Excerpt 2

Fact Sheet (English), dated May, 2012 ("FS"), AR IV.4

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2

290 Broadway
New York, NY 10007-1866

FACT SHEET

For a Clean Air Act
Prevention of Significant Deterioration of Air Quality
Draft Permit

ENERGY ANSWERS ARECIBO, LLC
ARECIBO PUERTO RICO RENEWABLE ENERGY ROJECT
ARECIBO, PUERTO RICO

Table of Contents

I. Background

On February 8, 2011, Energy Answers Arecibo, LLC (Energy Answers, or the applicant) submitted an air permit application to EPA Region 2 Office (EPA) requesting a Prevention of Significant Deterioration (PSD) permit for the construction and operation of a new 77 MW (megawatts) resource recovery facility, known as the Arecibo Puerto Rico Renewable Energy Project, in Arecibo, Puerto Rico (PR). Subsequently, Energy Answers submitted other documents on various dates to support its application. EPA considers the receipt of the additional information on October 31, 2011 as completing the application for this draft permit.

After reviewing the PSD application and the additional information, EPA prepared this Fact Sheet and draft PSD permit for the proposed Arecibo Puerto Rico Renewable Energy Project as required by 40 CFR Part 124 "Procedures for Decision Making."

II. Project Location

The proposed Arecibo Puerto Rico Renewable Energy Project will be located at the former site of the Global Fibers Paper Mill in Barrio Cambalache, Arecibo, PR. Energy Answers' project will be constructed on approximately 42 acres of the 80-acre site. Currently, the area in which the Energy Answers' facility is proposed is designated as meeting all National Ambient Air Quality Standards (NAAQS) promulgated to protect public health, except for lead (Pb).

III. Project Description

Energy Answers proposes to construct a resource recovery facility (project) capable of producing up to 77 MW of electrical power through the combustion of municipal solid waste (MSW), as the primary fuel. The project will consist of two municipal waste combustors, a steam turbine - electrical generator, ash handling system, storage silos, emergency equipment, storage tanks, and a cooling tower. Details are provided below based on information provided to EPA by the applicant.

A. Municipal Waste Combustors

The project will include two identical municipal waste combustors units (i.e., spreader-stoker boilers), designed to combust refuse-derived fuel (RDF) as the primary fuel. RDF is shredded MSW with most of the metal content removed and recycled. The two municipal waste combustors will be permitted at a maximum combined RDF consumption rate of 2,106 tons per day (TPD). Each municipal waste combustor will be permitted at a maximum capacity of 398,840 pounds (lb) of steam per hour that will be delivered to a steam turbine generator capable of producing up to 77 MW output of electricity. Each municipal waste combustor

will be equipped with three auxiliary burners that will combust ultra low sulfur distillate (ULSD) fuel oil No.2 with a maximum sulfur concentration of 0.0015 percent (%) by weight during warmup and shutdown periods, and to maintain the combustors' chamber temperature during potentially short-term interruptions of the waste supply.

B. Municipal Waste Combustors Fuel Characterization

The MSW will be delivered by street collection vehicles, and trucks; after passing radiation detection devices, the MSW will be weighed, and then unloaded on a tipping floor inside the MSW storage area that will be an enclosed building. Next, the MSW will be processed to remove all non-MSW and bulky-recyclable materials. The remaining waste will be shredded (inside the MSW enclosed processing building), and further processed to magnetically remove a portion (approximately 70 %) of the ferrous metal that is recycled. The shredded waste with the metal content removed, now called refuse-derived fuel (RDF), will move through enclosed conveyors to the RDF storage area (also an enclosed building) located next to the municipal waste combustors. From the storage area, the RDF will be distributed through conveyors to the municipal waste combustors that will be located in an enclosed building.

The MSW will be limited, exclusively, to the materials and items that qualify as municipal solid waste under the provisions of federally regulations entitled 40 CFR 60 Subpart Eb "New Source Performance Standards for Large Municipal Waste Combustors (Subpart Eb)". Subpart Eb regulates emissions of nine pollutants (nitrogen oxides: NO_x, carbon monoxide: CO, particulate matter: PM, mercury: Hg, Pb, cadmium: Cd, sulfur dioxide: SO_2, Dioxin and Furans: D/F, and hydrogen chloride: HCL) from municipal waste combustor units with capacity greater than 250 TPD of municipal solid waste constructed after September 20, 1994. Energy Answers' project is subject to Subpart Eb's provisions.

Subpart Eb standards were developed under Clean Air Act (CAA) section 111(b) "Standard of Performance for New Stationary Sources" and CAA section 129 "New Source Performance Standards for Solid Waste Combustion." Under section 129, the emission standards and guidelines adopted for municipal waste combustors must be based on Maximum Achievable Control Technology (MACT). Therefore, even though there is no National Emission Standards for Hazardous Air Pollutants promulgated under 40 CFR Part 63 applicable to municipal waste combustors; Subpart Eb emissions limitations reflect a MACT level of performance

While the RDF remains the primary fuel the applicant proposes to use, when available, the following are the maximum daily amounts of supplementary fuels for the two combustors (combined):

- Tire-derived fuel (TDF) 330 TPD
- Auto-shredder residue (ASR) 286 TPD
- Processed urban wood waste (PUWW) 898 TPD

The supplementary fuels will be substituted for a portion of the RDF normally charged to the combustors. These fuels will only be combusted and blended with RDF, and only one supplementary fuel at a time will be present in the RDF mixture fed to the municipal waste combustors. The supplementary fuels will be delivered separately, unloaded, shredded (except for the ASR, that will be delivered in a shredded form) and stored in a designated area in the MSW storage area, and then either blended with MSW prior to shredding or blended directly into the RDF stream prior to combustion. The municipal waste combustors will meet the same emission limits, when combusting RDF alone or in combination with supplementary fuels.

The ASR will be required to be free of fluids, batteries, air bags, mercury switches, or catalytic converters, and the PUWW will be required to be free of paint, stain, coatings, or wood preservatives (such as formaldehyde, copper, chromium, arsenate, creosote, or pentachlorophenol, etc.,). In addition, the TDF will be required to be made from de-wired scrap tires (de-wired scrap is defined as scrap tires with their metal content removed).

Before using any of the supplementary fuels, the applicant will conduct a combustion demonstration to verify the efficiency of the control equipment in reducing the air pollutants resulting from the combustion of these fuels. In addition, during the combustion demonstration period, the applicant will determine the maximum acceptable content of chlorine and heavy metals in ASR for which the hydrogen chloride and heavy metals emissions limits specified in the draft permit will be continuously met. Documentation provided by the supplier(s) showing the ASR's chlorine and heavy metals content will be required for each delivery. The applicant will be allowed to combust only ASR meeting the chlorine and heavy metals content criteria. Additional information regarding the supplementary fuels combustion demonstration period are provided in the draft permit (Enclosure 1).

C. Ash Handling System

The ash resulting from the municipal waste combustors will consist of two types: fly ash and bottom ash. Fly ash refers to the fine particles that are carried by the combustion gases (or flue gas) to the air pollution control equipment where they are collected and removed. After collection, the fly ash generated at the facility will be transported to a fly ash storage silo, via enclosed conveyors. From the silo, after being hydrated via a pug mill mixer, the fly ash will be transported for offsite disposal. The bottom ash is the heavier fraction of the ash that remains on the municipal waste combustors grates. The bottom ash generated at the facility will be collected and continuously removed, via enclosed conveyors, and

temporarily stockpiled in enclosed storage bunkers. From this point, the bottom ash will be transported, via enclosed conveyors, to the Bottom Ash Processing Activities Building, where it will be separated into ferrous metal, non-ferrous metal, and Boiler Aggregate TM (proprietary technology developed by Energy Answers and defined as a granular material recovered from bottom ash that is used as a substitute for conventional aggregate in construction products). The draft permit does not authorize the disposal or beneficial use of any ash or Boiler Aggregate TM, unless the applicant receives the Puerto Rico Environmental Quality Board Solid Waste Program approval for a specific disposal method or beneficial use. A list of the ash handling system emissions units is provided in Enclosure I.

D. Storage Silos

Two storage silos will be constructed to store the powdered activated carbon and the lime that will be used for the municipal waste combustors air pollution control equipment. The carbon and lime will be pneumatically conveyed from the bulk delivery truck into the storage silos and from the silos to the municipal waste combustors.

E. Emergency Equipment

The project will include a 670 brake horsepower (BHP) emergency diesel generator, which will be used when normal electrical power supply to the facility is interrupted, and a 335 BHP emergency diesel fire water pump, which will be used for fighting fires when no electricity is available at the facility.

New compression ignition engines are required to be certified in compliance with 40 CFR 60, Subpart IIII- New Source Performance Standards for Stationary Compression Ignition Internal Combustion Engines, including emission limits, upon purchase. Since different types of engines (e.g., emergency diesel generator, emergency fire-pump, and non-emergency engine) have different emission requirements, to comply with Subpart IIII requirements, the applicant will purchase engines that meet the specific emission requirements for emergency engines and for emergency fire pump engines.

The emergency generator will have a fuel-efficient certified engine, that will be at least model year 2010, and it will comply with all applicable provisions of Subpart IIII. The emergency fire pump will be the most fuel-efficient National Fire Protection Association (NFPA-20) certified fire pump available, that will be at least model year 2010, and it will also comply with all applicable provisions of Subpart IIII.

The emergency diesel generator and the emergency diesel pump will not be operated for more than 500 hours per year each, for emergency use, maintenance, and readiness testing purposes (combined), and these engines will be exclusively

fired on ULSD fuel oil No.2 with a maximum sulfur concentration of 0.0015 % by weight.

F. Storage Tanks

The project will include a 12,000 gallon aboveground, double walled, unpressurized tank to store aqueous ammonia solution containing 19% ammonia by volume. The ammonia will be used as a reagent for the Regenerative Catalytic Reduction (RSCR) - Selective Catalytic Reduction (SCR) module that is designed to reduce the NO_x emissions resulting from the municipal waste combustors. The applicant will implement work practices and measures to prevent, detect and correct any accidents, or ammonia leaks that may occur from the storage tank. Detailed information regarding these measures, monitoring and reporting requirements are provided in Enclosure I.

Three aboveground storage tanks will also be installed as part of the project to store distillate fuel oil No.2. This includes: (1) a 50,000 gallon tank that will serve the municipal waste combustor units and the RSCR units; (2) a 2,000 gallon tank that will serve the emergency generator; and (3) a 500 gallon tank that will serve the emergency fire pump.

G. Cooling Tower

The project will include a "four-cell" mechanical draft, evaporative (wet) type, cooling tower system. The purpose of the cooling tower is to condense the exhaust steam from the steam turbine.

IV. PSD Program Applicability and Review

The PSD regulations at 40 CFR Part 52.21 are intended to protect air quality in "attainment areas," which are areas that meet EPA's NAAQS, as well as in unclassifiable areas. The PSD regulations require major new stationary sources or major modifications to existing major stationary sources to undergo PSD review and to receive a PSD permit before commencement of construction.

The PSD regulations (40 CFR Part 52.21 (b) (1)) define a "major stationary source" as either (a) any of 28 stationary source categories identified in the CAA with potential emissions of 100 tons per year (TPY) or more of any regulated NSR pollutant, or (b) any other stationary source with potential emissions of 250 TPY or more of any regulated NSR pollutant. Municipal incinerators capable of charging more than 250 tons of refuse (i.e. MSW) per day, such as the Arecibo Puerto Rico Renewable Energy Project, are included in one of the 28 PSD designated stationary source categories. Consequently, Energy Answers is subject to the 100 TPY of potential emissions threshold.

EPA administers the PSD program in Puerto Rico and therefore is responsible for issuing PSD permits for major new stationary sources or major modifications to existing major stationary sources. Whenever a new major stationary source or a major modification is constructed, the source must apply for and obtain a PSD permit that meets regulatory requirements including:

- Best Available Control Technology (BACT), which is an emissions limitation based on the maximum degree of reduction achievable for each pollutant based on specific factors;

- An ambient air quality analysis that demonstrates all the emission increases do not cause or contribute to a violation of any applicable PSD increment or NAAQS;

- An additional impact analysis to determine direct and indirect effects of the proposed source on industrial growth in the area, soil, vegetation and visibility; and

- Consideration of Public comment including an opportunity for citizens to request a public hearing;

In addition, once a new stationary source has been determined to be a major stationary source or modification, it is subject to PSD review for each regulated NSR pollutant that the source would have the potential to emit in "significant" amounts, which in some cases are lower than the major stationary source thresholds.

Based on the above analysis, the proposed project is considered a major source of air pollution as defined by PSD program. The data in Table 1 lists the estimated emissions of the PSD regulated pollutants from the project and their significance emissions level thresholds.

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Table 1: Estimated Emissions of PSD-Regulated Pollutants from the proposed project. The project is subject to 100 TPY Major Source Threshold

Pollutant	Annual Emissions (TPY)	PSD Significant Emission Rate (TPY)	Does PSD apply?
NO_x	352	40	Yes
CO	357	100	Yes
Ozone* (as VOC)	52.4	40 of NO_x or VOC	Yes
SO_2	260	40	Yes
Municipal waste combustor acid gases (measured as SO_2 and HCl) SO_2 HCl	 260 124	40	Yes
Particulate matter (PM)**	58.76	25	Yes
PM_{10}**	105.41	15	Yes
$PM_{2.5}$**	90.35	10	Yes
Municipal waste combustor metals (measured as PM)	51.7	15	Yes
Municipal waste combustor organics (measured as D/F)	4.07E-05	3.5E-06	Yes
Sulfuric Acid Mist	16.6	7	Yes
Fluorides (measured as HF)	10.8	3	Yes
GHG emissions as Carbon dioxide equivalent (CO_2e)***	466,619	75,000	Yes

*Ozone is regulated by its precursors: NO_x and VOC. (See 40 CFR Part 52.21(b) (50) (i) (a))
**PM, PM_{10}, and $PM_{2.5}$ include fugitive emissions
***CO_2e does not include biogenic CO_2
**** Although not a PSD pollutant, the draft permit includes also 29.5 TPY of ammonia (NH_3) emissions. NH_3 emissions will result primarily from the Regenerative Selective Catalytic Reduction units that use ammonia solution as a reagent while reducing NO_x; also, a small portion of NH_3 emissions will result from the ammonia storage tank.

V. Best Available Control Technology (BACT) and BACT Emission Limitations

The applicant is required to apply BACT, as provided for at 40 CFR Part 52.21(j)(2) and (3), to the following pollutants: NO_x, CO, volatile organic compounds (VOC), SO_2, PM, particulate matter with an aerodynamic diameter equal to or less than 10 micrometers (PM_{10}), particulate matter with an aerodynamic diameter equal to or less than 2.5 micrometers ($PM_{2.5}$), fluorides (as hydrogen fluoride: HF), sulfuric acid mist (H_2SO_4), municipal waste combustor organics (as dioxin and furans), municipal waste combustor metals (as PM), municipal waste combustor acid gases (as SO_2 and HCL), and greenhouse gas (GHG) emissions.

BACT, is defined as, "an emission limitation… based on the maximum degree of reduction of each pollutant subject to regulation under the [the Clean air] Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determine is achievable for such source or modification through application of production processes or available methods, systems and techniques… for control of such pollutant."(40 CFR Part 52.21(b) (12); CAA, Section 169(3)).

In making BACT determinations, EPA follows the following five step "top-down" methodology. Under this methodology, all technically feasible and available control technologies are ranked in descending order of control effectiveness. In summary, the five steps involved in a top-down BACT evaluation are:

- Step 1: Identify all available control technologies.
- Step 2: Eliminate technically infeasible options.
- Step 3: Rank remaining control technologies.
- Step 4: Evaluate most effective controls and document results.
- Step 5: Select the BACT.

This section describes the BACT proposed for each air pollutant subject to PSD review that results from each emission unit of the project, including the fugitive emissions sources.

A. Municipal Waste Combustors

Control technologies

The control technologies proposed for each municipal waste combustor consist of the following air pollution control equipment, measures and work practices.

- Turbosorp circulating dry scrubber with lime injection, for the control of SO_2, HCL, Hg, D/F, HF, and H_2SO_4 emissions.

- Activated carbon injection system, for the control of Hg, and D/F emissions.

- Fabric filter system, for the control of PM, PM_{10}, $PM_{2.5}$, SO_2, Cd, Chromium (Cr), HCL, Pb, Hg, Nickel (Ni), D/F, HF, H_2SO_4, Zinc (Zn), Beryllium (Be), and Arsenic (As) emissions.

- Regenerative Selective Catalytic Reduction with an Oxidation Catalyst module, for the control of CO, and VOC, and a Selective Catalytic Reduction module that will use ammonia injection, for the control of NO_x emissions. It should be noted that RSCR units are equipped with small fuel oil burners to provide the optimal temperature range necessary for the NO_x reduction, and small propane pilot flame burners. Details regarding the size of the burners, and the fuel consumption rates are provided in Enclosure I.

- Thermal efficient design with a heat input rate from the two municipal waste combustors and the steam turbine generator of no more than 13.25 millions British Thermal units MMBtu/MW-hour (MW-hour represents the amount of electricity generated by the steam turbine generator) and the use of RDF (i.e., municipal solid waste) as the primary fuel, to minimize the GHG emissions during normal operation. The heat input rate of 13.25 MMBtu/MW-hour takes into account a decrease in the energy conversion efficiency factor over time for the combustors and turbine of 2 %.

- The use of ULSD fuel oil with a maximum sulfur concentration of 0.0015% by weight, as a warmup , shutdown fuel for the municipal waste combustors' auxiliary burners and for the RSCR units' burners, to minimize the SO_2, PM, PM_{10}, and $PM_{2.5}$ emissions.

- The implementation of good combustion practices to minimize NO_x and CO emissions during warmup events.

- The implementation of operations and maintenance practices comprising of maintaining a high level of operating time, and minimizing the frequency of warmup and shutdown events, to minimize the GHG emissions, during these events.

BACT Emissions Limits

Table 2 provides a summary of the BACT emission limits proposed for each municipal waste combustor, and when applicable, a comparison of these limits with the Subpart Eb standard emission limits. These BACT emission limits include also the emissions from the corresponding RSCR unit, since these units are vented through the common stack with the municipal waste combustors. In addition to the emissions limits included in Table 2, the draft permit contains also, air pollutants emission rates limits (i.e., lb/hr and tons per year).

Table 2: Comparison of Energy Answers BACT Emission Limits, proposed for each municipal waste combustor, with the applicable Subpart Eb Emission Limits.

Pollutant	BACT Emission Limits	Subpart Eb Emission Limits
Nitrogen Oxides	45 ppmvd * 480 lb/ 7 hours warmup event	150 ppmvd
Carbon Monoxide	75 ppmvd * 228 lb/7 hours warmup event	150 ppmvd
Ozone** (as VOC)	7 ppmvd	No Standard
Sulfur Dioxide	24 ppmvd	30 ppmvd
Hydrogen Chloride	20 ppmvd	25 ppmvd
Particulate matter (PM) (filterable)	10 mg/dscm	20 mg/dscm
PM_{10} (filterable + condensable)	24 mg/dscm	No Standard
$PM_{2.5}$ (filterable + condensable)	22 mg/dscm	No Standard
Municipal waste combustor metals (measured as particulate matter)	10 mg/dscm	No Standard
Municipal waste combustor organics (measured as dioxins and furans)	10 ng/dscm	13 ng/dscm
Sulfuric Acid Mist	1.0 ppmvd	No Standard
Fluorides (as HF)	3.2 ppmvd	No Standard
CO_2 equivalent emissions or CO_2e	During normal operation: (CO_2e without biogenic CO_2) 0.15 lb CO_2e/lb of steam 461,424 TPY CO_2e (total combined for two combustors) During warmup and shutdown: (CO_2e without biogenic CO_2) 4,921 TPY CO_2e (total combined for two combustors)	No Standard
Ammonia (NH_3)***	10 ppmvd	No Standard

**NOx and CO ppmvd* emissions limits do not apply during warmup periods
***Ozone* is regulated by its precursors: NO_x and VOC. See 40 CFR Part 52.21(b)(50)(i)(a)
****NH_3* also known as "NH_3 slip" is not a PSD pollutant; NH_3 results from the RSCR-Selective Catalytic Reduction module that uses ammonia solution as reagent, while reducing NO_x emissions; There are no NH_3 emissions predicted to result from the combustion of waste
ppmvd means parts per million by volume, dry at 7 percent oxygen (@ 7% O_2)
mg/dscm means milligrams per dry standard cubic meter @ 7% O_2
ng/dscm means nanograms per dry standard cubic meter @ 7% O_2

Special $PM_{2.5}$ Emission Limit Provision

The draft permit includes an initial limit for the sum of filterable + condensable $PM_{2.5}$ of 22 mg/dscm (@ 7% O_2 (based on average of three 1-hour test runs), and 11.21 pounds per hour (lb/hr) (based on 1-hour average). However, there is limited data available regarding condensable $PM_{2.5}$ from municipal waste combustors. Thus, in the event the applicant cannot meet the permit $PM_{2.5}$ limit because of the condensable particulate matter, based on EPA agrees to adjust the limit to a level not to exceed 30 mg/dscm (@ 7% O_2 , 15.28 lb/hr, based on EPA's review of the stack test results. It is important to note that the 15.28 lb/hr $PM_{2.5}$ emissions level were modeled by the applicant and found to comply with the air quality standards.

NH_3 emissions can form ammoniated chlorides, sulfates and nitrates in the municipal waste combustors exhaust gases, and therefore can contribute to the formation of $PM_{2.5}$ (including $PM_{2.5}$ condensable). EPA anticipates that the RSCR-SCR module operating at equal or less than 5 ppmvd @ 7% O_2 NH_3 slip (that is lower than the proposed limit of 10 ppmvd @ 7% O_2), may reduce the NO_x emissions at lower or equal than the permitted level. Therefore, in order for EPA to adjust the $PM_{2.5}$ emission limit, the applicant will have to demonstrate that an NH_3 slip limit of equal or less than 5 ppmvd is not feasible.

Municipal Waste Combustor (MWC) Metals

According to the PSD regulations, emissions of MWC metals are measured by using particulate matter, with a threshold of 15 TPY, as a surrogate for MWC metals. Since the PM potential to emit of each municipal waste combustor of 20.3 TPY exceeds the applicable threshold, the project is subject to BACT for MWC metals. Under Subpart Eb, emission limits for MWC metals are those for Cd, Pb, and Hg. Other metals that may result from the combustion of waste include Cr, Ni, Zn, As, and Be. None of the eight metals mentioned above are PSD regulated pollutants[1], and they will be addressed in the State permit issued by the Puerto Rico Environmental Quality Board (PREQB).

The applicant has provided emissions estimates for each one of the metals mentioned above. With the exception of Hg, all other metals resulting from the municipal waste combustion are emitted in association with PM, and therefore the PM control device (i.e., fabric filter) can effectively remove them. On the other hand, Hg, which is typically emitted in the gas phase, will not be completely controlled by the PM control device, and therefore will be controlled by an activated carbon injection system.

This draft permit proposes a limit of 10 mg/dscm @ 7% O_2 as BACT for MWC metals (measured as PM emissions). The same value is set for the PM emissions.

[1] Note that Pb is a PSD regulated pollutant, but it is not included in this permit because the applicant proposes to locate the source in a nonattainment area.

This limit will cover all the above listed metals, with the exception of Hg. As shown above, these metals, including Hg, will be controlled by the air pollution control equipment that are already proposed by the applicant even though they are not individually regulated under the PSD program. Additionally, although, not subject to PSD regulations, Cd, Pb, and Hg will have also to comply with all applicable provisions of Subpart Eb. Table 3 below, provides information on the emission limits that the applicant intends to incorporate in its PREQB permit for each municipal waste combustor for Lead, Mercury, Cadmium, Zinc, Chromium, Arsenic, Nickel, and Beryllium and when applicable, a comparison of these limits with the Subpart Eb standard emission limits. As shown in Table 3, these emission limits are equal to or lower than the corresponding Subpart Eb emission limits.

Table 3: Comparison of Energy Answers Emission Limits, proposed by applicant for each municipal waste combustor, with the applicable Subpart Eb Emission Limits

Pollutant	Emission Limits Proposed by Applicant	Subpart Eb Emission Limits
Lead	75 ug/dscm	140 ug/dscm
Mercury	17 ug/dscm	50 ug/dscm
Cadmium	10 ug/dscm	10 ug/dscm
Zinc	228.27 ug/dscm	No Standard
Chromium	0.002 lb/hr	No Standard
Arsenic	0.00025 lb/hr	No Standard
Nickel	0.003 lb/hr	No Standard
Beryllium	4.02E-04 lb/hr	No Standard

ug/dscm means micrograms per dry standard cubic meter @ 7% O_2

Municipal Waste Combustors: Greenhouse Gas and CO_2 equivalent emissions

A number of issues regarding the CO_2 equivalent emissions or CO_2e emission limits bear clarification. First, the pollutant that is subject to the PSD regulation is the greenhouse gases "GHG" emissions that is defined, "as the aggregate group of six greenhouse gases: carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH4), hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride." (See 40 CFR Part 52.21(b) (49) (i)).Since each gas has a different effect on global warming, PSD applicability is based on a carbon dioxide equivalent (CO_2e), determined by multiplying each pollutant by its global warming potential, and then summing the products derived for each pollutant.

The GHG emissions that result from the municipal waste combustors are comprised of CO_2, N_2O, and CH_4, with the CO_2 as the main constituent. Accordingly, the CO_2e emissions for the proposed project represent the sum of CO_2, N_2O, and CH_4, and the sum is computed using the procedures in the PSD

regulations. Details regarding the calculations of the CO_2e emissions are provided in Enclosure I.

In July 2011, the EPA deferred for a period of three years the application of PSD and Title V permitting requirements to biogenic CO_2 emissions from bioenergy and other biogenic stationary sources. Energy Answers qualifies, partially, for this deferral. The definition of the biogenic CO_2e is provided in 40 CFR Part 52.21(b) (49) (ii) (a).

Some of the CO_2 emissions resulting from the municipal waste combustors, while combusting RDF alone or RDF with supplementary fuels, represent biogenic CO_2, and therefore are excluded from the calculation of the project's GHG emissions. The applicant calculated the biogenic and non-biogenic CO_2 emissions resulting from the municipal waste combustors while firing RDF (i.e., municipal solid waste) alone, and for the RDF and each supplementary fuel mix. The least non-biogenic CO_2 emissions occur when burning RDF and PUWW, and the most non-biogenic CO_2 emissions occur when burning RDF and ASR. The CO_2e emissions (without biogenic CO_2) resulting from the combustion of RDF alone are estimated at 308,805 TPY CO_2e, the CO_2e emissions (without biogenic CO_2) resulting from the combustion of RDF and PUWW operating scenario are estimated at 149,328 TPY, and the CO_2e emissions (without biogenic CO_2) resulting from the combustion of RDF and ASR operating scenario are estimated at 454,706 TPY. Energy Answers' potential to emit of 461,424 TPY of CO_2e for the two municipal combustors combined (see Table 2 above) is based on the RDF and ASR operating scenario that would generate the maximum CO_2e emissions (without biogenic CO_2).

Consequently, since the CO_2e emissions (without biogenic CO_2) resulting from the combustion of the primary fuel (RDF) alone or from the combustion of the primary fuel and supplementary fuel mix are exceeding the PSD threshold of 75,000 TPY CO_2e, the proposed project is subject to PSD for the GHG emissions.

As shown in Table 2 above, the CO_2e BACT emission limit do not include biogenic CO_2 emissions. In order to demonstrate continuing compliance with the CO_2e BACT limits, the draft permit requires continuous emission monitoring system (CEMS) for total (biogenic + non-biogenic) CO_2 emissions, and the use of 40 CFR Part 98 emission factors and the actual fuel consumption rates, to determine the actual emissions of CH_4 and N_2O. However, since CEMS cannot distinguish between biogenic and non-biogenic CO_2, the draft permit requires that the biogenic CO_2 to be measured quarterly by using American Society for Testing and Materials (ASTM) D6866-08 " Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis", and ASTM D7459-08 "Standard Practice for Collection of Integrated Samples for the Speciation of Biomass(Biogenic) and Fossil - Derived Carbon Dioxide Emitted from Stationary Emissions Sources", or the most current ASTM version, and following the procedures described at 40 CFR

Part 98.34. The non-biogenic CO_2 will be determined by subtracting the biogenic CO_2 (delivered by ASTM) from the total CO_2 (from CEMS). The actual CO_2e emissions will be computed as a sum of the non-biogenic CO_2, CH_4, and N_2O emissions. The procedures of determining the CO_2e, biogenic and non-biogenic CO_2 emissions are detailed in Enclosure 1.

B. Ash Handling System and Storage Silos

The proposed BACT for the ash handling system emission units, and for the carbon and lime silos, is the installation of high efficiency fabric filters for the control of the PM, PM_{10} and $PM_{2.5}$ emissions. There are two fabric filters (one operating, one standby) proposed for each, the Bottom Ash Handling and Conveying System, and the Bottom Ash Storage and Conveying System. One fabric filter is proposed for the Bottom Ash Processing Activities Building. Additionally, the Fly Ash Conveying, Storage Silo, Conditioning, and Loading System, the Carbon Silo, and the Lime Silo will be each controlled by an individual fabric filter. The proposed BACT emissions limitation for PM, PM_{10}, and $PM_{2.5}$ for each of the above-mentioned emission units is 0.017 mg/dscm. Additionally, the draft permit is setting PM, PM_{10}, and $PM_{2.5}$ hourly emissions limits (lb/hr) for each emission unit. These emission limits are provided in Enclosure I.

C. Emergency Equipment

The proposed BACT for the emergency diesel generator will consist of the following:

- The installation of a new and fuel-efficient certified engine that will meet the applicable emission standards, monitoring, and recordkeeping provisions of Subpart IIII, and the limited hours of operation (i.e., maximum 500 hr/yr), to minimize the NO_x, CO, VOC, SO_2, PM, PM_{10}, $PM_{2.5}$, and GHG emissions; and

- The use of the ULSD fuel oil with a maximum sulfur concentration of 0.0015% by weight, to minimize the SO_2, PM, PM_{10}, and $PM_{2.5}$ emissions.

The proposed BACT for the emergency diesel fire pump will consist of the following:

- The installation of the most fuel efficient NFPA-20 certified fire pump available, which will meet the applicable emission standards, monitoring, recordkeeping provisions of Subpart IIII, and the limited hours of operation (i.e., maximum 500 hr/yr), to minimize the NO_x, CO, VOC, SO_2, PM, PM_{10}, $PM_{2.5}$, and GHG emissions; and

- The use of the ULSD fuel oil with a maximum sulfur concentration of 0.0015% by weight, to minimize the SO_2, PM, PM_{10}, and $PM_{2.5}$ emissions.

The emergency generator and fire pump proposed BACT emission limitations for NO_x, CO, VOC, SO_2, PM, PM_{10}, $PM_{2.5}$, and CO_2e are provided in Enclosure I.

A BACT emission limit must be at least as stringent as a 40 CFR Part 60 standard. See the definition of BACT at 40 CFR Part 52.21(b) (12). Thus, by meeting the Subpart IIII emission standards, the emergency generator and fire pump's proposed emissions limits will meet the BACT requirements, and also, these limits will be as stringent as other BACT determinations made for similar engines.

The GHG emissions resulting from the emergency generator and fire pump comprise of CO_2, CH_4, and N_2O, with the CO_2 as the main constituent. See discussion above regarding the GHG, and CO_2e emissions.

D. Cooling Tower

The proposed BACT for the cooling tower is the use of a drift eliminator that will limit the cooling tower circulating water flow drift loss to 0.0005%. The BACT emission limitations are 2.48 lb/hr of PM, 1.30 lb/hr of PM_{10}, and 0.005 lb/hr of $PM_{2.5}$.

E. Storage Tanks

The proposed BACT for the ammonia storage tank is the use of an emergency relief valve, a vapor recovery and return system, and the operation, and maintenance in accordance with the manufacturer specification. For the distillate fuel oil No.2 storage tanks, the operation and maintenance in accordance with the manufacturer specification is considered BACT. The proposed BACT emission limitations for NH_3 and VOC emissions resulting from the storage tanks are provided in Enclosure I.

F. Fugitive Particulate Emission Sources

Fugitive particulate emissions will result from the vehicle travel on the facility's roadways, from the activities inside the processing buildings (i.e., vents, windows, doors, etc.,), and from the conveying systems. The proposed BACT for the fugitive particulate emissions is comprised of the following control measures: paving all of the facility roads and parking areas, and landscaping, to the extent possible, all other areas; treating the paved roadways, parking areas, exterior and interior of the buildings and other areas as necessary by sweeping, vacuuming, and /or watering; using only vehicles that are enclosed or covered; performing all unloading, loading, storing, and processing activities in enclosed buildings; maintaining the facility MSW, and supplementary fuels unloading, storage and processing buildings under negative pressure at all times, and venting the exhaust

air from these buildings to municipal waste combustors (as combustion air); keeping the doors of all the facility processing buildings closed to the extent possible; using only fully enclosed conveyors; and operating the fabric filters at all times. A detailed list of all these control measures, along with the monitoring requirements and the BACT emission limits for PM, PM_{10}, and $PM_{2.5}$ are provided in Enclosure I.

VI. Basis for Permit Conditions

The draft permit conditions are based on the requirements of 40 CFR Part 52.21. These include requirements that owners or operators of a new major stationary source or major modification: (1) meet applicable State Implementation Plan (SIP) emission limitations and emission standards under 40 CFR Parts 60 and 61 pursuant to 40 CFR Part 52.21(j)(1); (2) apply best available control technology (BACT) for each pollutant subject to regulation under 40 CFR Part 52.21(j)(3); and (3) conduct air quality analyses under 40 CFR Part 52.21(k) through (p) to demonstrate that emissions would not exceed any NAAQS or PSD increment.

Based on the information submitted by Energy Answers, EPA determined that the project is approvable subject to public review. The proposed emission rates are considered BACT and they will not cause or contribute to an exceedance of any air quality standards or increment. As previously discussed, all air pollutants that are not subject to PSD, including Pb, Hg, Cd, Zn, Cr, As, Ni, and Be will be addressed in the State permit issued by PREQB. Additionally, the PREQB permit must contain appropriate requirements for the control of odors that may result from the proposed project. In addition, the PREQB's permit must address the project's compliance with any applicable provisions for disposal of Polychlorinated Biphenyls contained at 40 CFR Part 761 as related to the use of ASR as supplementary fuel. In conclusion, the applicant must comply with the federal PSD permit, the PREQB permit, as well as other applicable federal and state requirements.

VII. Ambient Air Quality Analysis

A. Summary of the Energy Answers' Air Quality Impacts Compared to Significant Impact Levels and Significant Monitoring Concentrations (ug/m3).

1. Energy Answers' impact in Table 1 is the maximum concentration derived from the EPA preferred dispersion model, AERMOD.

2. The Significant Impact Levels (SILs) are small de minimis levels (or screening levels) that EPA considers negligible concentrations when compared to the National Ambient Air Quality Standards (NAAQS) or PSD increment. EPA uses these levels as screening levels in order to determine whether a cumulative source analysis is required for that pollutant to show compliance with the NAAQS and increment. A cumulative source modeling analysis takes into account the combined impacts of the new source plus the impacts of other existing sources in the area including background. The SIL is also the value that is used to assess whether a particular source "significantly causes or contributes" to an exceedance of the NAAQS or PSD increment should an exceedance be identified. EPA allows a new source to forgo the cumulative source modeling analysis if the impacts from the new source alone are less than the SIL since by definition it could not significantly cause or contribute to an exceedance.

3. The air quality impacts shown in Table 1 are the worst-case impacts for each pollutant identified in the modeling analysis under the minimum, average, or maximum operating load scenarios.

4. Energy Answers' impact exceeded the SIL only for the 24-hour average $PM_{2.5}$, 1 hour SO_2, and the 1-hour NO_2. Therefore, further analyses were required for these pollutants in order to demonstrate compliance with the NAAQS and PSD increment. The results of those further analyses are in Table 2 below.

5. The Significant Monitoring Concentrations are also de minimis concentrations used by EPA to determine whether ambient air quality data should be obtained prior to the submission of the PSD permit application. Since its impacts are less than the SMC, Energy Answers was not required to perform pre-application monitoring. Background monitored data was nevertheless obtained by Energy Answers from Barceloneta and Catano as discussed further below.

6. There is only one SMC per pollutant. The dashed lines in the tables mean that the SMC is not applicable to that averaging time.

7. The $PM_{2.5}$ and PM_{10} air quality impacts were modeled at 2 different emission rates proposed in order to evaluate all possible emission scenarios including the condensable fraction. The worst-case impact is identified in Table 1.

Table 1. Energy Answers' Air Quality Impacts Compared to Significant Impact Levels and Significant Monitoring Concentrations (ug/m^3)

Pollutant	Energy Answers' Air Impact	Significant Impact Level (SIL)	Impacts > SIL (i.e., NAAQS and Increment analysis required?)	Significant Monitoring Concentration (SMC)	Impacts > SMC (i.e., preconstruction ambient air monitoring required?)
Carbon-monoxide					
1 hour	116.5	2,000	no	-------	-------
8 hour	34.5	500	no	575	no
PM_{10}					
24 hour	2.65	5	no	10	no
Annual	0.89	1	no	-------	-------
$PM_{2.5}$					
24 hour	1.95	1.2	yes	4	no
Annual	0.18	0.3	no	-------	-------
SO_2					
1 hour	42.65	7.8	yes	-------	-------
3 hour	23.24	25	no	-------	-------
24 hour	4.11	5	no	13	no
Annual	0.31	1	no	-------	-------
NO_2					
1 hour	57.38	7.5	yes	-------	-------
Annual	0.80	1	no	14	no

B. Summary of the National Ambient Air Quality Standards and PSD Increment Analysis (ug/m^3).

1. The National Ambient Air Quality Standards (NAAQS) are health based air quality concentrations established by the Clean Air Act to protect public health and welfare. In addition to the NAAQS, EPA established PSD increments. Air quality concentrations are also not allowed to degrade more than this "incremental amount" after its trigger date.

2. The increment is designed to protect the NAAQS while still allowing for economic growth. EPA has not promulgated a 1-hour NO_2 or SO_2 PSD increment.

3. Ambient background concentrations represent the component of the air quality due to minor, distance, and natural sources, which are not directly modeled. In this case, the $PM_{2.5}$ and SO_2 ambient background concentrations were measured in Barceloneta. The NO_2 ambient background concentrations were measured in Catano. These monitors are conservative since the data also includes concentrations from other major sources.

4. The air quality impacts shown above are the greater of each impact identified in the modeling analysis under the minimum, average, or maximum operating load scenarios using applicable statistical form of the NAAQS or increment.

5. The $PM_{2.5}$ and PM_{10} air quality impacts were modeled at 2 different emission rates proposed in order to evaluate all possible emission scenarios including the condensable fraction. The worst-case impact is identified in Table 2.

Table 2. National Ambient Air Quality Standards and PSD Increment Analysis (ug/m^3)

Pollutant	Energy Answers' Impact plus other existing sources	Ambient Background Concentration	Total Concentration	National Ambient Air Quality Standard	PSD Increment Consumed	PSD Increment
$PM_{2.5}$						
24 hour	9.25	16	25.3	35	1.95	9
SO_2						
1 hour	94.23	66.44	160.67	196	-------	-------
NO_2						
1 hour	85.5	65.2	150.7	188	-------	-------

VIII. Compliance Monitoring

To assure compliance with the emission limitations set up in the draft PSD permit, the facility is required to perform the following monitoring and testing:

- Operate continuous emission monitoring systems for NO_x, CO, SO_2, CO_2, and O_2 (for municipal waste combustors).

- Operate continuous opacity monitoring system (for municipal waste combustors).

- Perform initial and subsequent performance tests for all PSD pollutants (including total (biogenic + non-biogenic) CO_2 and biogenic CO_2) and opacity (for municipal waste combustors).

- Perform initial and subsequent performance tests for the NH_3 emissions (for municipal waste combustors).

- Perform quarterly tests for the waste (RDF and WDF)'s heating value (for municipal waste combustors).

- Perform initial and subsequent performance tests for opacity emissions (for the ash handling system emission units, the carbon and lime silos, and the emergency diesel generator and emergency diesel fire pump).

- Perform initial and subsequent performance tests for the visible emissions of combustion ash for the ash conveying systems (including transfer points), and for buildings and enclosures of ash conveying systems.

- Perform initial and subsequent performance tests for the drift loss on the cooling tower cells.

- Monitor and record fuel usage for each emission unit.

- Operate continuous monitoring systems or devices to measure: steam flow rate (lb of steam per hour); steam temperature (^{0} F); steam pressure (pounds per square inch gauge); energy output megawatts hour (MW-hour); combustion chamber temperature (^{0} F); and the stack gas volumetric flow rate (for the municipal waste combustors).

- Operate continuous monitoring systems or devices to measure: the pressure drop for the Activate Carbon Injection system, Turbosorp Circulating Dry scrubber, and the Fabric Filters (for all emission units); the activated carbon injection rate; the lime flow injection rate; the ammonia injection rate; the flue gas temperature at the inlet of the municipal waste combustors units' Fabric

Filters; the flue gas temperature at the inlet and outlet of the RSCR systems; and the flue gas temperature at the outlet of the Turbosorp Circulating Dry Scrubber systems.

- Operate bag leak detection systems for the Fabric Filters (for all emission units).

- Monitor continuously the flow rate of the cooling tower circulating water.

IX. Administrative Procedures

A 45-day public comment period will commence upon publication of the public notice in the local newspaper. Any interested person may submit written comments on the draft PSD permit. Written comments should be sent during the 45-day period to one of the following addresses:

U.S. Environmental Protection Agency
Region II
Air Programs Branch
290 Broadway
New York, New York 10007
Attention: Mr. Steven Riva

U.S. Environmental Protection Agency
Region II
Caribbean Environmental Protection Division
City View Plaza III-Suite 7000
#48 Rd. 165 km 1.2
Guaynabo, PR 00968-8069
Attention: Mr. Jose Font

Alternatively, written and oral comments may be submitted to EPA at the Public Hearing for this matter that EPA will hold pursuant to 40 CFR Part 124.12, to provide further opportunity to comment on the proposed PSD permit. At this Public Hearing, any person may appear on his own behalf, or may be represented by counsel or by other representatives, and may provide written or oral comments, in English or Spanish, and data pertaining to the proposed project.

Prior to the Public Hearing, EPA will also hold a Public Availability Session for providing interested parties with additional information and an opportunity for informal discussion of the proposed project. The date, time, and location of the Public Availability Session and Public Hearing can be found in the Public Notice. English and Spanish translation services will be provided at both the Availability Session and the Public Hearing.

Additional information concerning this fact sheet and the proposed draft permit may be obtained between the hours of 9:00 A.M. and 4:00 P.M., Monday through Friday, from Steven Riva at (212) 637- 4074, Annamaria Coulter (ambient air quality analysis) at (212) 637-4016, and Viorica Petriman (best available control technologies) at (212) 637-4021.

The PSD regulations specify procedural requirements (40 CFR Part 52.21(q)) which include administrative review of the final permit decision. Procedural requirements for administrative review are defined in the Consolidated Permit Regulations codified at 40 CFR Part 124. Only those persons who file comments or provide written or oral comments at the public hearing on the preliminary determination, may petition for administrative review except to the extent that changes are made from the draft to final permit decision. For those who do not provide comments, administrative appeal is available only with respect to changes that are made from today's draft permit to the final permit decision. In the event of an administrative appeal, upon completion of the appeal process, the final permit decision will be published in the Federal Register as a final agency action. Only those persons who appealed for administrative review may petition for judicial review in the U.S. Court of Appeals and must do so within 60 days of the date of the Federal Register notice.