

**112(g) Case-By-Case Maximum Achievable Control Technology Determination
Review of Green Energy Partners, LLC
Construction/Operation of a Waste Energy Power Plant
Located in Carnesville, Georgia (Franklin County)**

NOTICE OF MACT APPROVAL

SIP Permit Application No. 18072

May 2008

Reviewing Authority

**State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch
Stationary Source Permitting Program (SSPP)**

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1.0 EXECUTIVE SUMMARY

Green Energy Partners, LLC (Plant Carl) has applied for an air quality permit to construct and operate a power plant firing a combination of chicken litter and woody biomass. Biodiesel fuel, waste cooking oil, grease, or animal fat will be used for starter fuel. The facility is to be located in Carnesville, Georgia, in Franklin County.

The facility will consist of a 25 MW steam-turbine generator powered by steam from a 400 MMBtu/hr bubbling fluidized bed (BFB) boiler. The primary pollutants of concern are nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO₂), and hazardous air pollutants (HAPs). Potential emissions of these pollutants are above the major source thresholds. Franklin County has been designated by the U.S. Environmental Protection Agency (EPA) as attainment or unclassified for all criteria pollutants.

Under 40 CFR 63 Subpart A, Plant Carl will be a major source of HAP emissions because, even with permit limits, it will have the potential to emit more than 10 tons per year of any individual HAP or 25 tons per year of any combination of HAPs. As a newly constructed major source of HAPs without a promulgated Part 63 National Emission Standard for Hazardous Air Pollutants (NESHAP), this facility is subject to a case-by-case Maximum Achievable Control Technology (MACT) determination pursuant to Section 112(g) of the Clean Air Act Amendments of 1990.

Plant Carl is part of an industry category for Industrial, Commercial and Institutional Boilers and Process Heaters, for which the U.S. EPA promulgated a MACT standard called 40 CFR Part 63, Subpart DDDDD, "National Emission Standards for Hazardous Air Pollutants: Industrial, Commercial and Institutional Boilers and Process Heaters." (Boiler MACT) which was published in the Federal Register on September 13, 2004. This rule was vacated by the District of Columbia (D.C.) Circuit Court of Appeals on June 18, 2007; that decision became final by court mandate on July 30, 2007. Because a new NESHAP for this source category has not been promulgated at the time of permit issuance, the Plant Carl facility is subject to the case-by-case MACT-level control technology review under Section 112(g) of the 1990 Clean Air Act Amendments. The requirements for such case-by-case control technology reviews are codified in 40 CFR Part 63, Subpart B and adopted by reference, with a few revisions and clarifications, into the Georgia Rules for Air Quality Control.

To satisfy the 112(g) case-by-case MACT requirements (40 CFR 63.40 through 63.44, Control Technology Requirements in Accordance with Section 112(g)(2)(B) of the 1990 Clean Air Act Amendments), Plant Carl submitted an application for a MACT determination specifying control technology that, if properly operated and maintained, will meet the MACT emission limitations or standards determined according to the principles set forth in 40 CFR 63.43(d). Their analysis of similar facilities indicates that case-by-case MACT should be based on the emissions limitations and work practice standards of the vacated MACT standard. In order to fulfill these requirements, Plant Carl has requested emission limits for HAP and CO. Specifically the HAPs are split into categories which consists of HCl, Metal HAPs (Total selected metals (TSM) and mercury), and Organic HAPs (CO is the surrogate pollutant or organic HAPs). The Division has determined that the emission rates, operating limits, and work practice standards of the vacated MACT standard meet the criteria to be a 112(g) case-by-case MACT determination. Plant Carl proposes to comply with the above-mentioned emission limits and the emission standards by utilizing a dry scrubber, sorbent injection and an electrostatic precipitator.

Plant Carl will be subject to the Title V operating permit program because actual and potential emissions of NO_x, CO, SO₂, and HAPs will exceed the major source thresholds. Plant Carl must submit an application for a Title V permit within one year of commencing operations at the Carnesville facility.

2.0 APPLICATION INFORMATION

The permit application includes: an air quality permit application with process descriptions and an emissions inventory, 112(g) requirements. A toxic impact assessment was performed and included with the application. The toxic emissions impact from the construction and operation of the proposed facility is expected to be insignificant.

2.1 Applicant Name and Address

Green Energy Partners, LLC
Plant Carl
3465 Highway 198
Carnesville, Georgia 30521
Franklin County

2.2 Authorized Representative

Robert Turner
Director, Project Development

2.3 Application Submittals

March 18, 2008 Date of initial SIP application and case-by-case MACT determination, assigned Application No. 18072.

3.0 BACKGROUND

The permit application and subsequent submittals include: an air quality permit application with process descriptions and an emissions inventory and required elements of the 112(g) case-by-case MACT determination. A toxic impact assessment was performed and included with the application. The toxic emissions impact from the construction and operation of the proposed facility is expected to be insignificant.

3.1 Facility Location

Earth Resources, Inc. submitted Application No. 16665 dated March 20, 2006 to construct and operate a 21 MW power generation facility – Plant Carl in Carnesville, Georgia. The facility would consist of a 335 MMBtu/hr bubbling, fluidized-bed (BFB) boiler fueled with a mixture of wood biomass and chicken litter. The facility received Air Quality Permit No. 4911-119-0025-E-02-0 which was issued on October 31, 2006. The facility as described was never built.

The facility intends to begin construction in the Summer of 2008. The company will be required to submit a complete Title V application within twelve (12) months after the date that production operations commence at the Carnesville facility.

3.2 Permit Status of Facility Operations

As a new facility, the proposed Plant Carl does not have any pre-existing air quality permits. The facility intends to begin construction in the Summer of 2008. The company will be required to submit a complete Title V application within twelve (12) months after the date that production operations commence at the Carnesville facility.

3.3 Project Schedule

Construction on the proposed plant is expected to be completed in May 2009, and regular production operations are scheduled to commence in May 2009.

3.4 Proposed Operation

Plant Carl intends to construct and operate a power plant facility where the primary fuel is chicken litter and wood biomass. Waste oils, fats, or biodiesel will be used as starter fuels. Emissions of criteria pollutants and hazardous air pollutants (HAPs) will result from the combustion of these fuels in the boiler. The plant is expected to be utilized over an annual basis of 95%. This equates to operating 8,322 hours per year. The potential emissions are based on this utilization.

3.5 Estimated Emissions

The table below lists potential and projected actual emissions of criteria pollutants and HAPs from the entire facility.

Pollutant	Uncontrolled Annual Emissions (tons/yr)	Controlled Annual Emissions (tons/yr)
CO	241.3	241.3
NOx	249.7	149.8
SO2	191.4	76.6
VOC	25.8	25.8
PM/PM10/PM2.5	6431.2	45.0
NH3	27.1	27.1
HCL	343.9	27.5
Sulfuric Acid	14.6	5.8
Formaldehyde	7.3	7.3
Benzene	7.0	7.0
Mercury	0.006	0.003
Acrolein	0.13	0.13
Total Selected Metals (TSM)	2.88	2.02E-02
Total HAP	361.21	42.0

4.0 PROCESS DESCRIPTION

4.1 Power Facility

The primary emission source at the facility will be a 400 MMBtu/hr bubbling, fluidized-bed (BFB) boiler fueled with a mixture of wood biomass and chicken litter. Note that small quantities of biodiesel, waste cooking oil, grease, or animal fat will be used as starter fuels. No fossil fuels will be used in the boiler. Steam from this boiler will be routed to a turbine generator that will provide electricity for distribution to the power grid. Emissions of criteria pollutants and hazardous air pollutants (HAPs) will result from the combustion of these fuels in the boiler.

4.2 Emission Controls

Selective Non-Catalytic Reduction (SNCR): Urea will be injected into the post-combustion flue gas to reduce NO_x emissions. The urea chemically reduces the nitrogen oxides to molecular nitrogen (N₂) and water vapor (H₂O). The expected NO_x control efficiency of SNCR is between 30 and 50%.

Oxidation catalyst: One to two beds of catalyst will be included in the exhaust stream from the boiler. The Oxidation catalyst CO reduction efficiency of 25 to 50% is to be expected. The application in Appendix D page 4 stated that an oxidation catalyst was not technically feasible for the project. Upon further review of the predicted CO emissions from the Plant Carl boiler, Green Energy Partners determined that an oxidation catalyst maybe necessary to achieve the proposed emission limit. Originally, it appeared that the catalyst would not be feasible due to the reasons included in the application for Notice of MACT Approval. However, upon further review, the boiler/control technology expert on the project determined that the oxidation catalyst could be installed in the exhaust in a location downstream from the electrostatic precipitator (ESP). The ESP will minimize particulate loading and is expected to alleviate the previous concerns over plugging, slagging, and contamination.

Dry Scrubber: The exhaust from the boiler will be routed to a dry scrubber in which trona will be injected into the flue gas for acid gas removal. Trona is a hydrated sodium bicarbonate carbonate compound that has been shown to be highly effective in controlling SO₂ and HCl emissions (see paragraph below on handling). The expected control efficiencies for SO₂ and HCl are approximately 60% and 92%, respectively. This device is also expected to control sulfuric acid mist emissions at efficiency of approximately 60%.

Electrostatic Precipitator: The exhaust from the dry scrubber will be routed to an electrostatic precipitator (ESP). The purpose of this device is to control PM emissions, including fly ash and reacted trona particles from the scrubber. The expected control efficiency is approximately 99.3%.

Trona will be delivered from the mine in dedicated sealed trucks similar to bulk cement transport trucks. Once at the jobsite, the material will be pneumatically conveyed to the local storage silo with high-pressure blowers. The local storage silo has a bin vent filter. The material is then metered into the pulverizer for particle size reduction prior to being injected into the flue gas duct. The entire system from the silo to the injection is sealed to atmosphere, so no fugitive dust escapes to the atmosphere.

In addition to the boiler, the facility proposes to install a building to store fuels. Air from the fuel storage building will be ducted to the combustion air intake of the boiler. This draft will produce negative pressure in the storage building, thereby reducing the potential for fugitive emissions from fuel handling.

5.0 REVIEW OF APPLICABLE RULES AND REGULATIONS

5.1 Applicable Rules and Emission Standards

Georgia Rule 391-3-1-.03(1)

Applicability: Georgia Rule 391-3-1-.03(1) requires that any person prior to beginning the construction or modification of any facility which may result in air pollution shall obtain a permit for the construction or modification of such facility from the Director upon a determination by the Director that the facility can reasonably be expected to comply with all the provisions of the Act and the rules and regulations promulgated thereunder.

Georgia Rule 391-3-1-.02(2)(d) – Fuel Burning Equipment

Applicability: Georgia Rule 391-3-1-.02(2)(d) [a.k.a Georgia Rule (d)] is an applicable requirement that contains emission standards for particulate matter and visible emissions for the boiler that Plant Carl proposes to install.

Emission Standard: The allowable particulate matter emission rate for the boiler under Rule (d) is 0.10 pounds per million BTU heat input in accordance with Georgia Rule (d)2(iii). The allowable opacity limit for said unit is twenty (20) percent except for one six minute period per hour of not more than twenty-seven (27) percent opacity in accordance with Georgia Rule (d)3. The NOx emission standard of Rule (d)4 does not apply to boiler because the boiler does not fire a fossil fuel by definition. Because Plant Carl will install controls for PM (an ESP) on the boiler, exceedances of the particulate matter and opacity standards of Rule (d) are not expected to occur.

Georgia Rule 391-3-1-.02(2)(e) – Particulate Emission from Manufacturing Processes

Applicability: Georgia Rule 391-3-1-.02(2)(e) [a.k.a Georgia Rule (e)] is an applicable requirement that contains emission standards for particulate matter from manufacturing processes not subject to any more stringent PM emission standards.

Emission Standard: The allowable particulate matter emission rate for the storage silo under Rule (e). The PM emission limit is based on the process input rate of the equipment. The Storage Silo at the Plant Carl facility will be equipped with a bin vent filter in order to control PM; therefore it is not anticipated that the storage silo operations will exceed the particulate matter standard of Rule (e).

Georgia Rule 391-3-1-.02(2)(g) – Sulfur Dioxide

Applicability: Georgia Rule 391-3-1-.02(2)(g) [a.k.a Georgia Rule (g)] is an applicable requirement that contains emission standards for sulfur dioxide from fuel burning sources. Affected sources at the proposed Plant Carl facility include the boiler.

Emission Standard: Because the boiler is rated at greater than 100 million BTUs per hour maximum heat input capacity, Georgia Rule (g) limits SO₂ from these sources by imposing a limit on the sulfur content of the fuels burned in them of 3.0 percent by weight in accordance with Georgia Rule (g)2. Initial and period fuel sampling and sulfur content analysis will be used to demonstrate compliance with this standard. Note that the Rule (g) SO₂ emissions limit (in lb/MMBtu) does not apply because the boiler will not burn any liquid or solid fossil fuel.

40 CFR 60 Subparts A & Db – General Provisions and Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

Applicability: New Source Performance Standard (NSPS) Subpart Db contains requirements to reduce emissions from the combustion of fuels in process equipment used to produce steam or heat water. The only affected unit at the proposed Plant Carl facility is the boiler (Source Code B1).

Emission Standard: Because the proposed boiler will have a heat input capacity of greater than 100 MMBtu/hr and will be constructed, modified, or reconstructed after June 19, 1984, it will be subject to the New Source Performance Standard (NSPS) for Industrial-Commercial-Institutional Steam Generating Units, 40 CFR 60 Subpart Db. Because the boiler will not burn any coal, oil, or natural gas, only the PM standards of the NSPS will apply (i.e., the SO₂ and NO_x standards in 40 CFR 60.42b and 60.43b, respectively, are not applicable).

Since the boiler will combust over 30 percent wood (by heat input) on an annual basis and has a heat input capacity of greater than 250 MMBtu/hr, it will be subject to a PM emission limit of 0.03 lb/MMBtu [40 CFR 60.43b(h)(1)]. Also, because the boiler will combust wood, it will be subject to a limit of 20% opacity (6-minute average), except for one 6-minute period per hour of no more than 27% opacity [40 CFR 60.43b(f)].

Pursuant to 40 CFR 60.8, Green Energy Partners, LLC will be required to conduct an initial performance test for PM and opacity within 60 days after achieving the maximum production rate, but not later than 180 days after initial startup. Also, since the boiler will be subject to an opacity standard under 40 CFR 60.43b, the facility will be required to install, calibrate, maintain, and operate a continuous opacity monitoring system (COMS) [40 CFR 60.48b(a)]. This monitor should be installed on the exhaust stack from the ESP.

40 CFR 60 Subpart OOO - Standard of Performance for Nonmetallic Mineral Processing Plants

Applicability: New Source Performance Standard (NSPS) Subpart OOO contains requirements for facilities that process nonmetallic mineral using equipment such as crushing, grinding, screening, bucket elevator, belt conveyor, bagging operation, storage bin, enclosed truck or railcar loading stations.

Emission Standard: This NSPS specifies an emission standard for PM from the limestone handling systems as noted in Table V:

Pollutant	Standard	Legal Authority
PM	0.022 grains/dry standard cubic feet (applicable to stack emissions) 7% opacity (applicable to stack emissions) 10% opacity (applicable to fugitive emissions) 15% opacity (applicable to crushers at which a capture system is not used)	40 CFR 60.670

Compliance Demonstration: Compliance with the standard will be determined utilizing Method 5 and Method 9 test methods.

40 CFR 63 Subparts A & B – General Provisions and Case-By-Case MACT Review Under Section 112(g) of the Clean Air Amendments of 1990

Applicability: Because the proposed Plant Carl facility will be a new, major source of HAP emissions for which a MACT standard has not been promulgated (and which is not part of a de-listed source category), the operations at the facility must undergo a case-by-case MACT review pursuant to Section 112(g) of the 1990 Clean Air Act Amendments and the associated federal and state regulations that implement the 112(g) requirements, found at 40 CFR Par 63, Subpart B and the Georgia Rules for Air Quality Control at 391-3-1-.02(9)16, respectively.

Emission Standard: 112(g) requires the case-by-case review and application of new source MACT-level controls. Plant Carl has proposed as MACT for their operations emissions limitations and work practice standards based of the vacated MACT standard 40 CFR 63 Subpart DDDDD, National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters.

Plant Carl proposes to comply with the emission standards proposed via pollution prevention and abatement technologies. The company will utilize good combustion practices, oxidation catalyst, dry scrubber with trona injection, and an ESP for the pollution control equipment.

The boiler at Plant Carl would be subject to certain emission limits for particulate matter, hydrogen chloride, total selected metals (TSM), mercury and carbon monoxide (although carbon monoxide is not a HAP, it is being used as a surrogate for HAP emissions in the proposed NESHAP). TSM is defined as the combination of the following metallic hazardous air pollutants: arsenic, beryllium, cadmium, chromium, lead, manganese, nickel, and selenium. To verify compliance with these limits Plant Carl plans to conduct yearly testing and operate a continuous emission monitoring system for carbon monoxide.

5.2 Permitting Rules and Emission Standards That Do Not Apply

The following discussion pertains to air quality standards and permitting requirements that were evaluated for applicability to the proposed Plant Carl facility and were determined not to be applicable.

Georgia Rule 391-3-1-.02(7) – Prevention of Significant Deterioration (PSD)

Applicability and Emission Standards: Georgia Rule 391-3-1-.02(7) adopts by reference 40 CFR 52.21. The federal PSD permitting requirements and associated emission standards do not apply to the proposed Plant Carl facility because the potential emissions of all criteria pollutants, after controls and enforceable permit limits, will be below the corresponding applicability thresholds for PSD review.

Acid Rain Program – 40 CFR 72

Applicability and Emission Standards: The Acid Rain Program (40 CFR 72) will not apply to Plant Carl, because the boiler-turbine does not meet the definition of “unit” in 40 CFR 72.2:

“*Unit* means a fossil fuel-fired combustion device.”

Since the boiler will not burn any fossil fuel, it will not be considered a subject unit with respect to the Acid Rain Program.

40 CFR 60, 72, and 75, Subpart Da - Amended, Subpart HHHH – Emission Guidelines and Compliance Times for Coal-Fired Electric Generating Units – Clean Air Interstate Rule (CAIR)

Applicability and Emission Standards: The CAIR program will not apply to Plant Carl, because the boiler-turbine does not meet the definition of “unit” in 40 CFR 60.4102:

“*Unit* means a stationary coal-fired boiler or a stationary coal-fired combustion turbine.”

Since the boiler will not burn any fossil fuel, it will not be considered a subject unit with respect to the CAIR Program.

6.0 EMISSION RATES AND CHANGES

The methodologies used to quantify emissions from the emissions units at the Plant Carl facility are summarized in this section of the Notice of MACT Approval. The emission rates are calculated for all of the operations of the proposed facility. Projected emission rates are estimated by multiplying an emission factor by an associated process rate.

6.1 Case-by-Case MACT Applicability Under Section 112(g) of the 1990 CAAA

A newly constructed or reconstructed major source of HAP without a promulgated Part 63 NESHAP will be subject to the requirements 40 CFR 63.40 through 63.44, including a case-by-case MACT determination as described by the Section 112(g) of the 1990 Clean Air Act Amendments. The proposed Plant Carl facility is a “construct[ion] of a major source” as defined by 40 CFR 63.41. The facility will not be a reconstruction or modification of an existing site, and it will be a major source of HAP because it will have the potential to emit more than 10 tons per year of any individual HAP or 25 tons per year of any combination of HAPs.

6.2 HAP Emissions Profile

The boiler (Source Code: B1) is the only source of source of HAP emissions. The table below provides a speciation of the HAP emissions from the facility, before (potential) and after (actual) controls.

HAP	Uncontrolled Annual Emissions (tons/yr)	Controlled Annual Emissions (tons/yr)	Comment
HCL	343.9	27.5	Abated by Dry Scrubber
Formaldehyde	7.3	7.3	Abated by Oxidation catalyst
Benzene	7.0	7.0	Abated by Oxidation catalyst
Mercury	0.006	0.003	Abated by ESP
Acrolein	0.13	3.12E-02	No controls
Total Selected Metals (TSM)	2.88	2.02E-02	Abated by Dry Scrubber and ESP
Total HAP	361.21	42.0	

7.0 MAXIMUM AVAILABLE CONTROL TECHNOLOGY (MACT) ANALYSIS

A 112(g) case-by-case MACT determination is required for this facility. MACT emission limitation for new sources is defined as:

“...the emission limitation which is not less stringent than the emission limitation achieved in practice by the best controlled similar source, and which reflects the maximum degree of deduction in emissions that the permitting authority, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable by the constructed or reconstructed major source.” 40 CFR 63.41.

The requirements of the determination are set forth in 40 CFR 63.40 through 63.44.

7.1 MACT Technical Approach

Because EPA could not immediately issue MACT standards for all industries (and there was a potential for significant new sources of toxic air emissions to remain uncontrolled), section 112(g) of the Clean Air Act acts as a “gap-filler” requiring MACT-level control of air toxics when a new major source of HAP is constructed or reconstructed. The facility provides basic information about the source and its potential emissions through its air quality permit application. The application also specifies the emission controls that will ensure that new source MACT will be met. The Division reviews and approves (or disapproves) the application, and provides an opportunity for public comment on the determination.

The principles of a 112(g) case-by-case MACT determination are outlined in 40 CFR 63.43(d)(1) through (4) as follows:

(d) *Principles of MACT determinations.* The following general principles shall govern preparation by the owner or operator of each permit application or other application requiring a case-by-case MACT determination concerning construction or reconstruction of a major source, and all subsequent review of and actions taken concerning such an application by the permitting authority:

(1) The MACT emission limitation or MACT requirements recommended by the applicant and approved by the permitting authority shall not be less stringent than the emission control which is achieved in practice by the best controlled similar source, as determined by the permitting authority.

(2) Based upon available information, as defined in this subpart, the MACT emission limitation and control technology (including any requirements under paragraph (d)(3) of this section) recommended by the applicant and approved by the permitting authority shall achieve the maximum degree of reduction in emissions of HAP which can be achieved by utilizing those control technologies that can be identified from the available information, taking into consideration the costs of achieving such emission reduction and any non-air quality health and environmental impacts and energy requirements associated with the emission reduction.

(3) The applicant may recommend a specific design, equipment, work practice, or operational standard, or a combination thereof, and the permitting authority may approve such a standard if the permitting authority specifically determines that it is not feasible to prescribe or enforce an emission limitation under the criteria set forth in section 112(h)(2) of the Act.

(4) If the Administrator has either proposed a relevant emission standard pursuant to section 112(d) or section 112(h) of the Act or adopted a presumptive MACT determination for the source category which includes the constructed or reconstructed major source, then the MACT requirements applied to the constructed or reconstructed major source shall have considered those MACT emission limitations and requirements of the proposed standard or presumptive MACT determination.

7.2 Potential Control Options

The operations at the proposed Plant Carl facility were evaluated for potential applicability under NESHAPs that have already been promulgated. No currently promulgated NESHAP under 40 CFR Part 63 will be applicable to the proposed Plant Carl facility.

The Plant Carl facility has only one source of HAPs which is the boiler (Source Code: B1). The boiler was evaluated to determine the appropriate MACT level controls under Section 112(g) of the 1990 Clean Air Act Amendments. This evaluation included a review of any proposed NESHAPs under Section 112(d) that have not yet been promulgated and an evaluation of the best-controlled similar sources in the industry located elsewhere in the United States and its territories. The review of best-controlled similar sources included an evaluation of Fibrominn Biomass Power, Schiller Station, and South Point Biomass, which use similar fuels for the combustion in a boiler to produce power and which has been subject to case-by-case BACT control technology reviews in the past.

Potential control strategies and technologies evaluated for each of the pollutants subcategories included the following:

- Inorganic HAP including acid gases (HCl) – wet or dry scrubbers;
- Metal HAP (TSM) and mercury– particulate control specifically ESP;
- Organic HAP via CO limit and monitoring –use good combustion practices and an oxidation catalyst;

7.3 Technical Feasibility Review

A control method or technology is considered available if it can be obtained through commercial channels or applied within the common sense meaning of the term. An available control technology is applicable if it can reasonably be installed and operated. A technology that is both available and applicable is technically feasible. EPA has identified the potential control options in the proposed MACT standard as being available and applicable.

7.4 Company's Proposed MACT for HAP Control

Based on the case-by-case MACT determination, the boiler will be categorized as a new large solid fuel boiler and will be subject to the following emission limits:

- PM (or Total Selected Metals [TSM]): 0.025 lb/MMBtu (or 0.0003 lb/MMBtu)
- HCl: 0.02 lb/MMBtu
- Mercury: 0.000003 lb/MMBtu
- CO: 0.149 lb/MMBtu

Note that Plant Carl expects to demonstrate compliance with the TSM limit rather than the PM limit. Also, Plant Carl expects to demonstrate compliance with the TSM, HCl, and mercury standards through stack testing.

Since the boiler is subject to a CO limit and has a heat input capacity of 100 MMBtu/hr or greater, Plant Carl will be required to install, operate, and maintain a continuous emission monitoring system (CEMS) for CO. During the performance test, an initial performance evaluation of the CO CEMS will be conducted.

Since an ESP will be used for PM/TSM and mercury control, an opacity limit of 10% (1-hour block average) will apply. Plant Carl will be required to install, operate, certify, and maintain a COMS to demonstrate compliance with this limit.

Since a dry scrubber will be used for HCl control, Plant Carl will be required to maintain a sorbent injection rate (3-hour block average) at or above the operating levels established during the initial performance test .

7.5 Preliminary MACT Determination

The Division has reviewed the proposed operational restrictions that the applicant has proposed as MACT for the boiler, as well as the extensive research prepared by U.S. EPA in the course of development of the vacated Subpart DDDDD NESHAP and research on similar facilities throughout the county. During the Division's review another similar facility was located in Maryland – Fibroshore which is still being evaluated by the permitting authority. This facility has a lower PM limit (surrogate for TSM) but it has not been demonstrated in practice that this limit is achieved in practice. MACT requirements recommended by the applicant and approved by the permitting authority shall not be less stringent than the emission control which is achieved in practice by the best controlled similar source. It is the Divisions' position that the Fibroshore Facility should not be considered as part of the Case-By-Case MACT. The emissions limitations and work practice standards coupled with the annual stack testing will ensure the facility remains in compliance with the Air Quality Permit.

8.0 AIR QUALITY ANALYSIS

8.1 Toxic Impact Assessment (TIA) Modeling Results

Following the procedures as specified in the “Guidelines for Ambient Impact Assessment of Toxic Air Pollutant Emissions”, modeling done by both the Division and the company indicate that the maximum ground level concentrations for all toxic air pollutants that will be emitted from this operation are well below the acceptable ambient concentrations. As the result, the toxic emissions impact from the construction and operation of the proposed facility is expected to be insignificant.

ATTACHMENTS

- A.1 Draft Air Quality Permit No. 4911-119-0025-E-03-0**
- A.2 Narrative for SIP Permit Review for Permit No. 4911-119-0025-E-03-0**
- A.3 Toxic Impact Assessment (TIA) Information & Results**

A.2 Narrative for SIP Permit Review for Permit No. 4911-119-0025-E-03-0

NARRATIVE

TO: James A. Capp
FROM: Anna C. Aponte
DATE: May 29, 2008

Facility Name: **Plant Carl**
Facility Owner: **Green Energy Partners, LLC**
AIRS No.: 119-00025
Location: Carnesville, GA (Franklin County)
Application #: 18072
Date of Application: March 18, 2008

Background Information

Earth Resources, Inc. submitted Application No. 16665 dated March 20, 2006 to construct and operate a 21 MW power generation facility – Plant Carl in Carnesville, Georgia. The facility would consist of a 335 MMBtu/hr bubbling, fluidized-bed (BFB) boiler fueled with a mixture of wood biomass and chicken litter. The facility received Air Quality Permit No. 4911-119-0025-E-02-0 which was issued on October 31, 2006. The facility as described was never built.

Green Energy Partners, LLC is the new owner of the facility Plant Carl located in Carnesville, Georgia. Under the new owners a new application was submitted for the operation of a 25 MW power generation facility which is discussed in its entirety below.

Purpose of Application

Green Energy Partners, LLC is proposing to construct and operate a 25 MW power generation facility – Plant Carl – in Carnesville, Georgia. The primary emission source at the facility will be a 400 MMBtu/hr bubbling, fluidized-bed (BFB) boiler fueled with a mixture of wood biomass and chicken litter. Note that small quantities of biodiesel, waste cooking oil, grease, or animal fat will be used as starter fuels. No fossil fuels will be used in the boiler. Steam from this boiler will be routed to a turbine generator that will provide electricity for distribution to the power grid. Emissions of criteria pollutants and hazardous air pollutants (HAPs) will result from the combustion of these fuels in the boiler. The following control equipment will be constructed and operated during all periods of boiler operation:

- Selective Non-Catalytic Reduction (SNCR): Urea will be injected into the post-combustion flue gas to reduce NO_x emissions. The urea chemically reduces the nitrogen oxides to molecular nitrogen (N₂) and water vapor (H₂O). The expected NO_x control efficiency of SNCR is between 30 and 50%.

- Oxidation catalyst: One to two beds of catalyst will be included in the exhaust stream from the boiler. The CO reduction efficiency of 25 to 50% is to be expected. The application in Appendix D page 4 stated that an oxidation catalyst was not technically feasible for the project. Upon further review of the predicted CO emissions from the Plant Carl boiler, Green Energy Partners determined that an oxidation catalyst maybe necessary to achieve the proposed emission limit. Originally, it appeared that the catalyst would not be feasible due to the reasons included in the application for Notice of MACT Approval. However, upon further review, the boiler/control technology expert on the project determined that the oxidation catalyst could be installed in the exhaust in a location downstream from the electrostatic precipitator (ESP). The ESP will minimize particulate loading and is expected to alleviate the previous concerns over plugging, slagging, and contamination.
- Dry Scrubber: The exhaust from the boiler will be routed to a dry scrubber in which trona will be injected into the flue gas for acid gas removal. Trona is a hydrated sodium bicarbonate carbonate compound that has been shown to be highly effective in controlling SO₂ and HCl emissions (see paragraph below on handling). The expected control efficiencies for SO₂ and HCl are approximately 60% and 92%, respectively. This device is also expected to control sulfuric acid mist emissions at an efficiency of approximately 60%.
- Electrostatic Precipitator: The exhaust from the dry scrubber will be routed to an electrostatic precipitator (ESP). The purpose of this device is to control PM emissions, including fly ash and reacted trona particles from the scrubber. The expected control efficiency is approximately 99.3%.

Trona will be delivered from the mine in dedicated sealed trucks similar to bulk cement transport trucks. Once at the jobsite, the material will be pneumatically conveyed to the local storage silo with high-pressure blowers. The local storage silo has a bin vent filter. The material is then metered into the pulverizer for particle size reduction prior to being injected into the flue gas duct. The entire system from the silo to the injection is sealed to atmosphere, so no fugitive dust escapes to the atmosphere.

In addition to the boiler, the facility proposes to install a building to store chicken litter fuel. Air from that fuel storage building will be ducted to the combustion air intake of the boiler. This draft will produce negative pressure in the storage building, thereby reducing the potential for fugitive emissions from fuel handling.

To demonstrate ongoing compliance with the PSD avoidance limits, Green Energy Partners, LLC is proposing to operate continuous emissions monitoring systems (CEMS) for CO, NO_x, and SO₂. Each month, the facility will calculate monthly and 12-month rolling total emissions using CEMS data and will compare the calculated totals against the 249 ton per years limits. This approach is proposed to replace the multi-point stack testing program (as various wood/chicken litter input ratios), emission factor (lb/ton) development, and fuel input rate monitoring of Permit No. 4911-119-0025-E-02-0.

Green Energy Partners, LLC submitted a SIP application for the construction and operation of the above-described emission units. Additionally, the facility has requested emission limits to restrict the emissions below the PSD major source thresholds for nitrogen oxides, sulfur dioxide, and carbon monoxide.

Updated Equipment List

Emission Units			Associated Control Devices	
Source Code	Description	Installation Date	Source Code	Description
B1	400 MMBtu/hr Keeler/Dorr-Oliver, Bubbling, Fluidized Bed Boiler fired on wood/chicken litter	2009*	SNCR OX1 M1 EH1	Selective Non Catalytic Reduction Oxidation Catalyst Dry Scrubber Electrostatic Precipitator
S1	Storage Silo for Trona	2009*	F1	Bin Vent Filter

*proposed within current application

Emissions Summary

The emissions from the boiler were estimated based on AP-42 emission factors for wood combustion combined with stack test results from a boiler firing poultry litter. The poultry litter combustion testing was performed by Air Nova, Inc. for the Maryland Environmental Service at the Eastern Correctional Institution Cogeneration Facility (ECICF) in Westover, Maryland, firing 100% poultry litter. The emission factors used to estimate the potential emissions for this facility are interpolated values that correspond to firing 20% chicken litter and 80% wood and take into account the pollution control equipment that will be used at the facility.

Pollutant	Controlled Emissions (tons/yr)	
	Projected Max Actual	Potential
CO	241	249
NO _x	150	249
SO ₂	77	249
PM/PM ₁₀ /PM _{2.5}	45	50
VOC	26	26
HCl	28	33
Formaldehyde	7.3	7.3
Benzene	7.0	7.0
Acrolein	0.13	0.13
Mercury	0.003	0.005
Total Selected Metals	0.02	0.5
Total HAP	42	48
Ammonia	27	27
Sulfuric Acid	5.8	5.8

Regulatory Applicability

The following analysis of regulatory applicability has been prepared based on the projected emissions from the facility, as well as the specific equipment that will be operated.

Prevention of Significant Deterioration (PSD)

Franklin County is in attainment for all pollutants regulated under the National Ambient Air Quality Standards (NAAQS). The facility is not categorized in one of the 28 listed source categories in 40 CFR 52.21(b)(1)(i)(a) because the boiler is not fossil fuel-fired and is not used for gasification or fuel conversion. Therefore, the PSD major source threshold is 250 tons per year. Based on the projected emissions and control efficiencies and permit limits, Green Energy Partners, LLC will demonstrate through stack testing and ongoing monitoring that the facility will be a minor source with respect to PSD.

To ensure that the facility retains its synthetic minor source status, Green Energy Partners, LLC is requesting PSD avoidance limits of 249 tons per year for the following pollutants: CO, NO_x, and SO₂. Based on emissions calculations, the facility is a “true minor” source (i.e., potential emissions below 250 tons per year) for the other pollutants. Due to the NSPS PM limit (see discussion below), potential emissions of PM/PM₁₀ will be below 250 tons per year.

To demonstrate ongoing compliance with the PSD avoidance limits, Green Energy Partners, LLC is proposing to operate continuous emissions monitoring systems (CEMS) for CO, NO_x, and SO₂. Each month, the facility will calculate monthly and 12-month rolling total emissions using CEMS data and will compare the calculated totals against the 249 ton per years limits.

NSPS - 40 CFR 60 Subpart Db

Because the proposed boiler will have a heat input capacity of greater than 100 MMBtu/hr and will be constructed, modified, or reconstructed after June 19, 1984, it will be subject to the New Source Performance Standard (NSPS) for Industrial-Commercial-Institutional Steam Generating Units, 40 CFR 60 Subpart Db. Because the boiler will not burn any coal, oil, or natural gas, only the PM standards of the NSPS will apply (i.e., the SO₂ and NO_x standards in 40 CFR 60.42b and 60.43b, respectively, are not applicable).

Since the boiler will combust over 30 percent wood (by heat input) on an annual basis and has a heat input capacity of greater than 250 MMBtu/hr, it will be subject to a PM emission limit of 0.03 lb/MMBtu [40 CFR 60.43b(h)(1)]. Also, because the boiler will combust wood, it will be subject to a limit of 20% opacity (6-minute average), except for one 6-minute period per hour of no more than 27% opacity [40 CFR 60.43b(f)]. PM potential emissions are above the PSD major source threshold but the combination of the ESP and the Db limit of 0.03 limits the boiler to 53 tons per year.

Pursuant to 40 CFR 60.8, Green Energy Partners, LLC will be required to conduct an initial performance test for PM and opacity within 60 days after achieving the maximum production rate, but not later than 180 days after initial startup. Also, since the boiler will be subject to an opacity standard under 40 CFR 60.43b, the facility will be required to install, calibrate, maintain, and operate a continuous opacity monitoring system (COMS) [40 CFR 60.48b(a)]. This monitor should be installed on the exhaust stack from the ESP.

NSPS – 40 CFR 60 Subpart OOO

Each affected facility in the Storage Silo (Emission Unit ID S1) must comply with the following on or after the sixtieth day after achieving maximum production but not later than 180 after initial startup:

Applicability: NSPS Subpart OOO is an applicable requirement due to the handling of Trona at the facility.

Emission Standard: This NSPS specifies an emission standard for PM from the limestone handling systems as noted in Table V:

Pollutant	Standard	Legal Authority
PM	0.022 grains/dry standard cubic feet (applicable to stack emissions) 7% opacity (applicable to stack emissions) 10% opacity (applicable to fugitive emissions) 15% opacity (applicable to crushers at which a capture system is not used)	40 CFR 60.670

Compliance Demonstration: Compliance with the standard will be determined utilizing Method 9 test methods.

Case-by-case MACT – 40 CFR Part 63, Subpart B

Plant Carl has determined that potential emissions of HCl (a HAP) may be greater than 10 tons per year. Plant Carl is therefore subject to the National Emissions Standard for Hazardous Air Pollutants (NESHAP), Subpart B – Case-by-Case MACT determination, because not promulgated regulation exists for the Industrial Boiler source category. This determination is discussed in the attached document – Notice of MACT Approval.

Acid Rain Program – 40 CFR 72

The Acid Rain Program (40 CFR 72) will not apply to Plant Carl, because the boiler-turbine does not meet the definition of “unit” in 40 CFR 72.2:

“Unit means a fossil fuel-fired combustion device.”

Since the boiler will not burn any fossil fuel, it will not be considered a subject unit with respect to the Acid Rain Program.

Georgia Rules for Air Quality Control – Chapter 391-3-1

In addition to the NSPS and NESHAP, the facility will be subject to the following specific Georgia Rules for Air Quality Control – Chapter 391-3-1:

- Rule 391-3-1-.02(2)(d) – Fuel-burning Equipment: The following limits will apply to the boiler:
 - PM: 0.10 lb/MMBtu
 - Opacity: 20%, except for one 6-minute period per hour of no more than 27% opacity

Initial performance testing and operation of the COMS will be used to demonstrate compliance with this standard. Note that the Rule (d) NO_x limit applicable to fuel-burning equipment does not apply because the boiler will not burn coal, oil, or natural gas. Also, the more stringent PM limit from the NSPS.

- Rule 391-3-1-.02(2)(g) – Sulfur Dioxide: The following limit will apply to the boiler:
 - Fuel sulfur content of no more than 3% by weight.

Initial and period fuel sampling and sulfur content analysis will be used to demonstrate compliance with this standard. Note that the Rule (g) SO₂ emissions limit (in lb/MMBtu) does not apply because the boiler will not burn any liquid or solid fossil fuel.

- Rule 391-3-1-.02(2)(n) – Fugitive Dust: the facility will be required to take all reasonable precautions to prevent fugitive dust from becoming airborne and to maintain visible emissions from fugitive dust below 20% opacity.

The fuel storage area for chicken litter will be under cover and under negative pressure. The air flow from the storage areas will be conveyed into the boiler (and subsequent ESP) to minimize fugitive emissions.

Note that Rule 391-3-1-.02(2)(jjj) – NO_x Emissions from Electric Utility Steam Generating Units – does not apply because the boiler is not coal-fired and is not located in one of the counties subject to this standard.

Summary of Applicable Limits

The following table summarizes the emission limits that Green Energy Partners, LLC expects to apply to the boiler:

Pollutant	Limit	Standard	Compliance Demonstration Method
PM	0.03 lb/MMBtu	NSPS Db	Stack testing
NO _x	249 tons/yr	PSD Avoidance	CEMS
SO ₂	249 tons/yr	PSD Avoidance	CEMS
CO	249 tons/yr	PSD Avoidance	CEMS
	0.149 lb/MMBtu	NESHAP	CEMS
TSM	0.0003 lb/MMBtu	NESHAP	Stack testing
HCl	0.02 lb/MMBtu	NESHAP	Stack testing
Mercury	0.000003 lb/MMBtu	NESHAP	Stack testing
Opacity	10% (1-hour avg.)	NESHAP	COMS
	20% (6-min. avg.)*	NSPS	COMS

* One 6-minute period per hour of no more than 27% opacity is allowed.

Reporting Requirements

Plant Carl will be required to monitor compliance with the above-described limits and submit quarterly and semiannual reports. The quarterly reports will include all exceedences of the NSPS opacity standard and any downtime of the COMS. The semiannual reports will include all exceedences of the NESHAP opacity standard and CO concentration limit, as well as any downtime of the COMS or CEMS. Additionally, the semiannual report will include any deviations of the scrubber sorbent (trona) injection rate below the minimum level established during the most recent compliance test.

Plant Carl will also be required to maintain records of monthly and rolling twelve-month-consecutive totals of CO, NO_x, and SO₂ emissions from Boiler B1; these totals will be included with the quarterly reports.

Permit Conditions

Condition 2.1 incorporates applicable provisions of 40 CFR Part 60 Subpart A and Db for operation of Boiler (Source Code: B1).

Condition 2.2 incorporates two applicable operational limitations under 40 CFR 60, Subpart Db which limit PM emissions to 0.03 lbs/MMBtu and an opacity limit of 20 %.

Condition 2.3 incorporates applicable provisions of 40 CFR Part 63 Subpart A for operation of Boiler (Source Code: B1).

Condition 2.4 incorporates applicable operation limitations for the Boiler (Source Code: B1) under 40 CFR Part 63, Subpart B – Case-by-Case MACT which includes limits for Total Selected Metals (TSM), Hydrogen Chloride (HCl), Mercury, Carbon Monoxide (CO) and opacity.

Condition 2.5 incorporates Georgia Rule (g) for the Boiler (Source Code: B1) and limits the fuel to contain no more than 3 percent sulfur, by weight.

Condition 2.6 limits NO_x, CO, and SO₂ emissions from the Boiler (Source Code: B1) each to no more than 249 tpy.

Condition 2.7 specifies the types of fuels allowed to be burned in the Boiler (Source Code: B1).

Condition 2.8 incorporates applicable provisions and limitations of 40 CFR Part 60 Subpart OOO for operation of the Storage Silo (Source Code: S1).

Condition 2.9 incorporates Georgia Rule (e) for the Storage Silo (Source Code: S1) and sets a PM emission limit.

Conditions 3.1 and 3.2 incorporate Georgia Rule (n) to minimize fugitive dust for the entire facility.

Condition 4.1 is standard template conditions for control equipment.

Conditions 4.2 and 4.3 require the pollution control equipment be in operation at all times except during periods of startup, shutdown or malfunction.

Condition 4.4 requires a startup, shutdown, and malfunction plan (SSMP) to be developed and operated by the facility per 40 CFR Part 63 Subpart B

Condition 5.1 is a standard template condition for monitoring systems or devices that are installed by the Permittee.

Condition 5.2 requires the facility to install, calibrate, maintain and operate a continuous monitoring system for the sorbent injection rate on the Dry Scrubber (APCD ID No. M1).

Condition 5.3 requires the facility to install, calibrate, maintain, and operate a continuous opacity monitoring system (COMS) as required by 40 CFR 60 Subpart Db, and a continuous emissions monitoring system (CEMS) for Nitrogen Oxides (NO_x), Carbon Monoxide (CO), and Sulfur Dioxide (SO₂) on the Boiler (Source Code: B1).

Condition 5.4 requires VE checks for the storage silo (Source Code: S1).

Condition 5.5 requires Appendix F procedures and testing for verifying compliance and operation of the CEMS

Condition 6.1 contains standard template condition for performance test requirements.

Condition 6.2 contains the applicable test methods.

Condition 6.3 requires the facility to conduct a performance test for particulate matter emissions from Boiler (Source Code: B1).

Condition 6.4 requires the facility to conduct a performance test for TSM, HCl, and Mercury emissions from Boiler (Source Code: B1).

Condition 6.5 requires the facility to conduct performance evaluations on the CEMS systems as required by Condition 5.3.

Condition 6.6 requires the facility to conduct a performance test for the Storage Silo (Source Code: S1) to determine compliance with 40 CFR 60, Subpart OOO.

Condition Nos. 7.1 and 7.2 are template conditions for notification, reporting and record keeping requirements.

Condition 7.3 requires the facility per 40 CFR 60.7 to provide notifications of the actual date of initial startup of the Boiler (Source Code: B1) and anticipated date of performance testing, including CEMS and COMS performance evaluations.

Condition 7.4 contains quarterly reporting requirements.

Condition 7.5 requires calculation of monthly CO emission rates.

Condition 7.6 requires calculation of the 12-month rolling CO emission rate.

Condition 7.7 requires the facility to calculate and record the monthly NO_x emissions from the Boiler (Source Code: B1) using a NO_x CEMS.

Condition 7.8 requires the facility to calculate the 12 consecutive month total NO_x emissions from the Boiler (Source Code: B1).

Condition 7.9 requires the facility to calculate and record the monthly SO₂ emissions from the Boiler (Source Code: B1) using a SO₂ CEMS.

Condition 7.10 requires the facility to calculate the 12 consecutive month total SO₂ emissions from the Boiler (Source Code: B1).

Condition 7.11 requires the facility to maintain files of all required measurements, including CEMS etc. for a period of at least five years.

Condition 7.12 requires the facility per 40 CFR 60.7 and 40 CFR Part 60 Subpart OOO to provide notifications of the actual date of initial startup of the Storage Silo (Source Code: S1).

Condition 7.13 contains reporting requirements for excess emission, exceedances, and excursions.

Condition 8.2 requires the facility to submit a Title V application within 12 months from the date of initial startup of the facility.

Condition 8.3 revokes a previous permit issued to Earth Resources, Inc. for a similar project that did not commence.

Toxic Impact Assessment

Plant Carl and EPD conducted a toxic impact assessment for hazardous air pollutants being emitted from the facility. The SCREEN3 model and TIA for the boiler are attached. The facility passes the TIA for all modeled pollutants and all concentrations are within the acceptable ambient air concentrations.

Summary & Recommendations

In summary, it is recommended that Air Quality Permit No. 4911-119-0025-E-03-0 be issued for the Plant Carl facility. A Public Advisory expired on April 25, 2005. No comments were received. The facility is a PSD minor source, but is a Title V major source. Therefore, Green Energy Partners, LLC will be required to submit a Title V Major Source Operating Permit Application within one year after startup of the boiler. Condition 8.3 revokes the previous, permit issued to Earth Resources on October 31, 2006, for a similar project that did not commence.