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MAR 25 2008

BUREAU OF AIR REGULATION

March 24, 2008

Mr. Jeff Koerner  
DEP/DARM  
North Permitting Section  
Division of Air Resource Management  
2600 Blair Stone Road MS 5500  
Tallahassee, Florida 32399-2400

Re: Bartow Power Plant, Facility ID No. 1030011  
Proposed Bio-Fuel Test Burn  
Air Construction Permit Application

Dear Mr. Koerner:

Attached is an application for an air construction permit for a proposed bio-fuel trial burn at the Bartow Power Plant. Specifically, Progress Energy Florida (PEF) proposes to fire the bio-fuel in one of the existing combustion turbines and/or one of the existing steam units onsite. This initiative is part of PEF's ongoing efforts to use renewable fuels in a responsible and cost-effective manner. The development and use of bio-fuels, such as this, will have a positive impact on the reduction of CO<sub>2</sub> emissions as they are derive from biomass (CO<sub>2</sub> neutral).

Enclosed are an original and three (3) copies of the application package. PEF would appreciate your timely processing of the application, as the test burn has been tentatively scheduled for May 2008. Please contact me at (727) 820-5962 or Scott Osbourn, P.E. at (813) 287-1717 if you have any questions.

Sincerely,

A handwritten signature in black ink that reads 'Chris Bradley'.

Chris Bradley  
Senior Environmental Specialist

Enclosure

cc: Ms. Mara Nasca, FDEP SW District (Cover Letter)

MINOR SOURCE AIR CONSTRUCTION PERMIT APPLICATION  
COMBUSTION OF BIO-FUEL  
BARTOW POWER PLANT  
ST. PETERSBURG, PINELLAS COUNTY, FLORIDA

*Submitted to:*

*Florida Power Corporation (d/b/a Progress Energy Florida, Inc.)  
100 Central Avenue  
St. Petersburg, Florida 33701*

*Submitted by:*

*Golder Associates Inc.  
5100 West Lemon Street  
Suite 114  
Tampa, Florida 33609*

Distribution:

4 Copies Department of Environmental Protection  
2 Copies Progress Energy Florida  
2 Copies Golder Associates Inc.

March 2008

083-89518

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**PART I**

**FDEP APPLICATION FOR AIR PERMIT**



# Department of Environmental Protection

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## Division of Air Resource Management

### APPLICATION FOR AIR PERMIT - LONG FORM

BUREAU OF AIR REGULATION

#### I. APPLICATION INFORMATION

**Air Construction Permit** – Use this form to apply for an air construction permit for a proposed project:

- subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- at an existing federally enforceable state air operation permit (FESOP) or Title V permitted facility.

**Air Operation Permit** – Use this form to apply for:

- an initial federally enforceable state air operation permit (FESOP); or
- an initial/revised/renewal Title V air operation permit.

**Air Construction Permit & Revised/Renewal Title V Air Operation Permit (Concurrent Processing Option)** – Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

#### Identification of Facility

1. Facility Owner/Company Name: <b>PROGRESS ENERGY FLORIDA, INC.</b>	
2. Site Name: <b>BARTOW POWER PLANT</b>	
3. Facility Identification Number:	
4. Facility Location...: Street Address or Other Locator: <b>1601 WEEDON ISLAND DR.</b> City: <b>ST. PETERSBURG</b> County: <b>PINELLAS</b> Zip Code: <b>33702</b>	
5. Relocatable Facility? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6. Existing Title V Permitted Facility? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

#### Application Contact

1. Application Contact Name: <b>CHRIS BRADLEY, SENIOR ENVIRONMENTAL SPECIALIST</b>	
2. Application Contact Mailing Address... Organization/Firm: <b>PROGRESS ENERGY FLORIDA</b> Street Address: <b>p.o. Box 14042, MAC PEF-903</b> City: <b>ST. PETERSBURG</b> State: <b>FL</b> Zip Code: <b>33701</b>	
3. Application Contact Telephone Numbers... Telephone: <b>(727) 820-5962</b> ext. Fax: <b>(727) 820-5229</b>	
4. Application Contact Email Address: <b>CHRIS.BRADLEY@PGNMAIL.COM</b>	

#### Application Processing Information (DEP Use)

1. Date of Receipt of Application:	3/25/08
2. Project Number(s):	-011-AC
3. PSD Number (if applicable):	
4. Siting Number (if applicable):	

## APPLICATION INFORMATION

### Purpose of Application

**This application for air permit is submitted to obtain: (Check one)**

#### **Air Construction Permit**

Air construction permit.

#### **Air Operation Permit**

- Initial Title V air operation permit.
- Title V air operation permit revision.
- Title V air operation permit renewal.
- Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.
- Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

#### **Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)**

- Air construction permit and Title V permit revision, incorporating the proposed project.
- Air construction permit and Title V permit renewal, incorporating the proposed project.

**Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:**

- I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

### Application Comment

Progress Energy Florida (PEF) is proposing to conduct a trial burn of a bio-fuel. Specifically, a trial burn will be conducted for firing of a bio-fuel in a combustion turbine and/or a steam unit onsite. See Part II (the attached report) for details of the proposed trial burn.

The trial burn is proposed to begin around mid-May 2008. PEF requests that the candidate units not be designated in the permit, as unit availability and other circumstances at the time of the trial burn may dictate the use of certain units. However, the bio-fuel will likely be fired in either CT-1 or CT-2 and/or Steam Unit No. 2 or 3, depending on circumstances at the time of the test burn. Approximately 500 tons of the bio-fuel will be available for the test burn. The total proposed firing hours will be dependent on the amount of firing within the designated steam unit and the designated CT, as well as whether the bio-fuel is fired exclusively or co-fired with existing fuels. Therefore, PEF requests that the total bio-fuel firing be limited only by the total amount of available bio-fuel (i.e., 500 tons).

**APPLICATION INFORMATION**

**Scope of Application**

<b>Emissions Unit ID Number</b>	<b>Description of Emissions Unit</b>	<b>Air Permit Type</b>	<b>Air Permit Proc. Fee</b>
002	FFSG, Unit 2		NA
003	FFSG, Unit 3		NA
005	CT 1		NA
006	CT 2		NA

**Application Processing Fee**

**Check one:**  Attached - Amount: \$ \_\_\_\_\_  Not Applicable

**APPLICATION INFORMATION**

**Owner/Authorized Representative Statement**

**Complete if applying for an air construction permit or an initial FESOP.**

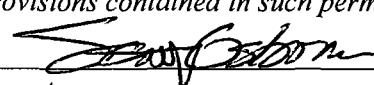
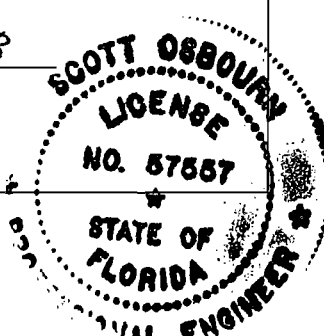
1. Owner/Authorized Representative Name : <b>TOM LAWERY, PLANT MANAGER</b>
2. Owner/Authorized Representative Mailing Address... Organization/Firm: <b>PROGRESS ENERGY</b> Street Address: <b>1601 WEEDON ISLAND DR.</b> City: <b>ST PETERSBURG</b> State: <b>FLORIDA</b> Zip Code: <b>33702</b>
3. Owner/Authorized Representative Telephone Numbers... Telephone: <b>(727) 827-6111</b> ext. Fax: <b>(727) 827-6102</b>
4. Owner/Authorized Representative Email Address: <b>TOM.LAWERY@PGNMAIL.COM</b>
5. Owner/Authorized Representative Statement:  <i>I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other requirements identified in this application to which the facility is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit.</i>   Signature  <u>3/24/08</u> Date





**APPLICATION INFORMATION**

**Professional Engineer Certification**

1. Professional Engineer Name: <b>SCOTT OSBOURN</b> Registration Number: <b>57557</b>
2. Professional Engineer Mailing Address... Organization/Firm: <b>GOLDER ASSOCIATES, INC.**</b> Street Address: <b>5100 WEST LEMON ST., SUITE 114</b> City: <b>TAMPA</b> State: <b>FL</b> Zip Code: <b>33609</b>
3. Professional Engineer Telephone Numbers... Telephone: <b>(813) 287-1717</b> ext.211 Fax: <b>(813) 287-1716</b>
4. Professional Engineer Email Address: <b>SOSBOURN@GOLDER.COM</b>
5. Professional Engineer Statement: <i>I, the undersigned, hereby certify, except as particularly noted herein*, that:</i> <i>(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and</i> <i>(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.</i> <i>(3) If the purpose of this application is to obtain a Title V air operation permit (check here <input type="checkbox"/>, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.</i> <i>(4) If the purpose of this application is to obtain an air construction permit (check here <input checked="" type="checkbox"/>, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here <input type="checkbox"/>, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.</i> <i>(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here <input type="checkbox"/>, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.</i>  Signature  Date <u>3/24/08</u>  (seal) 

\* Attach any exception to certification statement.

\*\* Board of Professional Engineers Certificate of Authorization #00001670

## FACILITY INFORMATION

### II. FACILITY INFORMATION

#### A. GENERAL FACILITY INFORMATION

##### Facility Location and Type

1. Facility UTM Coordinates... Zone <b>17</b> East (km) <b>334.3</b> North (km) <b>3204.5</b>		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) <b>28/57/34</b> Longitude (DD/MM/SS) <b>82/42/01</b>	
3. Governmental Facility Code: <b>0</b>	4. Facility Status Code: <b>A</b>	5. Facility Major Group SIC Code: <b>49</b>	6. Facility SIC(s):
7. Facility Comment :			

##### Facility Contact

1. Facility Contact Name: <b>CHRIS BRADLEY, SENIOR ENVIRONMENTAL SPECIALIST</b>
2. Facility Contact Mailing Address... Organization/Firm: <b>PROGRESS ENERGY FLORIDA</b> Street Address: <b>P.O. BOX 14042, MAC PEF-903</b> City: <b>ST PETERSBURG</b> State: <b>FLORIDA</b> Zip Code: <b>33701</b>
3. Facility Contact Telephone Numbers: Telephone: <b>(727) 820-5962</b> ext. Fax: <b>(727) 820-5229</b>
4. Facility Contact Email Address: <b>CHRIS.BRADLEY@PGNMAIL.COM</b>

##### Facility Primary Responsible Official

**Complete if an "application responsible official" is identified in Section I. that is not the facility "primary responsible official."**

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
4. Facility Primary Responsible Official Email Address:

## FACILITY INFORMATION

### Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a “major source” and a “synthetic minor source.”

1. <input type="checkbox"/> Small Business Stationary Source	<input type="checkbox"/> Unknown
2. <input type="checkbox"/> Synthetic Non-Title V Source	
3. <input checked="" type="checkbox"/> Title V Source	
4. <input checked="" type="checkbox"/> Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. <input type="checkbox"/> Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. <input checked="" type="checkbox"/> Major Source of Hazardous Air Pollutants (HAPs)	
7. <input type="checkbox"/> Synthetic Minor Source of HAPs	
8. <input type="checkbox"/> One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. <input type="checkbox"/> One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. <input type="checkbox"/> One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. <input type="checkbox"/> Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment:	

# FACILITY INFORMATION

## List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
PM	A	N
PM10	A	N
SO2	A	N
CO	A	N
NOx	A	N
VOC	A	N

**FACILITY INFORMATION**


**FACILITY INFORMATION**

**B. EMISSIONS CAPS**

**Facility-Wide or Multi-Unit Emissions Caps**

1. Pollutant Subject to Emissions Cap	2. Facility Wide Cap [Y or N]? (all units)	3. Emissions Unit ID No.s Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap
7. Facility-Wide or Multi-Unit Emissions Cap Comment:					

## FACILITY INFORMATION

### C. FACILITY ADDITIONAL INFORMATION

#### Additional Requirements for All Applications, Except as Otherwise Stated

1. Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Previously Submitted, Date: <u>7/2/04</u>
2. Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Previously Submitted, Date: <u>7/2/04</u>
3. Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Previously Submitted, Date: <u>7/2/04</u>

#### Additional Requirements for Air Construction Permit Applications

1. Area Map Showing Facility Location: <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable (existing permitted facility)
2. Description of Proposed Construction or Modification: <input checked="" type="checkbox"/> Attached, Document ID: <u>PART II</u>
3. Rule Applicability Analysis: <input checked="" type="checkbox"/> Attached, Document ID: <u>PART II</u>
4. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable (no exempt units at facility)
5. Fugitive Emissions Identification (Rule 62-212.400(2), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
6. Preconstruction Air Quality Monitoring and Analysis (Rule 62-212.400(5)(f), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
7. Ambient Impact Analysis (Rule 62-212.400(5)(d), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
8. Air Quality Impact since 1977 (Rule 62-212.400(5)(h)5., F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
9. Additional Impact Analyses (Rules 62-212.400(5)(e)1. and 62-212.500(4)(e), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable
10. Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): <input type="checkbox"/> Attached, Document ID: _____ <input checked="" type="checkbox"/> Not Applicable





**PART II**

**APPLICATION REPORT**

## 1.0 INTRODUCTION AND EXECUTIVE SUMMARY

The proposed Project involves evaluating the firing of a bio-fuel in one of the existing combustion turbines and/or one of the existing steam units at Progress Energy Florida's (PEF) Bartow Power Plant. This application for a minor source construction permit will allow for a trial burn as a high-level assessment that will assist PEF in the performance of a first-cut evaluation to determine if the proposed bio-fuel will meet expected performance and environmental criteria. This initiative is part of PEF's ongoing efforts to use renewable fuels in a responsible and cost-effective manner. The development and the use of bio-fuels, such as this, will have a positive impact on the reduction of CO<sub>2</sub> emissions as they derive from biomass (CO<sub>2</sub> neutral).

The above factors, in addition to the fact that no plant changes to existing process equipment are necessary to test burn the proposed bio-fuel, are presented as PEF's position that the Bartow steam units and combustion turbines are "capable of accommodating" this fuel. Therefore, if the test firing demonstrates no increase in air emissions, then there is no modification and the current Title V permit can be revised accordingly to allow for permanent firing of this fuel.

The following sections provide the Project Description (Section 2.0) and the Proposed Project Approach (Section 3.0). The trial burn is proposed to begin in mid to late May 2008. Relevant specifications for the bio-fuel are provided in Appendix A to this report.

## 2.0 PROJECT DESCRIPTION

PEF has had discussions with the Innovative Energy Group (IEG) regarding use of their bio-fuel. IEG has developed a commercially viable bio-fuel, through a patented fast pyrolysis technology for conversion of biomass to bio-fuel. The process, using an E-grass as the biomass source, has successfully undergone bench scale testing. Pyrolysis converts biomass into useful primary energy products through the heating of a raw material (i.e., E-grass) in the absence of oxygen. As a result of the thermal decomposition of the raw material, a gas, a liquid and a solid are formed, which can be used directly or further upgraded to give more value-added fuels. Fast pyrolysis, at a temperature around 500 °C, at very high heating rates and short vapor residence times, results in high liquid yields in a simple one-step process.

IEG intends to produce and deliver approximately 500 tons of this E-grass derived bio-fuel in May 2008 for use in one of the existing steam units onsite and/or one of the existing combustion turbines. PEF requests that the air construction permit not designate a particular unit for the trial burns, as the choice will be made depending upon unit availability and other circumstances at the time of the test burn. It is likely that either Steam Unit Nos. 2 or 3 will be selected, due to the transferability of the results to the Anclote steam units. In addition, combustion turbines (CTs) Nos. 1 or 2 are likely candidates due to their natural gas-firing capability, which may be of benefit to aid initial bio-fuel combustion in the CTs.

PEF requests that the air construction permit limit bio-fuel test firing to no more than the 500 tons of fuel to be delivered, but that there be no restriction on total firing hours. This is because the total proposed firing hours would be dependent on the amount of firing within the designated steam unit and/or the designated CT, as well as whether the bio-fuel is fired exclusively or co-fired with existing fuels. The Department may want the permit to provide a date certain by which the test firing program is to be concluded. If so, PEF requests up to 120 days to complete firing of the 500 tons of available bio-fuel.

Finally, the vendor-supplied bio-fuel specification sheet is provided as Appendix A to this report (the column designated as LEG). The bio-fuel, termed LEG (liquid E-grass) on the spec sheet, consists of very low ash and sulfur content. Therefore, PM and SO<sub>2</sub> emissions would be expected to be lower than corresponding values for both No. 2 oil (used in the CTs) and No. 6 oil (used in the steam units). In addition, fuel bound nitrogen (FBN) is lower than the distillate and residual oils. The high

moisture content (~ 20 percent) should serve to inhibit the formation of thermal NO<sub>x</sub>. The low projected thermal NO<sub>x</sub>, combined with the low FBN, should result in lower overall NO<sub>x</sub> emissions compared to the existing use of distillate and residual oils at the site. Emissions of CO may be slightly higher, due to the high fuel moisture content. However, this is currently unknown and the CO data obtained during this test burn will be useful for future bio-fuels comparisons.

### 3.0 PROPOSED PROJECT APPROACH

PEF anticipates conducting the test burn over an extended period of time to allow the impact of the bio-fuel to accumulate in the boiler/CT and other components, so that the effects of the bio-fuel can be determined. As stated earlier, PEF requests up to 120 days from receipt of the permit to complete the test burn program. A short-term test burn may not show any adverse performance effects that will become evident later when the bio-fuel is fired on a longer duration.

Section 2.0 provided a summary of the proposed bio-fuel spec sheet (provided in Appendix A, column LEG). Based on engineering judgment, reflective of the bio-fuel properties, certain conclusions can be inferred with respect to unit performance and emissions while firing the bio-fuel.

PEF anticipates the following effects on pollutants of concern:

- SO<sub>2</sub> emissions should be significantly reduced;
- PM/PM<sub>10</sub> emissions should be reduced;
- NO<sub>x</sub> emissions should be reduced;
- CO/VOC emissions should be comparable (to be confirmed through testing); and
- Opacity should be equal to or less than the use of distillate and residual oils.

All conditions of the existing permit related to air pollution emission limits and control equipment will remain in force during the trial burn. For the designated steam unit, CEMS data will be recorded and analyzed for the duration of the trial burn for SO<sub>2</sub>, NO<sub>x</sub> and opacity. An emission test will also be conducted and results reported for CO emissions (EPA Method 10); however, testing will also need to be conducted for the baseline condition, as actual CO emissions are currently unknown (there is no CO limit and AP-42 emission factors have historically been used to report annual CO emissions). CO test results should serve as a representative surrogate for anticipated effects on VOC emissions. Daily records (i.e., mass fuel feed rates and heat input) of the boiler operations when firing the bio-fuel will be maintained and reported.

The CTs are not equipped with CEMS, however, test ports are available on the unit stacks for emission testing purposes. For test firing in the designated CT, PEF proposes to conduct baseline testing (using No. 2 distillate oil) for NO<sub>x</sub>, CO and opacity. Testing will then be conducted for these pollutants while firing the proposed bio-fuel. CO test results should serve as a representative

surrogate for anticipated effects on VOC emissions. Daily records (i.e., mass fuel feed rates and heat input) of the CT operations when firing the bio-fuel will be maintained and reported.

Performance testing will cease as soon as possible if the test boiler/CT operations are not in accordance with current permit conditions or this protocol. Performance testing with this bio-fuel will not resume until appropriate measures to correct the problem have been implemented. A test report will be submitted to the Department within 45 days of completion of the trial burn.

**APPENDIX A**  
**BIO-FUEL PROPERTIES AND SPECIFICATIONS**



**LEG Properties**  
**Innovative Energy Global, Inc.**  
 by KJMills, PE  
 March 20, 2008



	Base Case LEG	alternate units
<b>LEG Concentration (ppmm)</b>		
sand	0.34	
char	0.70	
ash	<10	
sulfur	<0.05%	
vanadium	neg	
Na alkali	<0.01	
K alkali	0.042	
P alkali	0.009	
Ca Alkali	0.012	
Total Alkali	0.067	
N	2100	
Moisture (D95)	20%	
Carbon Residue (wt%, D4530)	12.0%	
Heat Value (Btu/lb, D4809)	8,253	81,232 Btu/gal
Flash Point (°F, D93)	145	
Total Glycols (mg/kg, D6584)	66	
Simulated Distillation IBP (°F, D2887)	223	
Simulated Distillation FBP (°F, D2887)	831	
Specific Gravity	1.18	9.84 lb/gal
Actual Cetane Index	28	
Viscosity (cSt 70°F)	12	
Heat Value % of #2 (mass)	47.6%	
LHV (Btu/ft3)	617,760	
Heat Value % of #2 (volume)	64.2%	
pH	2.5	
distillability range (degF)	223-831	
	2.5%	123.4
	7.5%	218.4
	20.0%	247.0
	40.0%	303.1
	60.0%	385.2
	80.0%	530.5
	92.5%	631.6
	97.5%	691.6
	100.0%	820.2

these values are based on bench scale tests