-engine aircrafts uses jet-fuel which does not have the lead additive and lead emissions are not calculated for these types of aircrafts.

Because the ANJ airport do not maintain information about the aircrafts fuel type and usage, EQB is assuming a conservative approach and will consider that the 1836 LTO/year projected for 2016 will be piston-engine aircrafts or aircrafts that use 100LL avgas with the lead additive. The EPA 2008 document specified that the average fuel usage by LTO of the single piston-engine or twin piston-engine aircrafts is 2.83 gal/LTO and 9.12 gal/LTO, respectively. EQB is assuming that all aircrafts will be twin piston-engine to use the major fuel usage during LTO and maintain the conservative approach. The EPA 2008 document mentioned that the lead concentration in the 100LL avgas specified by the ASTM is 2.12 grams of Pb per gallon. EPA 2008 also explain that the data collected from piston-engine aircrafts suggests that about 5% of the lead is retained in the engine and the engine oil, thus the emitted fraction of lead is 0.95.

The following equation[2] is used to calculate the projected lead emissions in the ANJ airport:

$$\text{Pb (tons/year)} = \frac{\text{(piston-engine LTO) (g Pb/LTO) (0.95)}}{907{,}180 \text{ g/ton}}$$

Where,

(piston-engine LTO) = 1836 LTO/year
(g Pb/LTO) = 9.12 gal/LTO * 2.12 grams Pb/gal = 19.3344 g Pb/LTO
(0.95) = % lead emitted
907,180 g/ton = conversion factor

[1]Calculating Piston-Engine Aircraft Airport Inventories for Lead for the 2008 National Emissions Inventory, EPA420-B-10-044, December 2010.

[2]Puerto Rico Ports Authority. Planning Division, July, 2013.

Then, the 2016 lead projected emissions for ANJ airport will be:

$$\text{Pb (tons/year)} = \frac{(1836 \text{ LTO/year})\ (19.3344 \text{ g Pb/LTO})\ (0.95)}{907{,}180 \text{ g/ton}}$$

= 0.037 tons/year

TBRCI Emissions Calculation, Fugitive Emissions, Slag Piles

The Section 13.2.4. of the AP-42 – Aggregate Handling and Storage Piles was used to calculate the lead emissions of the slag piles in the TBRCI area, due to wind erosion. Equation 1 of the section was used to generate a custom emission factor to describe the quantity of particulate matter emitted. PREQB made several inspections in the TBRCI facility.[1] According to the last two inspections, there are four slag piles inside the TBRCI facility, one inside the main building, another inside the new storage building, one in the old storage building and other in the iron storage area.

Equation 1 of Section 13.2.4 of the AP-42 to determine a custom emission factor for PM is as follows:

$$E = k\,(0.0032) * \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}\ lbs/ton$$

Where:

E = emission factor; applicable to TBRCI is in **pounds (lbs) per ton of slag**
k = particle size multiplier (dimensionless); TBRCI assumed **0.74**, Section 13.2.4 of AP-42, particle size <30 µm
U = mean wind speed (mph); TBRCI assumed to be **10 mph**
M = material moisture content; **0.92** from Table 13.2.4.1 of AP-42 (Iron and steel production, Slag), recommended when a site-specific value is not available

$$E = 0.74\,(0.0032) * \frac{\left(\frac{10}{5}\right)^{1.3}}{\left(\frac{0.92}{2}\right)^{1.4}} = 0.01729\ lbs/tons\ of\ slag$$

USEPA-Region 2 measured the volume of the slag piles. PREQB estimated that the total amount of slag in TBRCI facility is 5035 tons. These tons of slag are distributed in the following areas, 1261 tons of slag in the old storage area, 312 tons in the iron storage area, 689 tons of slag inside the main process building and 2773 tons inside the new storage building. EPA-CASD recommended[2] PREQB the value from AP-42 of 23%, for the lead content in the slag piles. This lead content percent was used for the calculation of the slag piles lead emissions.

[1]See Appendix F.
[2]See Appendix H.

Using the emission factor calculated with the Equation 1 of Section 13.2.4 of AP-42, the tons of PM for each slag pile will be;

Main Building Slag Pile

$$\frac{0.01729\ lbs\ of\ PM}{tons\ of\ slag} * \frac{689\ tons\ of\ slag}{year} = 11.91281\ lbs\ of\ PM/year$$

$$\frac{11.91281\ lbs\ of\ PM}{year} * \frac{1\ ton}{2000\ lbs} = 5.95640\ e^{-3}\ tons\ of\ PM/year$$

Old Storage Building Slag Pile

$$\frac{0.01729\ lbs\ of\ PM}{tons\ of\ slag} * \frac{1261\ tons\ of\ slag}{year} = 21.80269\ lbs\ of\ PM/year$$

$$\frac{21.80269\ lbs\ of\ PM}{year} * \frac{1\ ton}{2000\ lbs} = 1.09013\ e^{-2}\ tons\ of\ PM/year$$

Iron Storage Building

$$\frac{0.01729\ lbs\ of\ PM}{tons\ of\ slag} * \frac{312\ tons\ of\ slag}{year} = 5.39448\ lbs\ of\ PM/year$$

$$\frac{5.39448\ lbs\ of\ PM}{year} * \frac{1\ ton}{2000\ lbs} = 2.69724\ e^{-3}\ tons\ of\ PM/year$$

New Storage Building

$$\frac{0.01729\ lbs\ of\ PM}{tons\ of\ slag} * \frac{2773\ tons\ of\ slag}{year} = 47.94517\ lbs\ of\ PM/year$$

$$\frac{47.94517\ lbs\ of\ PM}{year} * \frac{1\ ton}{2000\ lbs} = 0.0239725\ tons\ of\ PM/year$$

As indicated previously, USEPA recommended PREQB the AP-42 value for the slag lead content of 23% to calculate the slag piles lead emissions. According to this, the lead emissions from each slag pile will be;

Main Building Slag Pile

$$\frac{5.95640\ e^{-3} tons\ of\ PM}{year} * \frac{23}{100} = 1.3699\ e^{-3}\ tons\ of\ Pb/year$$

Old Storage Building Slag Pile

$$\frac{1.09013\ e^{-2}\ tons\ of\ PM}{year} * \frac{23}{100} = 2.50729\ e^{-3}\ tons\ of\ Pb/year$$

Iron Storage Building

$$\frac{2.69724\ e^{-3}\ tons\ of\ PM}{year} * \frac{23}{100} = 6.203652\ e^{-4}\ tons\ of\ Pb/year$$

New Storage Building

$$\frac{0.0239725\ tons\ of\ PM}{year} * \frac{23}{100} = 5.51367\ e^{-3}\ tons\ of\ Pb/year$$

These slag pile lead emissions will be used in the attainment lead model for the Arecibo SIP.

XXII. APPENDIX C: Attainment Model Protocol, Arecibo Lead SIP

INTRODUCTION

This document presents the protocol for the lead attainment model in the area of The Battery Recycling Company Inc, (TBRCI) in Arecibo. In 2008, EPA promulgated the new National Ambient Air Quality Standard (NAAQS) for the lead rolling 3-month average of 0.15 ug/m^3. The new standard rule required that monitoring Agencies conduct ambient air lead monitoring in areas with Pb sources which are expected to or have been shown to contribute to a maximum Pb concentration in ambient air in excess of the NAAQS, the potential for population exposure, and logistics. At a minimum, there must be one source-oriented SLAMS site located to measure the maximum Pb concentration in ambient air resulting from each Pb source which emits 0.5 or more tons per year based on either the most recent NEI or other scientifically justifiable methods and data (such as improved emissions factors or site-specific data).

TBRCI in Arecibo had lead potential emissions over 0.5 tons/yr. In June 2010, a source oriented air quality monitor installed by PREQB near this industry, capture a lead concentration over the new standard of 0.15 ug/m^3. The area was declared as non-attainment for the new lead standard in 2011. The PREQB Air Quality Area create a task group to determine what facilities contribute to this concentration, establish emission control measures and prepare the State Implementation Plan for the Lead Nonattainment Area in Arecibo (Arecibo Lead SIP).

EMISSION INVENTORY

PREQB prepare the Baseline Emission Inventory 2011 (BEI2011) with the lead emission sources in Arecibo and background lead emission sources up to 16 km from TBRCI. The municipalities in the BEI2011 are Arecibo, Barceloneta, Ciales, Florida, Utuado and Hatillo, see Figure C1. For the attainment modeling study the Emissions Projection Inventory 2016 (EPI2016) will be used and it have emissions projections from all lead emission sources included in the BEI2011 according to the EPA recommendations.

The EPI2016 have all the facilities in the BEI2011 projected to 2016 and two proposed to be constructed by 2016, Energy Answers in Arecibo and Sunbeam Synergy in Barceloneta. According to the NAAQS revision, the Arecibo Lead SIP attainment year will be 2016. The air quality model used is AERMOD and this is the current preferred EPA model for air quality modeling studies.

In 2010, PREQB does not have a lead air quality monitor in Arecibo that could be used as background concentration or a representative one in a nearby area. The EPA recommendation to addresses the lead background concentration in the attainment modeling study is a multi-source AERMOD run using the background lead emissions from Arecibo nearby facilities projected to 2016. The municipalities used for background lead emissions were Barceloneta, Ciales, Florida, Hatillo and Utuado. The only municipality with background lead emissions sources is Barceloneta along with

the facilities in Arecibo. According to the industries current permits, lead potential emissions or permit allowable rate projected to 2016 will be used in the attainment modeling study. The ANJ airport lead emissions are from EPA EIS/NEI system and were projected to 2016 using the methodology recommended by the U.S. Office of Transportation and Air Quality (OTAQ)[12].

The facilities that emit lead in Arecibo are TBRCI, Safetech Corporation and PREPA Cambalache. Energy Answers is planning to build a renewable energy plant nearby TBRCI and their potential lead emissions will be included in the attainment model. According to the facility written notifications, TBRCI ceased operations[13] and the only lead emissions included in the EPI2016 are from the slag piles inside the facility. The Antonio Nery Juarbe (ANJ) airport is near TBRCI and their lead emissions were included in the modeling study.

The TBRCI slag piles lead emissions were calculated using the emission factors of AP-42 and the data provided by EPA-Region 2[14]. PREQB made several inspections of the TBRCI facility. According to these inspections, there are four slag piles in the TBRCI facility, one inside the main process building, another inside the new storage building and two others, one in the old storage building and one in the iron storage area[15]. These emission points are fugitive and the only action that is going to be considered in the attainment model is the wind erosion.

12 See Appendix B.

13 See Appendix E.

14 See Appendix H

15 See Appendix F.

Figure C1: Arecibo Lead SIP, Industry and Municipality Map

PREQB is working with some industry permits in Arecibo and nearby municipalities, and several changes or emissions reductions are expected in the sulfur percent and the fuel oil type. These future changes may impact the industries in Arecibo and nearby areas resulting in lowering the lead emissions. The Appendix C-1 presents the emission inventory data.

MODEL

The preferred EPA model AERMOD will be used for the attainment model. TBRCI has ceased operations and no more lead smelting operations will be performed. The only lead emissions in the facility will be fugitive, from the remaining slag piles inside the facility. According to PREQB inspections, there are four slag piles in the TBRCI facility, one inside the main process building, another inside the new storage building and two others, one in the old storage building and one in the iron storage area.

For the attainment model, the slag piles in the main process building and in the new storage building will be treated as a volume sources, because the piles are inside the buildings. The slag piles at the old storage building area and at the iron storage area were considered like an area source, because the material is exposed. The old storage building area source is a four-tier polygon with approximately 268 m^2 of expansion and the iron storage area is a six-tier polygon with a 350 m^2 of expansion, see Appendix C-1.

Background concentration was omitted, because in 2010 PREQB do not had a nearby lead air quality monitor that could be representative of the Arecibo area. PREQB addresses this using the EPA recommendation of a multi-source modeling scenario with projected or controlled emissions to 2016, for the facilities in the six municipalities previously mentioned in this document, including the Arecibo airport.

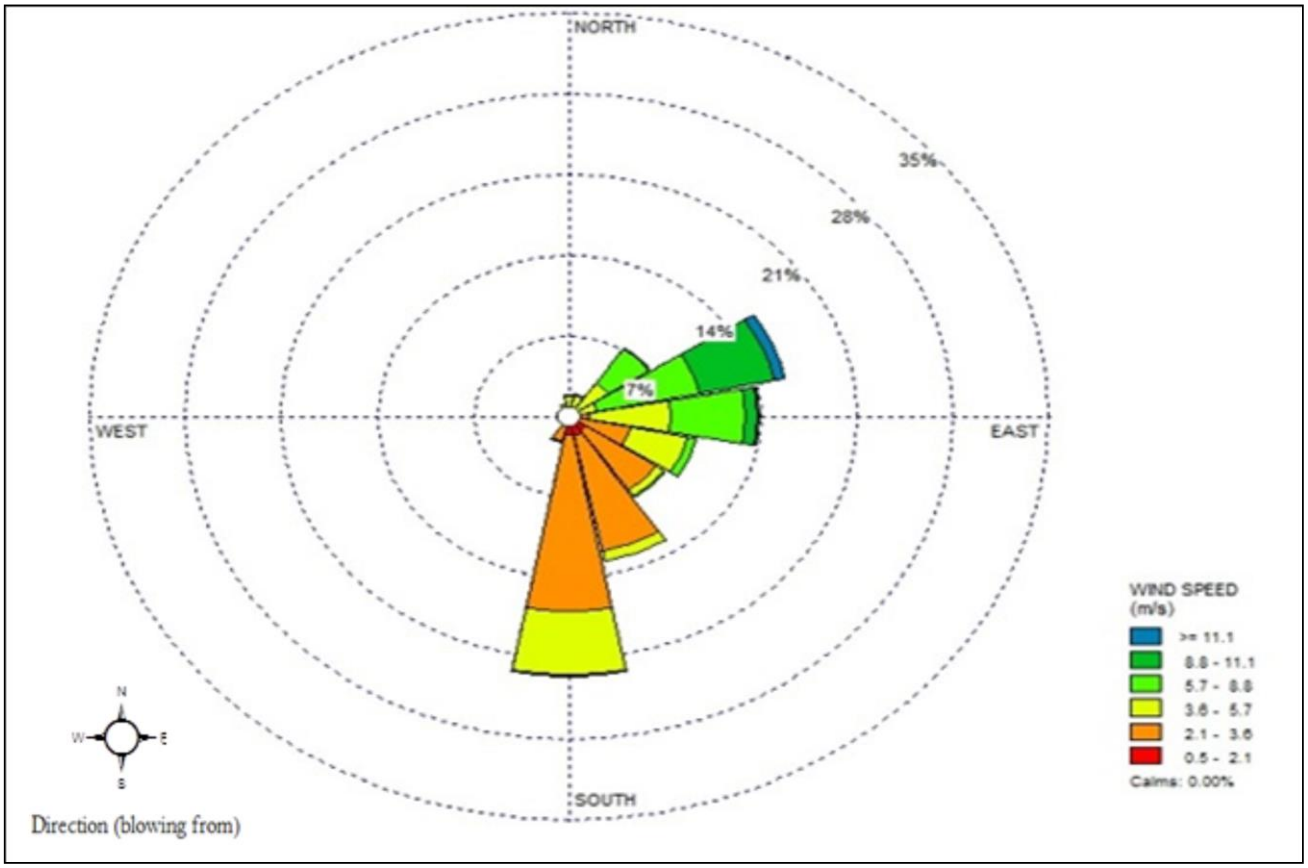
Figure C2 shows the TBRCI facility with the property fenceline, the main building, the new storage building and the area sources. EPA Leadpost processor is used for the calculation of the lead rolling 3-month average using the monthly modeling results.

Figure C2: Facility Property, Main Building and Area Source

METEOROLOGY

One year of site-specific meteorological data from 1992-1993 collected in the PREPA Cambalache station was used in the model. The data was processed using the AERMET new version that incorporates two surface characteristics in cases of missing data. Meteorological data from San Juan station was used for the substitution of the site-specific missing data. Figure C3 shows a wind rose of the Cambalache Station data.

Figure C3: Wind Rose from Cambalache Station, Arecibo



RECEPTORS

The terrain area that surrounds TBRCI is flat rural area, with some elevated terrain at 4 km approximately to the southeast/southwest. Four receptor grids will be used for the attainment model. A 500 meters grid and two refined grids of 250 and 100 meters. Another grid was created around the property fenceline, this is a dense receptor grid of 5 meters distance.

AERMOD model uses AERMAP to process the terrain data and the receptor elevations are extracted from the DEM maps. The UTM coordinates for the grids were southwest corner 739500 East/2038000 North and northeast corner 763000 East/2045500 North for the 500 meters, southwest corner 739500 East/2038000 North and northeast corner 746500 East/2045750 North for the 250 meters and southwest corner 742750 East/2042000 North and northeast corner 743950 East/2043000 North for the 100 meters. The coordinates for the 5 meters grid are southwest corner 743250 East/2041850 North and northeast corner 743750 East/2042250 North. Figures C4, C5 and C6 shows the grids.

Figure C4: Receptor Grid (500 meters)

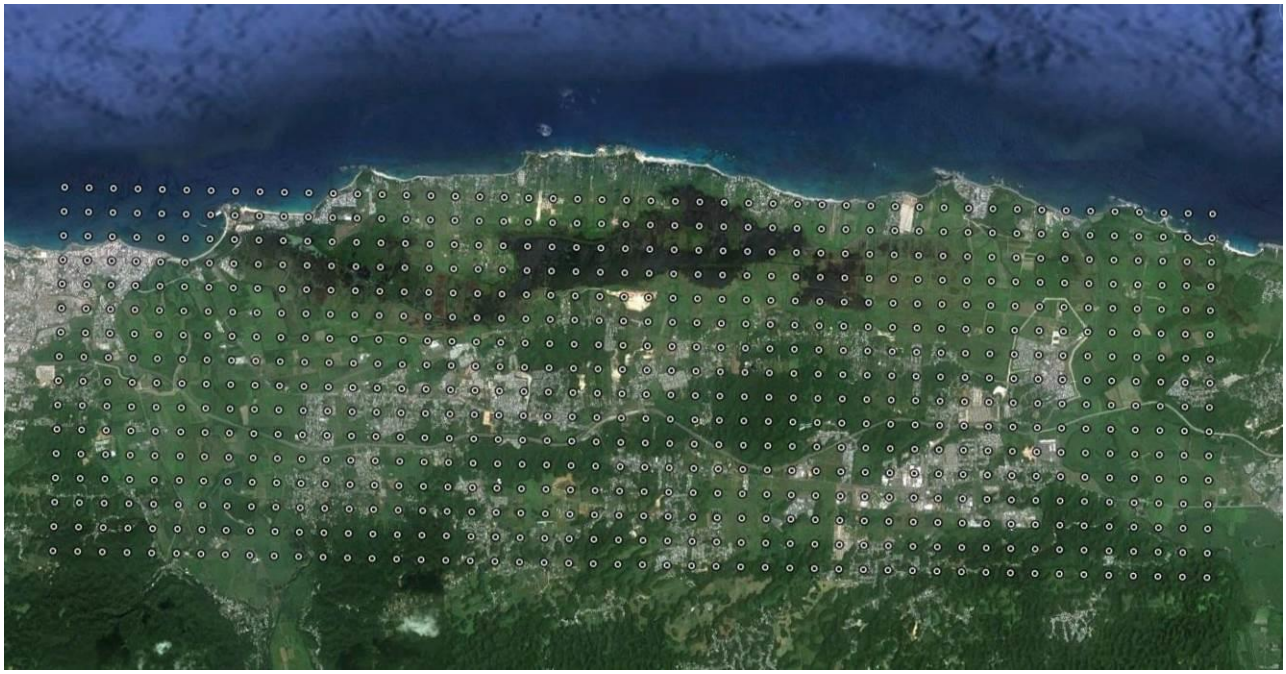


Figure C5: Refined Receptor Grids (250 and 100 meters)

Figure C6: Fenceline Refined Receptor Grid (5 meters)

XXIII. APPENDIX C-1: Attainment Lead Model Protocol

2016 Emissions Projection Year Inventory, Arecibo Lead SIP

2016 EMISSIONS PROJECTION YEAR INVENTORY, ARECIBO LEAD SIP

Battery Recycling

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Fugitive Emissions of Slag Pile Inside Main Process Building	Road 2, Km 72.2, Cambalache Ward/PO BOX 1016 Arecibo, PR 00613-1016			MAINB	743541	2041976	-	-	1.369E-03	0.000312557	-	-	-	-
Old Storage Slag Piles Fugitive Emissions				SLAGPILES	743386	2042067	-	-	2.507E-03	0.000572374	-	-	-	-
Iron Storage Area				IRONSTO	743477	2042039			6.203E-04	0.000141621				
New Storage Building				NEWSTOB	743529	2042108			5.513E-03	0.001258676				
								Total	**1.00E-02**	**2.28E-03**				

Energy Answers

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
2 Riley Spreader-Stoker Boilers	Road 2, Cambalache Ward, Arecibo	Arecibo		EA1	742631	2042526	Fabric Filters		0.3059	0.069840183	95.5	3.017	29.09	429.8
Diesel Powered Emergency Generator[1]				EA2	742611.8	2042599			2.30E-08	9.20E-08	10	0.152	99.4	779
								Total	**0.3059**	**0.0698**				

PREPA Cambalache

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Gas Turbine 1	Road 681, Km 0.5, Arecibo/PO BOX 364267 SAN JUAN, PR 00936-4267	Arecibo	20100101	1s	742887	2043963	-	-	0.09374	0.021401826	30.48	4.7	34.4	654
Gas Turbine 2			20100101	2s	742907	2043974	-	-	0.09374	0.021401826	30.48	4.7	34.4	654
Gas Turbine 3			20100101	3s	742917	2043994	-	-	0.09374	0.021401826	30.48	4.7	34.4	654
								Total	**0.28**	**6.40E-02**				

Safetech Corporation

Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Ducon Incinerator, HC96-10P Model Two Chambers	PO Box 140909 Arecibo, PR 00634/Lote 30, Santana Industrial Park, Arecibo	Arecibo	50100103	Ducon	746938	2042285	Wet Scrubber	98	0.009	2.01E-03	27.4	1.2	29.6	1276
								Total	**0.009**	**2.01E-03**				

[1]Lead emissions for the emergency generator based on 500 hrs/yr.

2016 Emissions Projection Year Inventory, Arecibo Lead SIP (Continued)

2016 EMISSIONS PROJECTION YEAR INVENTORY, ARECIBO LEAD SIP														
Antonio Nery Juarbe Airport														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
Airport	1079 Santana Arecibo, PR 00612-6614	Arecibo		ANJ	785844	2041395	-	-	0.037	0.008447	-	-	-	-
								Total	**0.037**	**8.45E-03**				
Abbvie Ltd (Abbott Laboratories)														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
Boiler 101	Road 2, Km 59, Barceloneta/PO BOX 278 BARCELONETA, PR 00617	Barceloneta	10200501		756337	2039253	-	-	0.00199	0.000454	60.3504	0.762	11.31722	415.3722
Boiler 102			10200501	EU8-P2	756337	2039253	-	-	0.00199	0.000454	60.3504	0.762	11.31722	415.3722
Cogeneration Unit			10100401	EU9-P1	756885	2039967	-	-	0.007517	0.001812	53.34	1.8288	24.9936	449.8167
Boiler 1			10200401	EU10-P1	756993	2039914	-	-	0.002513	0.000574	24.384	0.9144	10.0584	433.15
Boiler 4			10100501	EU11-P2	756993	2039914	-	-	0.002097	0.000479	24.384	0.9144	13.42034	425.3722
								Total	**0.0161**	**0.00377**				
Merck-Sharp & Dohme, Puerto Rico Branch														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
Boiler A, Serial: 02968	ROAD 2 KM 56.7 BARCELONETA/PO BOX 601 BARCELONETA	Barceloneta	10200401	EP-BOILER 1	759030	2039239	-	-	0.001029	0.000235	27.5	0.91	16.2	450
Boiler B, Serial: 06256			10200401	EP-BOILER 1	759030	2039239	-	-	0.001029	0.000235	27.5	0.91	16.2	450
Boiler C, Serial: 04043			10200401	EP-BOILER 2	759029	2039229	-	-	0.001029	0.000235	27.5	0.91	16.2	450
Boiler Cleaver Brook CB (Stand-by)			10100501	EP-BOILER 2	759029	2039229	-	-	0	0	27.432	1.2192	22.86	449.8167
Co-Generation Turbine, Serial: 83-06			10100501	EP-COGEN 1	759007	2039228	-	-	0.011286	0.002577	22.9	1.22	19.8	470
Rotary Kiln Incinerator			50300113				Wet & Collision Scrubber		0.00069	0.000158				
			50300113						0.002135	0.000488				
			50300113	EP-RKI 1	759402	2039008		99	0.000281	6.41E-05	27.5	0.91	9.2	390
Solvent Incinerator			50300113	EP-SOLV 1	759126	2039002	Caustic Wet Scrubber	-	0.000195	4.44E-05	14.48	0.36	12.29	361
Thermal Oxidation Units (2)			10100501	TOU	759129	2039148	Scrubber	95	0.000532	0.000122	6.096	0.4064	18.288	1255.372
								Total	**0.018**	**0.004156**				
Pfizer Pharmaceuticals LLC (Barceloneta)														
Emission Unit	**Address Physical/Postal**	**Municipality**	**SCC**	**Point ID**	**UTM**		**Control Equipment**	**Control Efficiency %**	**Emissions (ton/yr)**	**Model Emission Rate lbs/hr**	**Stack Height (m)**	**Stack Diameter (m)**	**Stack Exit Velocity (m/s)**	**Stack Temperature (K)**
					East	**North**			**Allowable**					
HRSG Cogeneration Unit (CU01)	Road 140, Km 64.4, Barceloneta/PO BOX 11247 BARCELONETA, PR 00617	Barceloneta	10100501	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183	0.00027	57.912	1.0668	7.9248	422.0389
5 Electric Generation Engines			20200102	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183	0.00027	57.912	0.762	15.5448	422.0389
Package Boiler (CU02)			10100501	PT02	756618	2039949	-		0.001183	0.00027	57.912	1.0668	7.9248	422.0389
								Total	**0.0035**	**0.00081**				

2016 Emissions Projection Year Inventory, Arecibo Lead SIP (Continued)

2016 EMISSIONS PROJECTION YEAR INVENTORY, ARECIBO LEAD SIP														
Eaton (Cutler-Hammer Electrical Company)														
Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
					East	North			Allowable					
Boiler 1	Road 681, Km 0.5, Arecibo/PO BOX 364267 SAN JUAN, PR 00936-4267	Arecibo	10300501	Eaton1	746475	2041401	-	-	0.000376	8.59E-05	11.5824	0.4572	14.6304	802.5944
Boiler 2			10300501	Eaton2	746475	2041401	-	-	0.000376	8.59E-05	11.5824	0.4572	14.6304	802.5944
								Total	0.00075	0.000171				
Sunbeam Synergy														
Emission Unit	Address Physical/Postal	Municipality	SCC	Point ID	UTM		Control Equipment	Control Efficiency %	Emissions (ton/yr)	Model Emission Rate lbs/hr	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
					East	North			Allowable					
MSW Gasifier	PR 140, Km 64.4 Barceloneta, PR	Barceloneta		MSW	757473	2038739	Baghouse	98	0.11	0.025114	30.48	0.914	60.12	394
								Total	0.11	0.02511				

Baseline Emission Inventory 2011, Arecibo Lead SIP

BASELINE EMISSION INVENTORY 2011 FOR ARECIBO LEAD SIP

Abbott Laboratories

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Boiler 101	Road 2, Km 59, Barceloneta/PO BOX 278 BARCELONETA, PR 00617	Barceloneta	325412	10200501		756337	2039253	-	-	0.000758	0.00022	60.3504	0.762	11.31722	415.3722
Boiler 102				10200501	EU8-P2	756337	2039253	-	-	0.000758	0.00093	60.3504	0.762	11.31722	415.3722
Cogeneration Unit				10100401	EU9-P1	756885	2039967	-	-	0.007517	0.006558	53.34	1.8288	24.9936	449.8167
Boiler 1				10200501						0.000855	6.46E-05				
				10200401	EU10-P1	756993	2039914	-	-	0.000209	0.000968	24.384	0.9144	10.0584	433.15
Boiler 4				10100501						0.000855	0.000158				
				10200401	EU11-P2	756993	2039914	-	-	0.000209	0	24.384	0.9144	13.42034	425.3722
Boiler 6				10100501						0.000855	0				
				10200401	EU11-P3	756999	2039878	-	-	0.000209	0	24.384	0.762	16.48663	416.4833
									Total	0.012	0.0088				

Merck-Sharp & Dohme, Puerto Rico Branch

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Boiler A, Serial: 02968	ROAD 2 KM 56.7 BARCELONETA/PO BOX 601 BARCELONETA	Barceloneta	325412	10200401	EP-BOILER 1	759030	2039239	-	-	0.001029		27.5	0.91	16.2	450
				10100501						-	0.000199				
Boiler B, Serial: 06256				10200401	EP-BOILER 1	759030	2039239	-	-	0.001029		27.5	0.91	16.2	450
				10100501						-					
Boiler C, Serial: 04043				10200401	EP-BOILER 2	759029	2039229	-	-	0.001029		27.5	0.91	16.2	450
				10100501						-	0.000168				
Boiler Cleaver Brook CB				10100501	EP-BOILER 2	759029	2039229	-	-	0.000476		27.432	1.2192	22.86	449.8167
Co-Generation Turbine, Serial: 83-06				10100501	EP-COGEN 1	759007	2039228	-	-	0.011287	1.14E-05	22.9	1.22	19.8	470
Rotary Kiln Incinerator				50300113						0.00069					
				50300113				Wet & Collision		0.002135					
				50300113	EP-RKI 1	759402	2039008	Scrubber	99	0.000281		27.5	0.91	9.2	390
Solvent Incinerator				50300113	EP-SOLV 1	759126	2039002	Caustic Wet Scrubber	-	0.000195		14.48	0.36	12.29	361
Thermal Oxidation Units (2)				10100501	TOU	759129	2039148	Scrubber	95	0.000532		6.096	0.4064	18.288	1255.372
									Total	0.018	0.00037				

Pfizer Pharmaceuticals LLC (Barceloneta)

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
HRSG Cogeneration Unit (CU01)	Road 140, Km 64.4, Barceloneta/PO BOX 11247 BARCELONETA, PR 00617	Barceloneta	325412	10100501	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183		57.912	1.0668	7.9248	422.0389
5 Electric Generation Engines				20200102	PT01	756618	2039949	Selective Catalytic Reduction	98.7	0.001183	0.001045	57.912	0.762	15.5448	422.0389
Package Boiler (CU02)				10100501	PT02	756618	2039949	-	-	0.001183	0	57.912	1.0668	7.9248	422.0389
									Total	0.0035	0.00105				

PREPA Cambalache

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Gas Turbine 1	Road 681, Km 0.5, Arecibo/PO BOX 364267 SAN JUAN, PR 00936-4267	Arecibo	221112	20100101	1s	742887	2043963	-	-	0.055065	0.001753	30.48	4.7	34.4	654
Gas Turbine 2				20100101	2s	742907	2043974	-	-	0.055065	0.006958	30.48	4.7	34.4	654
Gas Turbine 3				20100101	3s	742917	2043994	-	-	0.055065	0.003103	30.48	4.7	34.4	654
									Total	0.17	0.011				

Baseline Emission Inventory 2011, Arecibo Lead SIP (Continued)

BASELINE EMISSION INVENTORY 2011 FOR ARECIBO LEAD SIP

Battery Recycling

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Lead Smelting Furnace, 5.0 m^3 (EU-1)	Road 2, Km 72.2, Cambalache Ward/PO BOX 1016 Arecibo, PR 00613-1016	Arecibo	331419	30301002	EP-1										
5 Molten Lead Refining Kettles Burners (EU2-6)				30400426	EP2-6	743546	2042005	Baghouse	99.5	0.59	-	20.6	1.58115	9.58	351.8
Main Building Fugitive Emissions					1	743541	2041976	-	-	0.35	-	-	-	-	-
Material Transport and Handling					2	743386	2042067	Water Sprinklers, Sweeper Machine	30	0.27	-	-	-	-	-
									Total	1.21	-				

Eaton (Cutler-Hammer Electrical Company)

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Boiler 1	PO Box 709 Arecibo, PR 00613-0709/Road 2, Km 67.6, Santana Industrial Park, Arecibo	Arecibo	335311	10300501	Eaton1	746475	2041401	-	-	0.000376	4.3E-05	11.5824	0.4572	14.6304	802.5944
Boiler 2				10300501	Eaton2	746475	2041401	-	-	0.000376	2.0E-05	11.5824	0.4572	14.6304	802.5944
									Total	0.00075	6.20E-05				

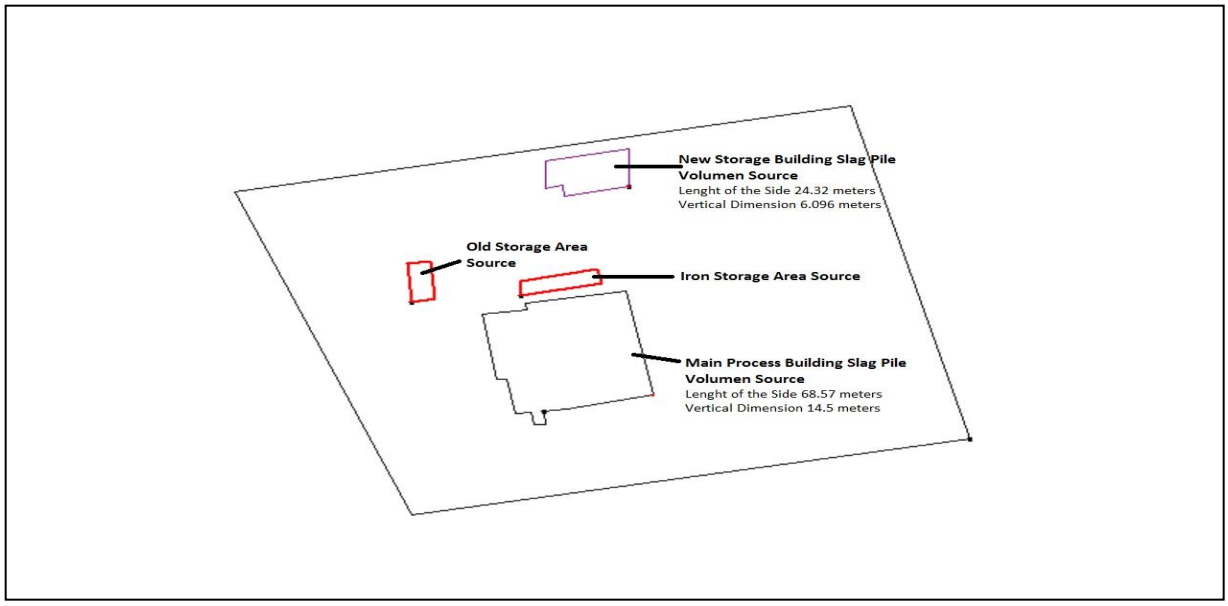
Safetech Corporation

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Ducon Incinerator, HC96-10P Model Two Chambers	PO Box 140909 Arecibo, PR 00634/Lote 30, Santana Industrial Park, Arecibo	Arecibo	562211	50100103	Ducon	746938	2042285	Wet Scrubber	98	0.009	0.009	27.4	1.2	29.6	1276
									Total	0.009	0.009				

Antonio Nery Juarbe Airport

Emission Unit	Address Physical/Postal	Municipality	NAICS	SCC	Point ID	UTM East	UTM North	Control Equipment	Control Efficiency %	Emissions (ton/yr) Allowable	Emissions (ton/yr) Actual	Stack Height (m)	Stack Diameter (m)	Stack Exit Velocity (m/s)	Stack Temperature (K)
Airport	1079 Santana Arecibo, PR 00612-6614	Arecibo	48811		ANJ	785844	2041395	-	-	-	0.00364	-	-	-	-
									Total	-	0.00364				

TBRCI Facility Layout



New Storage Building

σ_{yo} = 24.32 meters/4.3 = 5.66 m

σ_{zo} = 6.096 meters/2.15 = 2.83 m

Main Process Building

σ_{yo} = 68.57 meters/4.3 = 15.94 m

σ_{zo} = 14.5 meters/2.15 = 6.74 m

Old Storage Area Source Tiers

Area Source		
Tiers	Easting m	Northing m
1	743424	2042035
2	743422	2042059
3	743433	2042061
4	743435	2042037

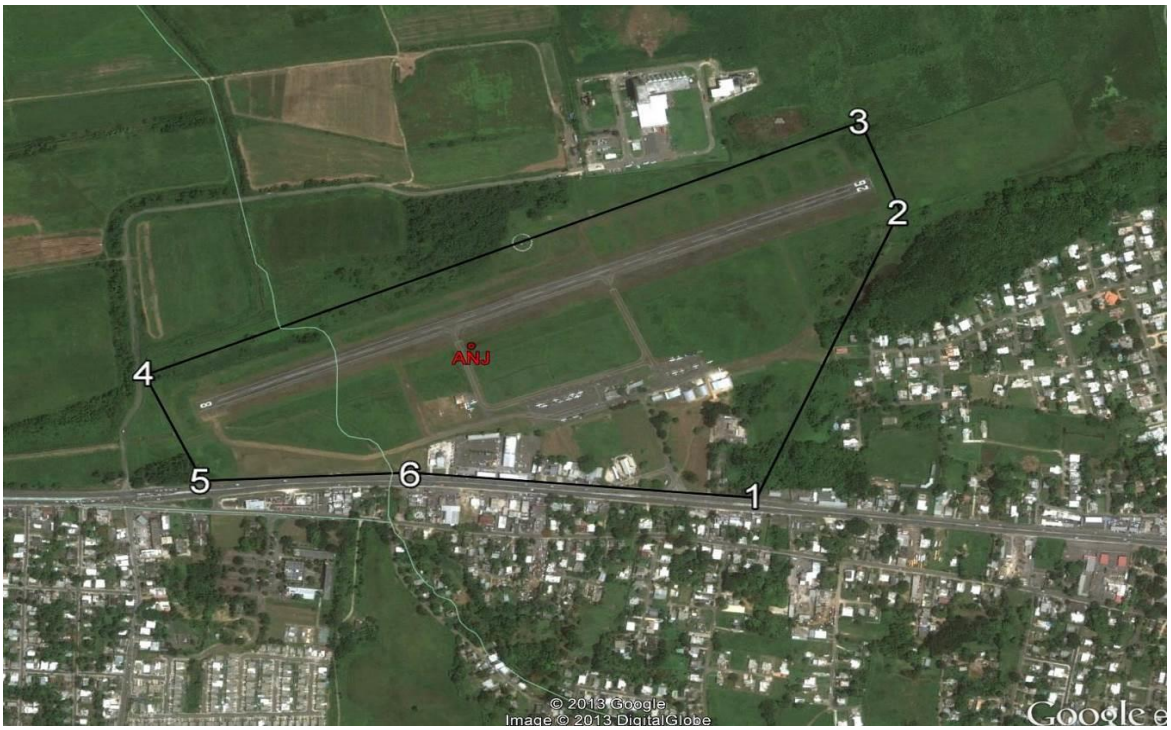
Area = 268 m^2

Iron Storage Area Source Tiers

Area Source		
Tiers	Easting m	Northing m
1	743477	2042039
2	743477	2042048
3	743514	2042056
4	743516	2042047

Area = 350 m^2

ANJ Airport Layout



Area Source Tiers

Tiers	Easting m	Northing m
1	745844	2041395
2	746069	2041924
3	745998	2042096
4	744817	2041576
5	744917	2041372
6	745268	2041396

Area = 506619 m^2

XXIV. APPENDIX D: Attainment Model Results

INTRODUCTION

This document presents the attainment modeling results for the lead non-attainment area in Arecibo. In 2008 EPA promulgated the new National Ambient Air Quality Standard (NAAQS) for the lead rolling 3-month average of 0.15 ug/m^3. The new standard rule required a source oriented air quality monitor in all areas where the lead emissions are equal or more than 0.5 tons/yr.

In June 2010 PREQB installed a source oriented air quality monitor near The Battery Recycling Company Inc, (TBRCI) in Arecibo and capture a lead concentration over the new standard of 0.15 ug/m^3. In 2011, the area was declared as non-attainment for the new lead standard.

PREQB prepared the State Implementation Plan for the Lead Nonattainment Area in Arecibo (Arecibo Lead SIP) and the attainment modeling. The air quality model used for the attainment modeling was AERMOD and this is the current preferred EPA model for air quality modeling studies. The lead emissions used in the attainment modeling study were the projected to 2016.

EMISSION INVENTORY

According to EPA recommendations the following municipalities were revised to prepare the Baseline Emission Inventory 2011 (BEI2011) and the Emission Projections Inventory 2016 (EPI2016): Arecibo, Barceloneta, Ciales, Florida, Hatillo and Utuado. The facilities in the BEI2011 that emit lead in Arecibo are TBRCI, Safetech Corporation, PREPA Cambalache and the Antonio Nery Juarbe Airport (ANJ). The other municipality that has background lead emission sources is Barceloneta and the following facilities were included in the BEI2011: Abbott Laboratories, Merck-Sharp & Dohme, Pfizer Pharmaceuticals LLC and Eaton. All industries were included in the EPI2016 along with the proposed new facilities, Energy Answers and Sunbeam Synergy.

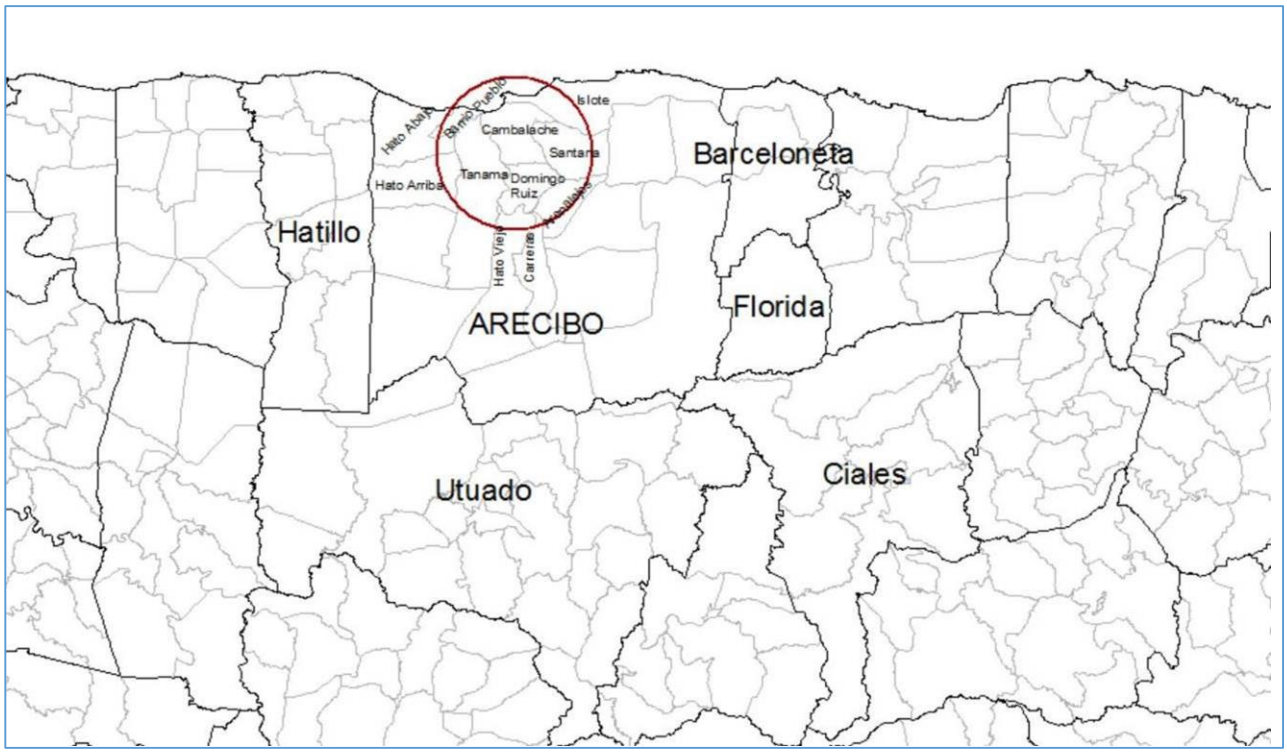
Energy Answers is planning to build a renewable energy plant near TBRCI and their projected lead emissions were included in the attainment model. Sunbean Synergy is also planning to build a renewable energy plant in Barceloneta and their projected lead emissions were also included in the attainment model.

The air quality model used is AERMOD and this is the current preferred EPA model for air quality modeling studies. Following the EPA recommendations for the lead background concentration, a multi-source AERMOD run was performed, using the background lead emissions from facilities nearby Arecibo. The following municipalities were recommended by EPA to be included in the model along with Arecibo: Barceloneta, Ciales, Florida, Hatillo and Utuado.

For the attainment model, an AERMOD run was performed using the lead emissions projected in the EPI2016. The Arecibo lead non-attainment area is a 4 km radio that includes the wards in Arecibo

municipality that could be impacted with high lead concentrations, see Figure D1. This area was selected with the maximum results of the lead designation model using the lead emissions in the BEI2011.

FIGURE D1: ARECIBO LEAD SIP IMPACT AREA



MODEL

The preferred EPA model AERMOD was used in the attainment model. The modeling scenario has all the facilities included in the EPI2016. TBRCI has ceased operations[16], then the only emissions that will be considered in the model are the slag piles fugitive lead emissions. PREQB performed several inspections of the TBRCI facility[17]. According to the inspection reports, TBRCI have four slag piles in their property. One of the piles is inside the main process building, another is inside the new storage building and two others, one in the old storage area and other in the iron storage. The slag piles inside the main process building and the new storage building were modeled as a volume sources and the slag piles in the old storage area and the iron storage were modeled like area sources[18].

EPA Leadpost processor was used for the calculation of the rolling 3-month average using the monthly modeling results. Background concentration was omitted because PREQB does not have a nearby lead air quality monitor that could be representative of the Arecibo area on 2010. The impact of the background lead emissions was evaluated using the multi-source modeling scenario.

[16] See Appendix E.
[17] See Appendix F.
[18] See Appendix C.

METEOROLOGY

One year of site-specific meteorological data from 1992-1993 collected in the PREPA Cambalache station was used in the model. The data was processed using the AERMET new version that incorporates two surface characteristics in cases of missing data. Meteorological data from San Juan station was used for the substitution of the site-specific missing data.

RESULTS

The attainment modeling results are presented in the following tables. The Table D1 presents the lead modeling results for all the facilities in the multi-source model. Table D2 presents the results for the TBRCI slag piles fugitive emissions. The tables include the facility maximum lead monthly concentration, the lead cumulative monthly concentration result, the facility contribution to the rolling 3-month average and their respective receptor coordinates. AERMOD attainment modeling output is in Appendix D-1.

TABLE D1: MULTI-SOURCE AERMOD MODELING RESULTS, ARECIBO LEAD SIP

Industry	Municipality	Results ug/m^3					
		Highest Monthly			Contribution to Rolling 3-Month Average		
		Concentration	East (m)	North (m)	Concentration	East (m)	North (m)
Abbott	Barceloneta	0.00016	756500	2040000	0.333 e^{-5}	743525	2042139
Eaton	Arecibo	0.00009	746250	2041250	0.000	743525	2042139
Merck	Barceloneta	0.0005	758500	2039000	0.333 e^{-5}	743525	2042139
Pfizer	Barceloneta	0.00004	756000	2039500	0.00	743525	2042139
PREPA	Arecibo	0.00063	742000	2043500	0.1 e^{-4}	743525	2042139
Safetech	Arecibo	0.00013	746500	2042000	0.666 e^{-5}	743525	2042139
ANJ	Arecibo	0.054	745500	2041750	0.3866 e^{-3}	743525	2042139
Energy Answers	Arecibo	0.00076	741500	2042000	0.1333 e^{-4}	743525	2042139
Sunbeam	Barceloneta	0.00209	757000	2038500	0.20 e^{-4}	743525	2042139
Battery Recycling	**Arecibo**	**0.11298**	**743530**	**2042140**	**0.9307 e^{-1}**	**743525**	**2042139**
Cumulative Concentration	**-**	**0.11318**	**745530**	**2042140**	**0.9352 e^{-1}**	**743525**	**2042139**

TABLE D2: TBRCI AERMOD MODELING RESULTS, ARECIBO LEAD SIP

TBRCI Emission Points	Model ID	Municipality	Results ug/m^3					
			Highest Monthly			**Contribution to Rolling 3-Month Average**		
			Concentration	East (m)	North (m)	Concentration	East (m)	North (m)
Main Process Building	MAINB	Arecibo	0.00779	743540	2042145	0.5936 e^{-2}	743525	2042139
Old Storage Area Source	SLAGPILE		0.08838	743425	2042120	0.68 e^{-3}	743525	2042139
Iron Storage Area Source	IRONSTO		0.01258	743500	2042134	0.3006 e^{-2}	743525	2042139
New Storage Building	NEWSTOB		0.10226	743530	2042140	0.834 e^{-1}	743525	2042139
Cumulative Concentration	BATTERY		**0.11298**	**743530**	**2042140**	**0.9307 e^{-1}**	**743525**	**2042139**

The impact of the background sources in the Arecibo lead concentration was insignificant, see Table D1. All background concentrations were minimum or none. There was no lead NAAQS exceedance in TBRCI or in any other facility. The multi-source model maximum cumulative monthly result was 0.11318 ug/m^3 with the major contribution from TBRCI emission source, with a maximum lead monthly concentration of 0.11298 ug/m^3. These concentrations were registered at the same receptor, at the TBRCI property fenceline, see Figures D2 & D3.

The rolling 3-month average for the multi-source model was 0.09352 ug/m^3 with the major contribution from TBRCI with a rolling 3-month average of 0.09307 ug/m^3. Both results were registered at the same receptor at the TBRCI property or 743525 East/ 2042139 North. See Figure D4.

.

Figure D2: Arecibo Lead SIP, Multi-Source Modeling Scenario, Maximum Monthly Results, ug/m^3

Figure D3: Arecibo Lead SIP, Multi-Source Modeling Scenario, TBRCI Maximum Monthly Results, ug/m^3

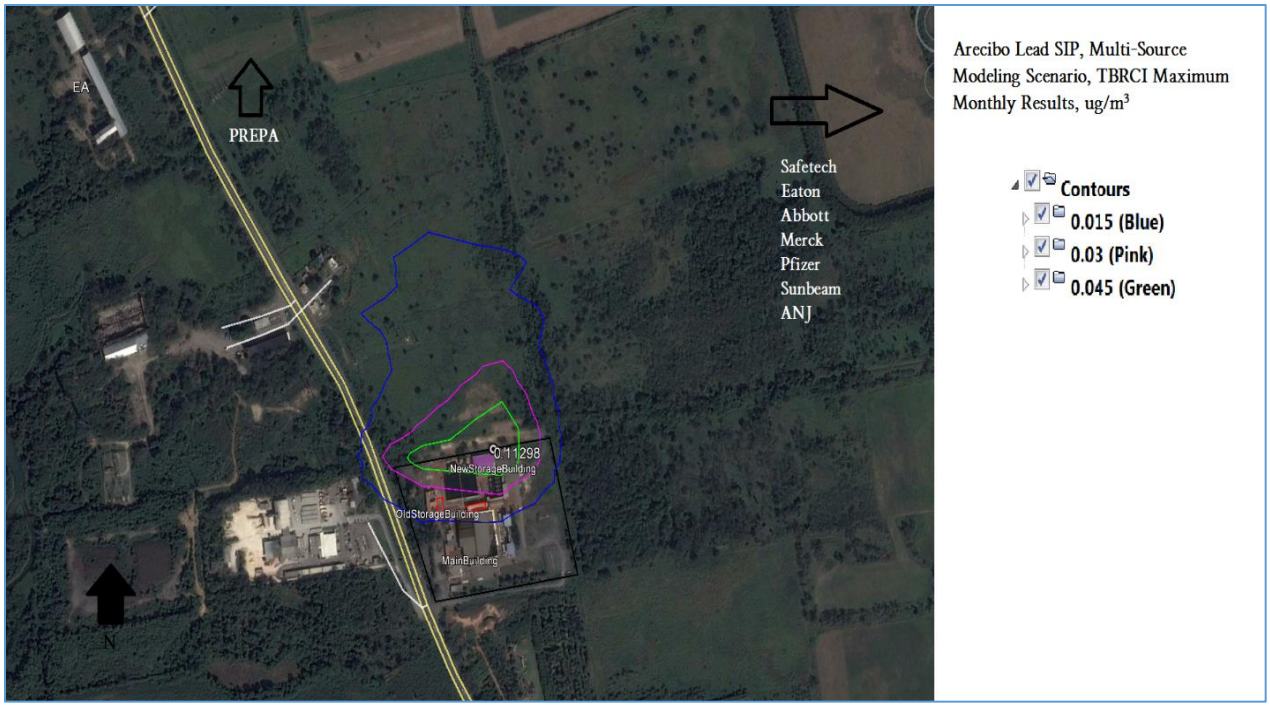


Figure D4: Arecibo Lead SIP, Multi-Source Modeling Scenario, Rolling 3-Month Average, ug/m^3

TBRCI model results do not exceeded the lead NAAQS. The highest monthly result for the TBRCI facility was 0.11298 ug/m^3 at a fenceline receptor or 743530 East/2042140 North, see Figure D3. The major contributor for this concentration was the slag pile inside the new storage building emission point, with a maximum monthly result of 0.1026 ug/m^3 at the same receptor. The highest monthly result for the slag pile inside the main process building was 0.00779 ug/m^3 at a nearby fenceline receptor or 743540 East/2042145 North, see Figures D5 and D6.

The highest monthly result for the slag piles in the area sources was 0.08838 ug/m^3 at 743425 East/2042120 North for the old storage building and for the iron storage area was 0.01258 ug/m^3 at 743500 East/2042134 North, see Figures D7 and D8. TBRCI have the maximum contribution to the multi-source model cumulative rolling 3-month average lead NAAQS.

The leadpost output is in Figure D9 with the rolling 3-month average NAAQS for all the facilities included in the attainment modeling and the cumulative result. The multi-source lead model rolling 3-month average was 0.09352 ug/m^3. The leadpost output shows that the facility with the maximum contribution to the rolling 3-month average is TBRCI with 0.09307 ug/m^3. The contribution of other facilities to this result were insignificant or none. See Tables D1 and D2.

Figure D5: Arecibo Lead SIP, Multi-Source Modeling Scenario, Slag Pile New Storage Building Emission Point Maximum Monthly Results, ug/m^3

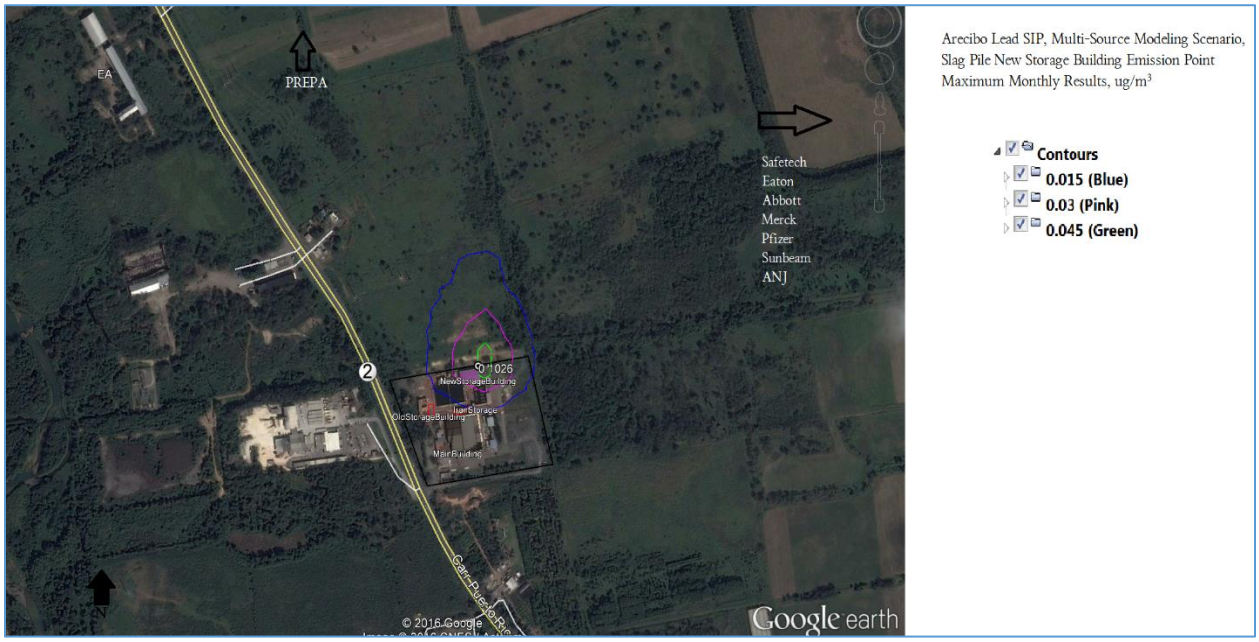


Figure D6: Arecibo Lead SIP, Multi-Source Modeling Scenario, Main Building Slag Pile Emission Point Maximum Monthly Results, ug/m^3

Figure D7: Arecibo Lead SIP, Multi-Source Modeling Scenario, Old Storage Building Slag Pile Emission Point Maximum Monthly Results, ug/m^3

Figure D8: Arecibo Lead SIP, Multi-Source Modeling Scenario, Iron Storage Area Slag Pile Emission Point Maximum Monthly Results, ug/m^3

Figure D9: Arecibo Lead Sip, Multi-Source Modeling Scenario, Leadpost Output

```
################################## SUMMARY ################################
Overall maximum 3-month averaged concentration
With individual source contributions

Month     Year          X            Y       Elev   Hill ht  Flagpole
November  1992   743525.31250  2042139.25000      3.00      3.00      0.00

Group     Concentration
ALL       0.935233E-01
BATTERY   0.930733E-01
NEWSTOB   0.834600E-01
MAINB     0.593667E-02
IRONSTO   0.300667E-02
SLAGPILE  0.680000E-03
ANJ       0.386667E-03
SUNBEAM   0.200000E-04
ENERGYA   0.133333E-04
PREPA     0.100000E-04
SAFETECH  0.666667E-05
ABBOTT    0.333333E-05
MERCK     0.333333E-05
EATON     0.000000E+00
PFIZERB   0.000000E+00

Monthly average concentrations for maximum 3-month average concentration

ALL       0.907900E-01 September  1992
BATTERY   0.902100E-01 September  1992
NEWSTOB   0.821600E-01 September  1992
MAINB     0.576000E-02 September  1992
IRONSTO   0.204000E-02 September  1992
SLAGPILE  0.260000E-03 September  1992
ANJ       0.530000E-03 September  1992
SUNBEAM   0.200000E-04 September  1992
ENERGYA   0.100000E-04 September  1992
PREPA     0.100000E-04 September  1992
SAFETECH  0.100000E-04 September  1992
ABBOTT    0.000000E+00 September  1992
MERCK     0.000000E+00 September  1992
EATON     0.000000E+00 September  1992
PFIZERB   0.000000E+00 September  1992

ALL       0.109720E+00 October    1992
BATTERY   0.109520E+00 October    1992
NEWSTOB   0.979300E-01 October    1992
MAINB     0.699000E-02 October    1992
IRONSTO   0.440000E-02 October    1992
SLAGPILE  0.210000E-03 October    1992
```

Figure 9: Arecibo Lead SIP, Multi-Source Modeling Scenario, Leadpost Output (Continued)

```
ANJ       0.140000E-03 October    1992
SUNBEAM   0.100000E-04 October    1992
ENERGYA   0.200000E-04 October    1992
PREPA     0.200000E-04 October    1992
SAFETECH  0.000000E+00 October    1992
ABBOTT    0.000000E+00 October    1992
MERCK     0.000000E+00 October    1992
EATON     0.000000E+00 October    1992
PFIZERB   0.000000E+00 October    1992

ALL       0.800600E-01 November   1992
BATTERY   0.794900E-01 November   1992
NEWSTOB   0.702900E-01 November   1992
MAINB     0.506000E-02 November   1992
IRONSTO   0.258000E-02 November   1992
SLAGPILE  0.157000E-02 November   1992
ANJ       0.490000E-03 November   1992
SUNBEAM   0.300000E-04 November   1992
ENERGYA   0.100000E-04 November   1992
PREPA     0.000000E+00 November   1992
SAFETECH  0.100000E-04 November   1992
ABBOTT    0.100000E-04 November   1992
MERCK     0.100000E-04 November   1992
EATON     0.000000E+00 November   1992
PFIZERB   0.000000E+00 November   1992


##########################################################################
```

CONCLUSION

The multi-source lead model for the Arecibo SIP showed compliance with the rolling 3-month average lead NAAQS. According to the model results, no exceedances of the standard were present in the area. All concentrations were below the 0.15 ug/m^3 lead standard, therefore the rolling 3-month average was below the NAAQS. The maximum monthly concentration was registered at the TBRCI property and do not exceeded the standard. The TBRCI maximum monthly results and the rolling 3-month average were below the lead NAAQS. Therefore, the AERMOD model for the State Implementation Plan for the Lead Nonattainment Area in Arecibo, demonstrate attainment with the rolling 3-month average lead NAAQS.

XXV. APPENDIX D-1: Attainment Modeling Results

*** AERMOD - VERSION 15181 *** *** Lead Multi Source Model with Fenceline Receptors 2015 (23% of PB in *** 02/02/16
*** AERMET - VERSION 15181 *** *** Multi-Source Model with TBRCI Shutdown only Slag Piles Emissions Con *** 14:17:55
PAGE 1

**MODELOPTs: RegDFAULT CONC ELEV NODRYDPLT NOWETDPLT RURAL

*** MODEL SETUP OPTIONS SUMMARY ***

**Model Is Setup For Calculation of Average CONCentration Values.

-- DEPOSITION LOGIC --
**NO GAS DEPOSITION Data Provided.
**NO PARTICLE DEPOSITION Data Provided.
**Model Uses NO DRY DEPLETION. DRYDPLT = F
**Model Uses NO WET DEPLETION. WETDPLT = F

**Model Uses RURAL Dispersion Only.

**Model Uses Regulatory DEFAULT Options:
1. Stack-tip Downwash.
2. Model Accounts for ELEVated Terrain Effects.
3. Use Calms Processing Routine.
4. Use Missing Data Processing Routine.
5. No Exponential Decay.

**Other Options Specified:
CCVR_Sub - Meteorological data includes CCVR substitutions

**Model Assumes No FLAGPOLE Receptor Heights.

**The User Specified a Pollutant Type of: OTHER

**Model Calculates 1 Short Term Average(s) of: MONTH

**This Run Includes: 25 Source(s); 15 Source Group(s); and 7485 Receptor(s)

with: 20 POINT(s), including
0 POINTCAP(s) and 0 POINTHOR(s)
and: 2 VOLUME source(s)
and: 3 AREA type source(s)
and: 0 LINE source(s)
and: 0 OPENPIT source(s)

**Model Set To Continue RUNning After the Setup Testing.

**The AERMET Input Meteorological Data Version Date: 15181

**Output Options Selected:
Model Outputs Tables of Highest Short Term Values by Receptor (RECTABLE Keyword)
Model Outputs External File(s) of Concurrent Values for Postprocessing (POSTFILE Keyword)
Model Outputs External File(s) of High Values for Plotting (PLOTFILE Keyword)
Model Outputs Separate Summary File of High Ranked Values (SUMMFILE Keyword)

**NOTE: The Following Flags May Appear Following CONC Values: c for Calm Hours
m for Missing Hours
b for Both Calm and Missing Hours

**Misc. Inputs: Base Elev. for Pot. Temp. Profile (m MSL) = 10.00 ; Decay Coef. = 0.000 ; Rot. Angle = 0.0
Emission Units = GRAMS/SEC ; Emission Rate Unit Factor = 0.10000E+07
Output Units = MICROGRAMS/M**3

**Approximate Storage Requirements of Model = 10.5 MB of RAM.

**Input Runstream File: Attainmentleadmodel201523%Pb_2yrs_OTHER.DTA
**Output Print File: Attainmentleadmodel201523%Pb_2yrs_OTHER.LST

**File for Summary of Results: C:\Documents Elianeth\D\My DocumentsINFORMES\LeadST\LEADSIP\LeadSIP2015\Model20153rdscenario23%P

*** AERMOD - VERSION 15181 *** *** Lead Multi Source Model with Fenceline Receptors 2015 (23% of PB in *** 02/02/16
*** AERMET - VERSION 15181 *** *** Multi-Source Model with TBRCI Shutdown only Slag Piles Emissions Con *** 14:17:55
PAGE 2
**MODELOPTs: RegDFAULT CONC ELEV NODRYDPLT NOWETDPLT RURAL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

*** AERMOD - VERSION 15181 *** *** Lead Multi Source Model with Fenceline Receptors 2015 (23% of PB in *** 02/02/16
*** AERMET - VERSION 15181 *** *** Multi-Source Model with TBRCI Shutdown only Slag Piles Emissions Con *** 14:17:55
PAGE 3
**MODELOPTs: RegDFAULT CONC ELEV NODRYDPLT NOWETDPLT RURAL

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: ARE.SFC Met Version: 15181
Profile file: ARE.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 11641 Upper air station no.: 11641
Name: UNKNOWN Name: UNKNOWN
Year: 1992 Year: 1992

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
92	08	12	225	01	-19.1	0.185	-9.000	-9.000	-999.	191.	30.0	0.19	0.28	1.00	2.60	122.	10.0	295.9	2.0
92	08	12	225	02	-10.6	0.111	-9.000	-9.000	-999.	90.	11.7	0.19	0.28	1.00	2.20	126.	10.0	295.2	2.0
92	08	12	225	03	-17.1	0.165	-9.000	-9.000	-999.	162.	24.0	0.19	0.28	1.00	2.50	134.	10.0	295.2	2.0
92	08	12	225	04	-19.2	0.234	-9.000	-9.000	-999.	272.	60.6	0.19	0.28	1.00	2.80	139.	10.0	294.6	2.0
92	08	12	225	05	-19.1	0.234	-9.000	-9.000	-999.	271.	60.6	0.14	0.28	1.00	3.00	158.	10.0	295.0	2.0
92	08	12	225	06	-18.1	0.221	-9.000	-9.000	-999.	250.	54.1	0.19	0.28	1.00	2.70	139.	10.0	294.6	2.0
92	08	12	225	07	-11.4	0.234	-9.000	-9.000	-999.	271.	101.7	0.19	0.28	0.53	2.60	139.	10.0	294.9	2.0
92	08	12	225	08	26.7	0.296	0.489	0.005	158.	386.	-87.7	0.19	0.28	0.24	2.70	127.	10.0	297.2	2.0
92	08	12	225	09	62.6	0.651	1.015	0.005	606.	1261.	-399.9	0.19	0.28	0.16	6.30	106.	10.0	299.0	2.0
92	08	12	225	10	93.1	0.660	1.260	0.005	780.	1286.	-280.0	0.10	0.28	0.15	7.40	96.	10.0	302.4	2.0
92	08	12	225	11	115.9	0.697	1.391	0.005	843.	1393.	-264.7	0.10	0.28	0.14	7.80	73.	10.0	304.0	2.0
92	08	12	225	12	129.7	0.858	1.493	0.006	932.	1900.	-440.9	0.10	0.28	0.14	9.70	62.	10.0	303.9	2.0
92	08	12	225	13	133.6	0.808	1.582	0.006	1076.	1749.	-357.4	0.10	0.28	0.14	9.10	63.	10.0	304.0	2.0
92	08	12	225	14	130.0	0.799	1.640	0.006	1231.	1715.	-355.1	0.10	0.28	0.14	9.00	63.	10.0	303.1	2.0
92	08	12	225	15	116.0	0.688	1.628	0.005	1351.	1390.	-254.7	0.10	0.28	0.14	7.70	68.	10.0	301.0	2.0
92	08	12	225	16	94.3	0.685	1.554	0.005	1444.	1362.	-309.2	0.10	0.28	0.15	7.70	70.	10.0	301.0	2.0
92	08	12	225	17	65.0	0.715	1.392	0.006	1504.	1448.	-508.2	0.10	0.28	0.16	8.10	74.	10.0	300.8	2.0

92 08 12 225 18 29.9 0.683 1.081 0.006 1531. 1359. -967.2 0.10 0.28 0.23 7.80 77. 10.0 300.5 2.0

92 08 12 225 19 -13.6 0.665 -9.000 -9.000 -999. 1304. 1962.5 0.10 0.28 0.50 7.70 80. 10.0 300.0 2.0
92 08 12 225 20 -44.1 0.432 -9.000 -9.000 -999. 739. 165.6 0.10 0.28 1.00 5.30 87. 10.0 299.1 2.0
92 08 12 225 21 -40.9 0.399 -9.000 -9.000 -999. 607. 140.6 0.19 0.28 1.00 4.30 102. 10.0 298.1 2.0
92 08 12 225 22 -25.2 0.244 -9.000 -9.000 -999. 308. 52.6 0.19 0.28 1.00 3.00 128. 10.0 296.8 2.0
92 08 12 225 23 -9.7 0.106 -9.000 -9.000 -999. 102. 11.2 0.19 0.28 1.00 2.10 109. 10.0 296.6 2.0
92 08 12 225 24 -22.9 0.222 -9.000 -9.000 -999. 252. 43.5 0.10 0.28 1.00 3.20 92. 10.0 296.4 2.0

First hour of profile data
YR MO DY HR HEIGHT F WDIR WSPD AMB_TMP sigmaA sigmaW sigmaV
92 08 12 01 2.0 0 -999. -99.00 296.0 99.0 -99.00 -99.00
92 08 12 01 10.0 1 122. 2.60 -999.0 99.0 -99.00 -99.00

F indicates top of profile (=1) or below (=0)

*** AERMOD - VERSION 15181 *** *** Lead Multi Source Model with Fenceline Receptors 2015 (23% of PB in *** 02/02/16
*** AERMET - VERSION 15181 *** *** Multi-Source Model with TBRCI Shutdown only Slag Piles Emissions Con *** 14:17:55
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**MODELOPTs: RegDFAULT CONC ELEV NODRYDPLT NOWETDPLT RURAL

*** THE SUMMARY OF HIGHEST MONTH RESULTS ***

** CONC OF OTHER IN MICROGRAMS/M**3 **

GROUP ID		AVERAGE CONC	DATE (YYMMDDHH)	NETWORK RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	OF TYPE	GRID-ID
ALL	HIGH 1ST HIGH VALUE IS	0.11318m	ON 92103124:	AT (743530.00, 2042140.00, 3.00, 3.00, 0.00)	DC	
	HIGH 2ND HIGH VALUE IS	0.09914m	ON 93043024:	AT (743525.30, 2042139.24, 3.00, 3.00, 0.00)	DC	
ABBOTT	HIGH 1ST HIGH VALUE IS	0.00016m	ON 93073124:	AT (756500.00, 2040000.00, 95.00, 128.00, 0.00)	DC	
	HIGH 2ND HIGH VALUE IS	0.00015	ON 93063024:	AT (756500.00, 2040000.00, 95.00, 128.00, 0.00)	DC	
EATON	HIGH 1ST HIGH VALUE IS	0.00009	ON 92083124:	AT (746250.00, 2041250.00, 13.00, 13.00, 0.00)	DC	
	HIGH 2ND HIGH VALUE IS	0.00008m	ON 93073124:	AT (746250.00, 2041250.00, 13.00, 13.00, 0.00)	DC	
MERCK	HIGH 1ST HIGH VALUE IS	0.00050m	ON 93073124:	AT (758500.00, 2039000.00, 89.00, 167.00, 0.00)	DC	
	HIGH 2ND HIGH VALUE IS	0.00039	ON 92083124:	AT (758500.00, 2039000.00, 89.00, 167.00, 0.00)	DC	
PFIZERB	HIGH 1ST HIGH VALUE IS	0.00004	ON 92083124:	AT (756000.00, 2039500.00, 85.00, 121.00, 0.00)	DC	
	HIGH 2ND HIGH VALUE IS	0.00003	ON 93053124:	AT (756000.00, 2039500.00, 85.00, 121.00, 0.00)	DC	
PREPA	HIGH 1ST HIGH VALUE IS	0.00063m	ON 93073124:	AT (742000.00, 2043500.00, 0.00, 0.00, 0.00)	DC	
	HIGH 2ND HIGH VALUE IS	0.00057	ON 92083124:	AT (742000.00, 2043500.00, 0.00, 0.00, 0.00)	DC	
SAFETECH	HIGH 1ST HIGH VALUE IS	0.00013	ON 92083124:	AT (746500.00, 2042000.00, 5.67, 5.67, 0.00)	DC	
	HIGH 2ND HIGH VALUE IS	0.00011m	ON 93073124:	AT (746500.00, 2042000.00, 5.67, 5.67, 0.00)	DC	

ENERGYA HIGH 1ST HIGH VALUE IS 0.00076m ON 93073124: AT (741500.00, 2042000.00, 3.00, 3.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.00067 ON 92083124: AT (741500.00, 2042000.00, 3.00, 3.00, 0.00) DC

BATTERY HIGH 1ST HIGH VALUE IS 0.11298m ON 92103124: AT (743530.00, 2042140.00, 3.00, 3.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.09889m ON 93043024: AT (743525.30, 2042139.24, 3.00, 3.00, 0.00) DC

ANJ HIGH 1ST HIGH VALUE IS 0.05404m ON 93043024: AT (745500.00, 2041750.00, 7.00, 7.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.05397 ON 92113024: AT (745500.00, 2041750.00, 7.00, 7.00, 0.00) DC

MAINB HIGH 1ST HIGH VALUE IS 0.00779m ON 92103124: AT (743545.00, 2042145.00, 3.00, 3.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.00667m ON 93043024: AT (743530.00, 2042140.00, 3.00, 3.00, 0.00) DC

SLAGPILE HIGH 1ST HIGH VALUE IS 0.08838m ON 92103124: AT (743425.14, 2042120.37, 7.00, 7.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.07958m ON 93043024: AT (743425.14, 2042120.37, 7.00, 7.00, 0.00) DC

SUNBEAM HIGH 1ST HIGH VALUE IS 0.00209m ON 93073124: AT (757000.00, 2038500.00, 110.67, 200.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.00191 ON 92083124: AT (757000.00, 2038500.00, 110.67, 200.00, 0.00) DC

IRONSTO HIGH 1ST HIGH VALUE IS 0.01258m ON 92103124: AT (743495.00, 2042135.00, 3.00, 7.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.01178m ON 93043024: AT (743495.00, 2042135.00, 3.00, 7.00, 0.00) DC

NEWSTOB HIGH 1ST HIGH VALUE IS 0.10226m ON 92103124: AT (743530.00, 2042140.00, 3.00, 3.00, 0.00) DC
HIGH 2ND HIGH VALUE IS 0.08662m ON 93043024: AT (743525.30, 2042139.24, 3.00, 3.00, 0.00) DC

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

*** AERMOD - VERSION 15181 *** *** Lead Multi Source Model with Fenceline Receptors 2015 (23% of PB in *** 02/02/16
*** AERMET - VERSION 15181 *** *** Multi-Source Model with TBRCI Shutdown only Slag Piles Emissions Con *** 14:17:55
PAGE 5
**MODELOPTs: RegDFAULT CONC ELEV NODRYDPLT NOWETDPLT RURAL

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 8 Warning Message(s)
A Total of 96 Informational Message(s)

A Total of 8760 Hours Were Processed

A Total of 0 Calm Hours Identified

A Total of 96 Missing Hours Identified (1.10 Percent)

******** FATAL ERROR MESSAGES ********
*** NONE ***

******** WARNING MESSAGES ********

SO W320	76	PPARM: Input Parameter May Be Out-of-Range for Parameter	VS
SO W320	95	PPARM: Input Parameter May Be Out-of-Range for Parameter	VS
OU W565	7624	OUPOST: Possible Conflict With Dynamically Allocated FUNIT	POSTFILE
OU W565	7625	OUPOST: Possible Conflict With Dynamically Allocated FUNIT	POSTFILE
OU W565	7633	OUPOST: Possible Conflict With Dynamically Allocated FUNIT	POSTFILE
OU W565	7634	OUPOST: Possible Conflict With Dynamically Allocated FUNIT	POSTFILE
OU W565	7635	OUPOST: Possible Conflict With Dynamically Allocated FUNIT	POSTFILE
OU W565	7636	OUPOST: Possible Conflict With Dynamically Allocated FUNIT	POSTFILE

XXVI. APPENDIX E: TBRCI Shutdown Notification

Copy of the notification.

XXVI. APPENDIX F: PREQB Inspection Report

Copy of the Report

XXVII. APPENDIX G: Translation of R-15-9-6

Copy of the Resolution

XXVIII. APPENDIX H: Assumptions for the TBRCI Lead Emissions Modeling

Copy of the Memorandum