TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

INEOS New Planet BioEnergy
Indian River County BioEnergy Facility
925 74th Avenue
Vero Beach, Florida 32968-9702
ARMS Facility ID No. 0610096

PROJECT

Draft Permit No. 0610096-005-AC
Biomass to Ethanol Production
Permit Modification
Removal of NSPS Subpart AAAA Requirements

COUNTY

Indian River County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
2600 Blair Stone Road, MS#5500
Tallahassee, Florida 32399-2400

February 13, 2014

1. GENERAL PROJECT INFORMATION

1.1. Facility Description and Location

INEOS New Planet BioEnergy, LLC (INPB) has constructed a facility in Indian River County (IRC) to produce ethanol from a biomass feedstock consisting of mostly vegetative yard waste, clean woody biomass, construction and demolition (C&D) debris and municipal solid waste (MSW). The IRC INPB facility is located near Vero Beach, Florida, at the former location of an Ocean Spray citrus processing facility at the intersection of 74th Avenue and Oslo Road near Interstate 95. The UTM coordinates are Zone 17, 550.7 kilometers (km) East and 3,051.3 km North. The location of Indian River County in Florida is shown in **Figure 1**, while an aerial view of the INPB facility is shown in **Figure 2**.

Figure 1 – Indian River County, Florida. **Figure 2 – Aerial View of INPB Facility.**

Construction of the facility has been completed and the facility is in operation. However, the facility is currently only processing biomass feedstocks, such as wood chips, and not MSW. Consequently, only a small amount of ethanol is being produced at the facility. When fully up and running, the facility is expected to produce up to 8 million gallons per year (MGPY) of ethanol. The facility is also capable of generating a small amount of electrical power available for commercial use: about 6 megawatts (MW) gross, with a net of 2 MW-net exported to the grid. The facility is categorized under Standard Industrial Classification (SIC) Code No. 2869 - Industrial Organic Chemicals, Not Elsewhere Classified. The Florida Department of Environmental Protection (Department) previously authorized construction of the facility pursuant to air construction Permit No.0610096-001-AC with subsequent modifications to the

original permit accomplished in air construction Permit Nos. 0610096-002-AC, 0610096-003-AC and 0610096-004-AC. Electronic copies of all previous air permit applications and issued permits packages are available at the following web link:
http://www.dep.state.fl.us/air/emission/bioenergy/indian_river.htm

1.2. Process Description

The primary feedstock for the facility is biomass, MSW, vegetative matter, C&D, yard waste which is classified as MSW, land clearing debris and untreated wood collected by the IRC Solid Waste Disposal District (SWDD) curbside collection program, delivered to the county's collection centers, or delivered directly to the facility by the public. The MSW will be pre-processed prior to the feedstock dryers in a similar manner as producing refuse-derived fuel (RDF). This includes sizing using shredders, air drying to remove moisture (in the case of biomass and yard waste) and removal of bulk materials. INPB will not be a primary receiver of MSW from a service area but will receive MSW that has already been processed at a landfill where bulk items and recycled material have been removed. The pre-processed MSW material is then fed to the feedstock dryers. The remainder of the feedstock will consist of the other components listed above.

The INPB bio ethanol technology process gasifies the biomass feedstock. The organic material is not directly combusted; instead, oxygen is supplied to the gasifier which converts the feed material into a synthetic gas (syngas) consisting of carbon monoxide (CO), carbon dioxide (CO_2), hydrogen (H_2) and other hydrocarbons.

Under most circumstances, this syngas is not to be directly combusted after it is cleaned (polished) and cooled (quenched). Instead it is fed into a fermentation system where proprietary bacterial metabolic action converts the syngas into ethanol. The ethanol is then distilled, dehydrated, denatured, stored and loaded into dedicated ethanol tanker trucks for shipment offsite. Off (process) gases from the fermentation process is routed to a vent gas boiler for combustion. Steam from the vent gas boiler as well as steam from waste heat recovery at the gasifiers is routed to a steam turbine electrical generator (STEG) to generate electricity. Vent gas boiler emissions are controlled by sodium bicarbonate injection to control sulfur dioxide (SO_2) and other acid gases such as hydrogen chloride (HCl), activated carbon injection (ACI) to control mercury (Hg) and other metal and organic compounds and fabric filtration to control particulate matter (PM). Under certain circumstances, such as the fermentation bacteria not being available, the syngas from the gasification process is directly routed to the vent gas boiler for combustion. In addition, under certain circumstances, polished or unpolished syngas is sent to a flare.

A block diagram of the INEOS ethanol process is provided in **Figure 3** below. As seen from **Figure 3**, the INPB syngas from the gasification of MSW and other feedstocks is initially polished (red dashed square) by dry gas scrubbing with bicarbonate and ACI before being routed to a quench and compression system (red dashed arrow). From that point, the syngas is either routed to the fermentation process and then the vent gas boiler (orange dashed arrows) or directly to the vent gas boiler (yellow dashed arrow). Alternatively, under certain circumstances such as startup, shutdown, or emergencies, syngas (polish or unpolished) can be routed to a flare (blue arrows).

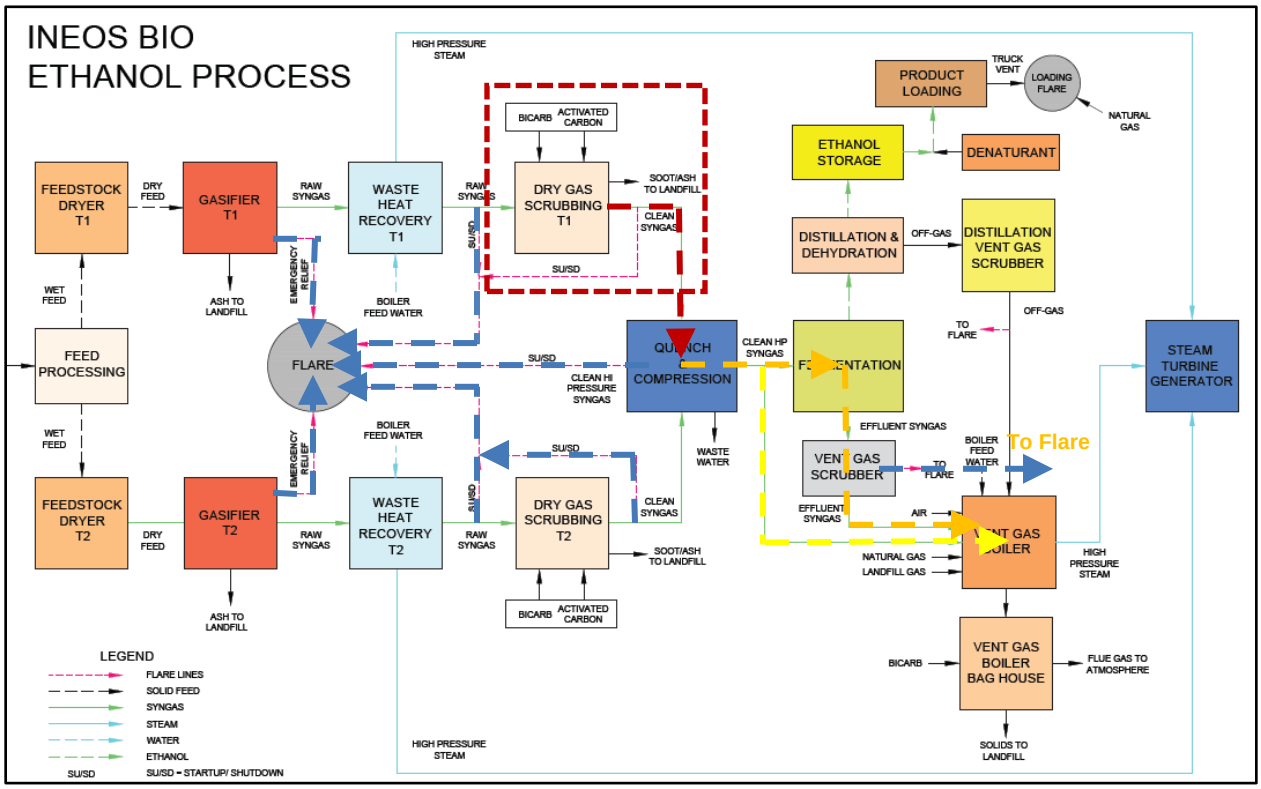

Figure 3 – Block Schematic Diagram of INPB Ethanol Process.

1.3. Primary Regulatory Categories

- The facility is **not** major source of hazardous air pollutants (HAP).
- The facility does **not** operate units subject to the acid rain provisions of the Clean Air Act.
- As a results of this permitting action, the facility **will not be** a Title V major source of air pollution in accordance with Chapter 62-213, Florida Administrative Code (F.A.C.) because the facility will no longer be subject to a New Source Performance Standard (NSPS) 40 Code of Federal Regulations (CFR) 60, Subpart AAAA - Standards of Performance for Small Municipal Waste Combustion Units for Which Commenced After August 30, 1999 or for Which Modifications or Reconstruction is Commenced After June 6, 2001. This subpart puts forth the requirements for solid waste combustion. Since this subpart will no longer apply, the INPB facility will no longer be a Section 129 source under the Clean Air Act (CAA). A Section 129 solid waste combustion source is by default a Title V source. See **Subsection 1.5 "Permit Modification 4 (Current Project)"** for a more detailed discussion of this topic.
- The facility is **not** a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.
- The facility operates units that are subject to the NSPS at 40 Code of Federal Regulations, Part 60 (40 CFR 60), and the National Emissions Standards for Hazardous Air Pollutants (NESHAP) at 40 CFR 63.

1.4. Permit History

On August 25, 2010, the Department issued a minor source air construction permit (Permit No. 0610096-001-AC) to INPB to build a facility in IRC to convert waste biomass, including MSW, to ethanol. The construction permit established various federally enforceable limitations on the facility's potential to emit (PTE) of certain pollutants. The emissions limitations in the permit ensured that the facility emits air pollutants at annual rates less than the emissions thresholds for the prevention of significant deterioration (PSD) pre-construction permitting program which for the INPB facility was 100 tons per year (TPY) at

the time the permit was issued. If subject to the PSD program, the facility would have been required to conduct a Best Available Control Technology (BACT) determination for pollutants above certain thresholds. The PSD program is discussed in more detail below. Subsequent to the original construction permit, three permit modifications have been accomplished prior to the current permitting action. Each of these previous permit modifications are discussed below.

1.4.1. Permit Modification 1

Once construction had commenced on the INPB IRC facility, the Department issued a minor source air construction permit modification (Permit No. 0610096-002-AC) on September 28, 2011. This permit modification consisted of the following major actions:

- Modified the materials handling area to reflect four smaller diesel engines instead of one large engine;
- Updated the fermentation and distillation system requirements to reflect two scrubbers instead of a single scrubber and desulfurization unit;
- Altered the MSW trial period so that instead of requiring a follow-on permit application to authorize routine processing of MSW, the permit will grant authority to process MSW on a routine basis at feed rates for which compliance has been demonstrated;
- Authorized the installation of a larger vent gas boiler and required installation of post-combustion controls (sorbent injection followed by a fabric filter);
- Increased the authorized capacity (gallons) of the product and denaturant storage tanks; and
- Eliminated the desulfurization unit and its associated oxidation tank, and replaced two flares (gasifier flare and syngas flare) with a single, larger flaring system (syngas flare).

1.4.2. Permit Modification 2

On August 7, 2012, the Department issued a second minor source air construction permit modification (Permit No. 0610096-003-AC). This permit modification consisted of the following major actions:

- Increase in the capacity of the burner in the Vent gas boiler from 84.5 million British thermal units per hour (MMBtu/hr) to 97.2 MMBtu/hr. There will be no other physical changes to the boiler, stack or associated equipment;
- Replace the 1989 model year 500 Kilowatt (kW) Caterpillar Model No. 3412 emergency diesel-fired generator with a smaller 2009 model year 400 kW Kohler Model No. 400REZX natural gas-fired emergency generator. Assigned the new emergency generator an emission unit number (EU 011);
- Modify Appendix BMP of the permit to reflect the changes made in Permit No. 0610096-002-AC with regard to municipal solid waste (MSW). In Permit No. 0610096-002-AC, instead of requiring a follow-on permit application to authorize routine processing of MSW, the permit granted authority to process MSW on a routine basis at feed rates for which compliance has been demonstrated. INPB has also requested some minor changes to some language in the BMP plan for clarification proposes;
- Added language to the permit to provide flexibility during the startup and shakedown of the facility with regard to the vent gas boiler;
- Refine the hydrogen sulfide (H_2S) concentration estimated in the syngas and fermenter off gas generated at the facility based on new data from a pilot facility that utilizes the same waste feedstock as the INEOS facility. Previously, the estimated H_2S concentrations had been 700 parts per million (ppm) in the syngas and 1,000 ppm in the off gas. The new estimate is 500 parts per million (ppm) in both gas streams. Based on this new H_2S estimate, the mass of H_2S entering the vent gas boiler has been reduced resulting in the estimated mass emission rates (pounds per hour and tons per year) of all pollutants from the vent gas boiler being reduced;
- Increase the allowable operational hours of the syngas flare during the normal operation of the facility to provide additional flexibility during the startup of the gasification, fermentation and distillation systems and the vent gas boiler. The reduction in the H_2S concentration allows the operational hours

of the flare to be increased from 300 hours to 640 hours without exceeding the 100 TPY PSD threshold for SO_2 emissions that was applicable at the time; and

- Incorporate an H_2S sampling protocol into the permit to provide reasonable assurance that the H_2S concentration in the syngas and off gas streams does not exceed the permitted 500 ppm level.

1.4.3. Permit Modification 3

On June 28, 2013, the Department issued a third minor source air construction permit modification (Permit No. 0610096-004-AC). This permit modification consisted of the following major actions:

- Modification of the odor control plan to indicate that an enclosed area to store MSW is not required until such time that waste that can generate odors, such as putrescible household and institutional waste streams, are processed at the facility **(objectionable odors are still prohibited at the facility)**;
- Distinctions were made in the permit between the proposed feedstock streams to clearly define what is and is not considered MSW to better define when the air pollution testing requirements contained in NSPS Subpart AAAA come into force;
- Allowed a reduction in the sampling frequency of the continuous monitoring system (CMS) measuring the H_2S concentration in the fermenter off gas from once every 15 minutes to once every hour;
- Based the timing of the pollutant emission stack testing required by NSPS Subpart AAAA on when MSW, including yard waste as defined in Subpart AAAA, is actually gasified in the ethanol production process (see bullet 2 above);
- Modified the requirement to use ACI to remove Hg from syngas generated by the gasifier that is directly routed to the vent gas boiler thereby bypassing the ethanol production process. Specifically, the condition was changed so that ACI was only required when syngas from the gasification of MSW is routed to the boiler;
- The NSPS Subpart AAAA requirements were clarified to indicate that testing the vent gas boiler stack for total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans (D/F), lead (Pb), Hg, cadmium (Cd) and HCl emissions be required 60 days after achieving the maximum production rate, but no later than 180 days from the initial gasification of MSW (related to bullets 2 and 4 above);
- The tank farm description was updated to reflect the as built configuration; and,
- Allowed natural gas to be used to supplement syngas in the syngas control flare to ensure proper combustion along with changing the monitoring parameter to syngas flow rather than air flow.

1.5. Permit Modification 4 (Current Project)

On September 20, 2013, INPB submitted an application for a fourth air construction permit modification which is addressed in this Technical Evaluation and Preliminary Determination (TEPD) document. This permit modification consists of removing the requirements of NSPS Subpart AAAA. The reasons for the removal are discussed in more detail later in this document.

In addition, Florida rules have changed since the IRC INPB facility was originally permitted. Specifically, Florida has adopted EPA rule 40 CFR 52.21(b)(1)(iii)(*t*), wherein… *"the term chemical processing plant shall not include ethanol production facilities that produce ethanol by natural fermentation included in NAICS codes 325193 or 312140."* This means that since the IRC INPB facility is no longer a MWC with the removal of NSPS Subpart AAAA requirements and is no longer considered a *"Chemical Processing Plant"*, it is not one of the 28 source categories under PSD regulations. Thus the 100 TPY threshold for triggering a PSD review in no longer valid. Instead, now under Florida rules the IRC INPB facility would have to emit or have the potential to emit 250 TPY or more of any PSD pollutant to be considered a major stationary source subject to a PSD review. The permit has been modified to reflect this rule change. PSD applicability is discussed in more detail in **Section 3** of this document.

1.6. INPB IRC Facility Emission Units (EU)

Table 1 gives a list of the EU at the IRC INPB facility. EU 005 and 009 were eliminated as a result of Permit Modification 1 (DEP file No. 0610096-002-AC). A new EU (EU 011) containing the emergency generator and emergency fire pump engine was created as a result of Permit Modification 2 (DEP File No. 0610096-003-AC). These changes are highlighted in yellow in **Table 1**. Permit Modification 3 and the current permit modification did/do not result in the elimination or addition of any EU.

TABLE 1 – LIST OF THE EU AT THE INPB IRC FACILITY.

EU No.	Emission Unit Description
001	Materials Handling Area
002	Feedstock Dryers No. 1 and No. 2
003	Gasification, Fermentation and Distillation Systems
004	Distillation Unit Fugitive Emissions
~~005~~	**~~Desulfurization Unit Oxidation Tank~~ (Inactive)**
006	Vent Gas Boiler
007	Tank Farm
008	Loadout Flare
~~009~~	**~~Gasifier Flare~~ (Inactive)**
010	Syngas Flare
011	**Emergency Equipment (Added EU)**

1.7. Processing Schedule

September 20, 2013: The Department received the application for an air pollution construction permit modification.

October 8, 2013: The Department deemed the application incomplete and issues a Request for Additional Information (RAI).

December 20, 2013: The Department received INPB response to the RAI.

February 12, 2014: Department distributed written Intent to Issue Air Permit and posted documents.

2. APPLICABLE REGULATIONS

2.1. State Regulations

This project is subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize DEP to establish rules and regulations regarding air quality as part of the F.A.C. This project is subject to the applicable rules and regulations defined in the following chapters of the F.A.C (see **Table 2**).

Table 2– List Applicable State Regulations from F.A.C.

Chapter	Description
62-4	Permits
62-204	Air Pollution Control – General Provisions
62-210	Stationary Sources of Air Pollution – General Requirements
62-212	Stationary Sources – Preconstruction Review
62-213	Operation Permits for Major Sources (Title V) of Air Pollution
62-214	Requirements for Sources Subject to the Federal (Title IV) Acid Rain Program
62-296	Stationary Sources – Emission Standards
62-297	Stationary Sources – Emissions Monitoring

The following are specific state regulations that are applicable to this project. Regulations that are no longer applicable are also denoted.

- Chapter 62-213, F.A.C. Operation Permits for Major Sources of Air Pollution (Title V). As a result of this permitting action, the facility **will no longer be** a source falling under Section 129 of the CAA which deals with Solid Waste Combustion. A Section 129 source by default is a major source of air pollution under the Title V program. Consequently, since all criteria pollutant emissions at the INPB facility are less than 100 TPY, the facility will no longer be a Title V source.
- Subsection 62-296.320(1), F.A.C. VOC Emissions. This rule forbids the storage, pumping, handling, processing, loading, unloading or use of VOC without applying vapor emission control devices or systems. This rule could potentially apply to the INPB IRC facility.
- Subsection 62-296.320(2), F.A.C. Objectionable Odor Prohibited. This rule prohibits any person from discharging air pollutants which cause or contribute to objectionable odors. At the INPB IRC facility, this rule will apply to the Materials Handling Area (EU 001).
- Paragraph 62-296.320(4)(b), F.A.C. General Visible Emissions Standard. This rule applies a visible emissions limit of 20 percent opacity for equipment that does not otherwise have limits for visible emissions or for PM.
- Paragraph 62-296.320(4)(c), F.A.C. Unconfined Emissions of PM. This rule prohibits industrial facilities from emitting unconfined PM (such as dust from unpaved roads) without taking reasonable precautions.
- Rule 62-296.416, F.A.C. Waste-to-Energy Facilities. As a result of this permitting action, the facility **will no longer be** subject to rules for small MSW. This had included Rule 62-296.416, F.A.C., which limits Hg emissions from waste-to-energy facilities.

2.2. Federal Regulations

The U.S. Environmental Protection Agency (EPA) establishes air quality regulations in 40 CFR 60 that identifies NSPS for a variety of industrial activities. 40 CFR 61 specifies NESHAP based on specific pollutants. 40 CFR 63 specifies NESHAP provisions based on the Maximum Achievable Control Technology (MACT) for given source categories. Florida adopts these federal regulations in Rule 62-204.800, F.A.C., and stationary sources in Florida are required to comply with the adopted federal regulations as per Subsection 62-296.100(3), F.A.C.

The following federal regulations are applicable this project. Regulations that are no longer applicable are also denoted along with newly applicable regulations.

- 40 C.F.R. part 60, Subpart A—NSPS General Provisions. The general provisions apply to all emissions units that are subject to one or more of the NSPS rules.
- 40 C.F.R. part 60, Subpart Dc—NSPS for Small Industrial-Commercial-Institutional Steam Generating Units. As a result of this permitting action, Subpart Dc **will apply** to the gasification units/biological reactor/vent gas boiler train, with the point of comparison to the federal emission limits at the exit of the vent gas boiler stack and after the post-combustion air pollution controls.
- 40 C.F.R. part 60, Subpart AAAA—NSPS for Small MWC. As a result of this permitting action, Subpart AAAA **will no longer apply** to the gasification units/biological reactor/vent gas boiler train, with the point of comparison to the federal emission limits at the exit of the vent gas boiler stack and after the post-combustion air pollution controls.
- 40 C.F.R. part 60, Subpart Kb—NSPS for Volatile Organic Liquid Storage Vessels. This rule establishes design and emissions control criteria for certain storage tanks, as a function of their size and the vapor pressure of the organic liquid being stored. At the proposed facility, only the product storage tank and the denaturant storage tank will be subject to this subpart.

- 40 C.F.R. part 60, Subpart IIII—NSPS for Stationary Compression Ignition Internal Combustion Engines. This rule applies to the engines used to process the feedstock and the emergency equipment at the facility.
- 40 C.F.R. part 63, Subpart ZZZZ—NESHAP for Stationary Reciprocating Internal Combustion Engines. This rule applies to the engines used to process the feedstock and the emergency equipment at the facility.
- 40 C.F.R. part 60, Subpart VVa—NSPS for Equipment Leaks of VOC. This rule limits fugitive emissions of VOC from leaking equipment (such as pumps, valves, flanges and connectors) through the implementation of a site-specific leak detection and repair (LDAR) plan.

3. PSD APPLICABILITY REVIEW

3.1. General PSD Applicability

The Department regulates major stationary sources in accordance with Florida's PSD program pursuant to Rule 62-212.400, F.A.C. PSD preconstruction review is required in areas that are currently in attainment with the state and federal ambient air quality standards (AAQS) or areas designated as "unclassifiable" for these regulated pollutants.

PSD pollutants that are common to a facility such as INPB include: CO, nitrogen oxides (NO_X), PM, PM with a mean diameter of 10 microns or less (PM_{10}), PM with a mean diameter of 2.5 microns or less ($PM_{2.5}$), SO_2, volatile organic compounds (VOC), sulfuric acid mist (SAM), Pb, fluorides (F), H_2S, HCl, Hg, MWC acid gases measured as SO_2 and HCl, municipal waste combustor (MWC) organics measured as D/F and MWC metals measured as PM.

As defined in Rule 62-210.200(Definitions), F.A.C., a stationary source is a "major stationary source" (major PSD source) if it emits or has the potential to emit (PTE):

- 250 tons per year (tons/year) or more of any PSD pollutant; or
- 100 tons/year or more of any PSD pollutant and the facility belongs to one of the 28 listed PSD major facility categories.

As previously mentioned, Florida rules have changed since the IRC INPB facility was originally permitted. As a result, the facility is no longer considered a *"Chemical Processing Plant"* which is one of the 28 listed PSD major facility categories with a 100 TPY major source PSD threshold. Instead the threshold for PSD major source is now 250 TPY.

3.2. PSD Applicability for the Modification Project

3.2.1. Applicant's Analysis

The IRC INPB facility is located in Indian River County, which is currently in attainment (or otherwise designated as unclassifiable) with respect to the AAQS. When the facility was considered a *"Chemical Processing Plant"*, the applicant proposed certain operational and emissions limitations to keep the facility's PTE to less than 100 TPY for the PSD pollutants so as not to trigger a PSD review with associated BACT determinations. The estimated PTE pollutant emissions at the IRC INPB facility are given in **Table 3** below. Even though a PSD major source threshold of 250 TPY now applies, INPB has not asked for emission increase of any pollutants as a result of this project. Consequently, the facility is still a minor source and not subject to a PSD review.

TABLE 3 – SUMMARY INPB FACILITY PTE EMISSIONS.

Emissions Source	Annual Emissions (TPY)								
	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	Pb	Total HAP	HCl
Feedstock Handling Area									
Paved Road	---	---	---	---	2.87	0.43	---	---	---

Emissions Source	Annual Emissions (TPY)								
	NO_X	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	Pb	Total HAP	HCl
Materials Handling Operations	---	---	---	---	1.20E-02	1.82E-03	---	---	---
Shredding and Screening	---	---	---	---	4.72	4.72	---	---	---
Shredder and Screen Engines	13.07	12.37	0.80	---	0.72	0.72	---	---	---
Feedstock Windrows	---	---	---	33.38	---	---	---	---	---
Emergency Fire Pump	0.31	0.07	4.05E-03	---	2.20E-02	2.20E-02	---	---	---
Emergency Generator	0.13	0.27	1.26E-04	0.07	2.04E-03	2.04E-03	---	---	---
Feedstock Dryers	---	---	---	33.38	3.79	3.79	---	5.45	---
Vent Gas Boiler	72.09	18.29	44.98	9.33	7.54	7.54	6.28E-02	4.85	4.76
Distillation	---	---	---	0.46	---	---	---	0.18	---
Syngas Flare	2.17	40.62	22.41	2.65	0.92	0.92	9.56E-03	4.87	4.80
Tank Farm	---	---	---	1.69	---	---	---	5.25E-02	---
Dry Chemical Silos	---	---	---	---	0.66	20.92	---	---	---
Cooling Tower	---	---	---	---	2.11	2.11	---	---	---
Loading Area Flare	7.41E-02	1.39	---	1.66	2.00E-02	2.00E-02	---	5.42E-04	---
Miscellaneous Tanks	---	---	---	0.25	---	---	---	4.31E-03	---
Total	**87.85**	**73.00**	**68.20**	**82.88**	**23.37**	**21.66**	**<0.008**	**15.41**	**9.56**

3.2.2. Department Review of NSPS Subpart AAAA Applicability

As stated above, INPB has not requested any relaxation of permitted emission limits. Instead, they have requested that the requirements of NSPS Subpart AAAA be removed from the permit. In addition, INPB has requested that the requirements of NSPS Subpart Dc – Requirements for Small Industrial-Commercial-Institutional Steam Generating Units be substituted for the requirements of Subpart AAAA with respect to the vent gas boiler (EU 006).

3.2.2.1. *Non-Hazardous Secondary Materials Rule:* NSPS Subpart AAAA was promulgated under Section 129 of the CAA that was added in the 1990 Amendments of the CAA to address emissions from solid waste incineration. The term "solid waste incineration unit" under Section 129 means “a distinct operating unit of any facility which combusts any solid waste material from commercial or industrial establishments or the general public, including single and multiple residences, hotels, and motels. Section 129 also allows the EPA Administrator to establish the meaning of “solid waste”.

On March 21, 2011, EPA promulgated rules that clarify non-hazardous secondary materials as used as fuels or ingredients in combustion units pursuant to 42 U.S.C. Section 7429(g)(6). EPA stated in its promulgation of 40 CFR Part 241 that this definition “will determine whether a combustion unit is required to meet the emissions standards for solid waste incineration units issued under Section 129 of the CAA or the emissions standards for commercial, industrial, and institutional boilers issued under Section 112 of the CAA.”

EPA clarified that in 40 CFR 241 what a “solid waste” is for the purposes of Section 129 applicability. Fuels comparable to “traditional” fuels that are “legitimately” used as fuels are not “solid waste” and are not subject to standards promulgated under Section 129. In the preamble to this promulgation, EPA identified the production of “syngas” as an example of the types of fuels that are not “solid waste.” EPA

explained:

"Fuel or ingredient products that result from the processing of discarded non-hazardous secondary materials and that meet the legitimacy criteria as discussed below are not solid wastes. Because the resulting fuel/ingredient products are, in effect, reclaimed or extracted products from a recycling process, EPA considers such materials to be "new" products that have not been discarded and therefore are not solid wastes. Until the non-hazardous secondary materials have been processed into a non-waste fuel or ingredient product meeting the legitimacy criteria, the discarded non-hazardous secondary material are generally assumed to be solid wastes."

"Synthesis gas (or syngas as it is commonly referred) produced from the gasification of solid waste is another material that can also meet the requirements of a fuel product produced from the processing of discarded non-hazardous secondary materials, provided the syngas has been adequately processed to remove contaminants. Gasification is a chemical production process that converts carbonaceous material into a synthesis gas that can be used for energy production (or as a building block for other chemical manufacturing processes). In general, gasification systems are designed to react with carbon-containing materials and steam at high temperatures to produce a synthesis gas composed mainly of carbon monoxide and hydrogen."

While EPA's promulgation defined most non-hazardous secondary materials as solid wastes, the rule contained exceptions of what was a "solid waste" when used as a fuel or ingredients in combustion units. EPA listed "syngas" as an example of a fuel that is not "solid waste" when used "legitimately" for fuel or an ingredient in combustion units. As explained in "Codification of the Legitimacy Criteria" of the 40 CFR 241 promulgation in part states (**bold text added**):

"This provision-40 CFR 241.3(d)-codifies the legitimacy criteria for fuels and ingredients. In order to be considered a non-waste fuel, non-hazardous secondary materials used as a fuel in combustion units must meet the legitimacy criteria codified in § 241.3(d)(1) ***. To meet the fuel legitimacy criteria, the non-hazardous secondary material must be managed as a valuable commodity, have a meaningful heating value and be used as a fuel in a combustion unit that recovers energy, and contain contaminants at levels comparable to or lower than those in traditional fuels which the combustion unit is designed to burn****."*

3.2.2.2. *Departments Analysis*: INPB stated in its permit application that:

"The INPB process includes two gas streams produced from municipal solid waste that can be used as fuels in the vent gas boiler. These are "cleaned" syngas directly from the gasifiers and "process gas" from the fermentation process. Both the "syngas" and "process gas" are "new" products because they have been adequately cleaned to remove contaminants and meet the legitimacy criteria as described in EPA's promulgation of 40 CFR 241. This rule exempts the "syngas" and "process gas" produced in the INPB gasification and fermentation processes from the definition of solid waste as both "traditional" fuels and comparable fuels that are legitimately used as a fuel. Under the definition of "traditional" fuels, EPA includes synthetic fuels. The syngas and process gas are produced as a fuel either directly by the boiler in the case of syngas or as a feedstock to the fermentation process to produce a fuel (i.e., ethanol). The process gas produced by the fermentation process has additional contaminant removal. These fuels are used to produce valuable commodities (energy and ethanol) and are not discarded; therefore, they are not solid wastes."

"The three legitimacy criteria are met because:

1. *The syngas and process gas will be managed as valuable commodities for energy production (replacing natural gas) and ethanol production (replacing fossil fuels),*
2. *The syngas and process gas have meaningful fuel heating values, and*
3. *The syngas and process gas will have contaminant levels comparable to traditional fuels that the combustion unit is designed to burn.*

Therefore, the boiler will not combust "solid waste" since the syngas and process gas is a "traditional"

fuel by replacing natural gas or landfill gas and qualify as comparable fuels exclusion in 40 CFR 241."

As a result of the above analysis wherein INPB stated both the syngas and process gas meets the three fuel legitimacy criteria, INPB has requested that all permit conditions contained in Air Permit No. 0610096-004-AC associated with NSPS Subpart AAAA be removed and that the vent gas boiler be classified as a Section 112 boiler source with respect to the CAA. In particular, the applicant has requested that most of the NSPS Subpart AAAA emission limits pertaining to the vent gas boiler (EU 006) be removed and replaced by any applicable emission limits contained in NSPS Subpart Dc that apply to Small Industrial-Commercial-Institutional Steam Generating Units. In addition, INPB has requested that several criteria PSD pollutant emission limits, e.g., NO_X, CO, etc., that are in Subpart AAAA remain in the permit.

The Department requested that INPB provide additional documentation supporting the assertion that the syngas and process gas meet the three fuel legitimacy requirements described above. Specifically, the Department requested:

a. That INPB describe the processing that the syngas goes through before it is combusted. The response should specify the process when the fermentation process is being used and when the bypass is being used;

b. That INPB describe the contaminants that are expected to be in the syngas after it is released from the gasification unit and how the processing removes these contaminants (specifically focusing on metals and the precursor elements: Chlorine, Fluorine, Nitrogen, and Sulfur);

c. That INPB describe what fuels the boiler is "designed to burn" and which of these fuels qualify as traditional fuels;

d. INPB provide information on the contaminant profile of each traditional fuel the engines are designed to burn and compare these values to the contaminants that exist in the syngas after processing;

e. INPB state whether any contaminants are at higher levels than a traditional fuel, and if they are, please describe how the increase is not a significant increase (i.e., an increase that does not threaten public health or the environment);

f. INPB describe the heating value of the syngas after it has been processed; and

g. INPB describe how the syngas is managed as a valuable commodity (i.e. please describe how the syngas is managed like a similar gaseous fuel).

The INPB response to the above questions can be accessed by clicking the below link:

Link to INPB response to Department RAI

The Department believes that a fundamental transformation occurs to the syngas as it acts as a feedstock in the ethanol fermentation process which results in the process (vent) gas. This means in the Department's opinion, that the process gas can no longer in any meaningful way be considered directly derived from the gasification of MSW and is thus is not even subject to the legitimacy criteria. Accordingly, legitimacy criteria like heat content with regard to the process gas is immaterial to the determination as to whether Subpart AAAA does or does not apply to the INPB facility. However, the Department will still assess the INPB legitimacy criteria analysis with emphasis on the syngas.

Based on the response, the Department in general terms agrees with INPB's assertion that the syngas and process gas meet the three fuel legitimacy criteria when compared to a traditional syngas from coal gasification and a traditional fuel (natural gas) that the vent gas boiler was designed combust. The vent gas boiler was also designed to burn the INPB syngas and process gas. **Table 4** provides a comparison of the syngas and process (fermenter) gas from the INPB facility to two syngases generated from the gasification of coal. As seen from **Table 4**, process gas from the INPB facility has a much lower carbon monoxide (CO) content than the three syngases while also having a much higher carbon dioxide (CO_2) content than the syngases. The rest of gas constituents are similar. However, the process gas has approximately half the heating value in British thermal units per cubic foot (Btu/cf) as the three syngases.

TABLE 4 – GAS CONSTITUENT COMPARISION.

GAS	INPB Syngas Volume %	INPB Fermenter Vent gas Volume %	Wabash River IGCC Volume %	TECO Polk IGCC Volume %
Carbon Monoxide	35.2	6.9	46	44.1
Carbon Dioxide	10.7	53.6	17	14.5
Hydrogen	29.2	33.7	34	38
Water Vapor	23.2	2.3	2	0.3
Nitrogen (Argon)	1.7	3.2	1	3
Ethanol (or Methane)	N.A.	0.3	N.R.	0.1
Hydrogen Sulfide	<0.1	<0.1	0.1	<0.1
Heat Content (Btu/cf)	209	132	272	264
Sources: INPB, 2013; DOE NETL, 2013. N.A. = not applicable; N.R. = not reported.				

- **Syngas Contaminants Levels**

There are several questions with the INPB syngas with respect to certain estimated contaminant levels when compared to natural gas. The questions pertain to the amount of mercury (Hg), selenium (Se) and to a lesser extent lead (Pb) in the syngas after contaminant cleaning process. A comparison of contaminant levels in the syngas with respect to natural gas was provided by INPB and is give in **Table 5** below while **Table 6** provides pound per hour (lb/hr) emission rate comparisons between the syngas and natural gas (also provided by INPB).

TABLE 5 - ESTIMATED CONTAMINANT CONCENTRATION IN SYNGAS AND NATURAL GAS IN PARTS PER MILLION (ppm).

Contaminant	INPB Syngas (ppm)*	Natural Gas (ppm)
Antimony (Sb)	0.0033	ND
Arsenic (As)	0.0001	0.0036
Beryllium (Be)	0	0.0002
Cadmium (Cd)	0.0001	0.0196
Chromium (Cr)	0.0022	0.025
Copper (Cu)	0.0115	0.0152
Lead (Pb)	**0.004**	**ND**
Mercury (Hg)	**0.0466**	**0.0046**
Nickel (Ni)	0.0018	0.0375
Selenium (Se)	**0.0099**	**0.0004**
* Gasified from MSW		

TABLE 6 - CONTAMINANT EMISSION RATES (lb/hr) IN SYNGAS AND NATURAL GAS.

Contaminant	Syngas (lb/hr)	Natural Gas (lb/hr)	Difference (lb/hr)
Antimony (Sb)	4.30E-05	ND	NA
Arsenic (As)	1.10E-06	1.90E-05	-1.80E-05
Beryllium (Be)	4.60E-08	1.10E-06	-1.10E-06

Contaminant	Syngas (lb/hr)	Natural Gas (lb/hr)	Difference (lb/hr)
Cadmium (Cd)	1.40E-06	1.00E-04	-1.00E-04
Chromium (Cr)	2.90E-05	1.30E-04	-1.00E-04
Copper (Cu)	1.50E-04	8.10E-05	7.00E-05
Lead (Pb)	**5.30E-05**	**ND**	**NA**
Mercury (Hg)	**6.10E-04**	**2.50E-05**	**5.90E-04**
Nickel (Ni)	2.40E-05	2.00E-04	-1.80E-04
Selenium (Se)	**1.30E-04**	**2.30E-06**	**1.30E-04**

As seen from **Table 5**, the Hg contaminant level in the syngas is estimated to be ten times greater (exactly 10.13) than the Hg in natural gas, while the Se level is 24.75 times greater than natural gas. With respect to Hg the Department queried the Air Consultant for INPB, Golder and Associates, as to why the Hg level was so high in the syngas indicated in the application. The Department believed the level was excessive when the ACI injection system used to clean the syngas (see **Figure 3**) was taken into account along with the low temperature of the syngas due to quenching. A portion of the response from Mr. Ken Kosky, P.E. of Golder and Associates is given below.

"The Hg emission were very conservatively estimated by assuming only 60.71% removal prior to use in the vent gas boiler. This was the lowest removal efficiency for sources combusting RDF or MSW and using acid gas control and a fabric filter. This resulted in an estimated Hg concentration of 0.0466 ppm in the syngas ……. and a Hg emission rate of 6.1E-04 lb/hr ……. This did not account for the quenching or the carbon injection that is used to clean the syngas prior to use. A more typical control efficiency for Hg in the system that has been installed is at least 94.7%. This is the removal efficiency stated by EPA in the emission factor for RDF combustion using acid gas controls and a baghouse. Using an estimated Hg control efficiency of 94.7% would result in Hg emissions of 8.3E-05 lb/hr. This is the level of Hg emissions would (sic) *be more typical of the controls installed for cleaning syngas at INPB."*

Using this more appropriate Hg emission rate of 8.3×10^{-05} lb/hr as compared to the rate of 6.10×10^{-04} lb/hr for the level of syngas cleanup processes that are installed given in **Table 6** calculates to yearly Hg emissions of 0.73 pounds (lb/yr) from the vent gas boiler. This estimated yearly emission rate assumes that all the syngas bypasses the fermentation process and is directly routed to the vent gas boiler for combustion (see **Figure 3**). This is a very conservative assumption since the primary function of the facility is to make ethanol by routing the syngas to the fermentation process. The De Minimis level of Hg emissions given in Section 112(g) of the CAA is 1.9 lb/yr for Hg. According to the EPA, this is the emission level at which point minimal environmental harm can be assumed. For these reasons, Hg concentrations are not expected to exceed 1.9 lb/yr. Consequently, it is clear the level of Hg emissions from the combustion of syngas is not environmentally significant, especially when one considers that most syngas will be routed to the fermentation process. According to Mr. Kosky of Golder, the process gas from the fermentation process has an Hg level that is over 300 times lower than that of the syngas.

With regard to Selenium (Se), based on the lb/hr emission rate given in **Table 6**, the yearly emission rate is 1.14 pounds. The De Minimis rate for this HAP given in 112(g) of the CAA is 113 lb/yr. Consequently, based on EPA guidance provided in 112(g) of the CAA the containment level of Se in the syngas will not constitute an environmental threat.

Lead (Pb) is a HAP but it is also a criteria pollutant and does not have a De Minimis emission level in Section 112(g). Pb is not detectable in natural gas while there is 0.004 ppm (4 part per billion (ppb)) in the syngas. With regard to the comparison of non-traditional fuels with low levels of a particular contaminant, the EPA provides some guidance. Per the Federal Register (76 FR 15456, 15524 (March 21, 2011)), the EPA states (**bold text added**):

"In response to those commenters requesting further guidance on how to interpret the ''comparable to or lower than'' standard, the following examples are provided."

"A non-hazardous secondary material contains 500 parts per million (ppm) of lead, while the traditional fuel that would or could be burned in the combustion unit contains 475 ppm of lead. These levels would be considered comparable (since it falls within a small acceptable range) and thus, would meet this factor. If, on the other hand, the level of lead in the non-hazardous secondary material was 1,000 ppm, these levels would not be comparable and it may indicate that the non- hazardous secondary material was being burned to dispose of the material and that the activity is sham recycling."

"A traditional fuel contains no detectable amounts of barium, while the non-hazardous secondary material contains a minimal amount of barium (e.g., 1 ppm). In this situation, the levels would be considered comparable since it falls within a small acceptable range. *If, however, the barium were at much higher levels in the non-hazardous secondary material (such as 50 ppm), the levels would not be comparable and it may indicate discard of the barium and sham recycling."*

Using the above EPA guidance which states that zero ppm of barium is considered comparable to one ppm of barium, it can be inferred that 0 ppm of lead is comparable to 0.004 ppm of lead. Consequently, for the purpose of a fuel legitimacy criteria analysis, the lead in the syngas is comparable to natural gas.

- **Heat Content of INPB Process Gas and Syngas**

The heat content of the polished INPB syngas is slightly less than the heat content of syngas derived from coal (see **Table 4**): 209 Btu/cf (INPB syngas), 272 Btu/cf (Wabash River IGCC) and 263 Btu/cf (TECO Polk IGCC). In addition, the INPB syngas has approximately 1/5th the heat content of natural gas: 1,020 Btu/cf (typical) versus 209 Btu/cf. However, the INPB polished syngas still has a meaningful heat content in that it can be directly combusted in the vent gas boiler to generate up to 6 MW of electrical power. The Department agrees with INPB that the polished syngas generated from the gasification of MSW has a meaningful heat content with respect to the legitimacy criteria.

The INPB process gas has only 63% of the heat content of the INPB syngas (132 Btu/cf versus 209 Btu/cf). However, the process gas coming from the fermentation process has been fundamentally transformed from the syngas entering the fermentation process. The evidence of this transformation is the CO and CO_2 content (%) of the syngas and process gas: syngas (35.2 and 10.7) and the process gas (6.9 and 53.6). The transformation is caused by the constituent components of the syngas being partly consumed during the fermentation process to generate ethanol. The constituents remaining after generating the ethanol comprise the process gas. The fermentation process also results in the loss heat content of the process gas when compared to the syngas.

3.2.2.3. *Department's Determination, NSPS Subpart AAAA*

Based on the analysis presented above and the INPB response to the questions posed by the Department, the Department agrees with INPB that Subpart AAAA does not apply to the INPB waste-to-ethanol facility. The requirements of Subpart AAAA will be removed from the permit. The requirements of NSPS Subpart Dc will be incorporated into the permit covering the gasification units/biological reactor/vent gas boiler train, with the point of comparison to any applicable federal emission limits at the exit of the vent gas boiler stack. Compliance with any INPB requested emission limits will also be shown at the vent gas boiler stack.

With the removal of NSPS Subpart AAAA requirements, annual emissions testing for the following pollutants will no longer be required at the INPB IRC facility: dioxins/furans; cadmium; lead, mercury and hydrogen chloride. Since the vent gas boiler operates only on gaseous fuel (natural gas, syngas and process gas) there are no emission limits that apply to the boiler in NSPS Subpart Dc. To address this problem, INPB has proposed to keep the Subpart AAAA limits already in the permit for certain criteria pollutants: specifically NO_X, SO_2, PM; CO and opacity. These limits for the vent gas boiler are:

- Opacity – 10 percent, ten 6 minute averages by COMS;
- PM – 24 milligrams per dry standard cubic meter at 7% O_2 by Stack tests;
- SO2 – 30 parts per million dry volume corrected to 7% O_2, 24-hour block average by CEMS;
- NOX – 120 parts per million dry volume corrected to 7% O_2, 12 month average of 24-hour block

averages by CEMS;

- CO – 50 parts per million dry volume corrected to 7% O_2, 4-hour block averages by CEMS.
- Hg – 1.9 pounds per year (lb/yr) by initial and annual stack tests or by initial and semi-annual syngas sampling. (Department set limit, see below).

The Department accepts INPB proposal with regard to the emission limits given above. In addition, any notification, record keeping, reporting, fuel monitoring, etc., required by NSPS Subpart Dc will be incorporated into the permit with respect the gasification units/biological reactor/vent gas boiler train.

Since one of the primary reasons the Department believes that the legitimacy criteria were met for the syngas from the gasification of MSW was the reduction in the mercury in the syngas caused by the use of the ACI system, the Department will require that the ACI system continue to be used whenever MSW is gasified. In addition, to accurately determine the ACI system rate required to meet the de minimis mercury emission rate of 1.9 lb/yr or less, the Department will require Hg compliance testing by either initial/annual stack testing or initial/semi-annual syngas sampling. The choice of compliance method is at the discretion of the permittee. The permittee shall notify the compliance authority of the choice of compliance method 30 days prior to the first Hg compliance test. The ACI rate determined during compliance testing shall be the set rate used in the dry gas cleanup system when gasifying MSW until another compliance test is conducted. Use of the ACI when gasifying MSW will also help control the emission of other metal and organic HAPs. When not gasifying MSW use of the ACI system is not required.

3.2.3. Major Source Threshold for Ethanol Facilities

The Department wishes to reflect in the permit the fact that the INPB IRC facility is now subject to a 250 TPY PSD major source threshold instead of the 100 TPY threshold previously applied to the facility. Language in the permit will be changed accordingly. As previously mentioned, this change is necessary since the INPB facility was original permitted, Florida has adopted the EPA rule stating the natural fermentation based ethanol plants are no longer considered "*Chemical Processing Plants*" subject to the 100 TPY PSD applicability threshold. INPB has not asked for any increase in emissions as a result of this project or this PSD threshold change. Consequently, for this permitting action, the 250 TPY PSD threshold is not relevant.

4. PRELIMINARY DETERMINATION

The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the draft permit. This determination is based on a technical review of the complete application, reasonable assurances provided by the applicant and the conditions specified in the draft permit. David Read, P.E., is the primary processor for reviewing the application and drafting the permit. He may be contacted at (850)717-9075 or by email at David.Read@dep.state.fl.us.