

**NORTH CAROLINA DIVISION OF
AIR QUALITY**

Application Review

Issue Date: 13 April 2021

Region: Fayetteville Regional Office
County: Richmond
NC Facility ID: 7700101
Inspector's Name: N/A
Date of Last Inspection: N/A
Compliance Code: N/A

Facility Data			Permit Applicability (this application only)
<p>Applicant (Facility's Name): International Tie Disposal, LLC - Project Tie</p> <p>Facility Address: International Tie Disposal, LLC - Project Tie 174 Marks Creek Church Road Hamlet, NC 28345</p> <p>SIC: 3624 / Carbon and Graphite Products NAICS: 335991 / Carbon and Graphite Product Manufacturing</p> <p>Facility Classification: Before: Permit/Registration Pending After: Synthetic Minor Fee Classification: Before: N/A After: Synthetic Minor</p>			
Contact Data			
Facility Contact	Authorized Contact	Technical Contact	Application Data
Jill DeLisio (704) 321-0802 13700 Providence Rd. Weddington, NC 28104	Basil A. Polivka II Director of Pyrolysis Program (704) 321-0802 13700 Providence Rd. Weddington, NC 28104	Basil A. Polivka II Director of Pyrolysis Program (704) 321-0802 13700 Providence Rd. Weddington, NC 28104	
Review Engineer: Jeffrey D. Cole		Comments / Recommendations:	
Review Engineer's Signature:	Date:		

1. Purpose of Application:

International Tie Disposal, LLC - Project Tie is a greenfield biochar manufacturing facility located in Hamlet, Richmond County. The biochar production process uses pyrolysis to create biochar from creosote treated railroad ties and untreated wood. The company has requested the initial air quality permit for this facility.

The facility will be classified as Synthetic Minor due to potential NOx, CO and VOC emissions before controls exceeding the Title V permitting thresholds.

The application did not contain any confidential information.

The facility contact for the permit application is Mr. Basil A. Polivka II, Director of Pyrolysis Program, (704-321-0802). The facility utilized a consultant to prepare the permit application. The contact at the consultant, Trinity Consultants, is Ms. Nicole Saniti, P.E. (704-553-8838 x104).

2. Facility Description

International Tie Disposal, LLC - Project Tie submitted a permit application for a new facility located at 174 Marks Creek Church Road, Hamlet, Richmond County, North Carolina. The proposed facility will manufacture biochar using a controlled heating process known as pyrolysis. The pyrolysis process will volatilize unwanted chemical components to produce the carbonaceous biochar. The facility will have 426 kilns and 62 natural gas-fired afterburners onsite. The proposed facility will operate 24 hours per day, 7 days per week, 365 days per year. To maintain emissions below the Title V thresholds, only 160 of the 426 kilns will operate daily. This will be accomplished by the facility initially firing 62 kilns in the first of 2 daily 8-hour shifts, 62 kilns in the second 8-hour shift and 36 kilns for the third 8-hour shift. As the first of the 62 kilns finish its 7 to 8-hour pyrolysis process, its afterburner is removed and placed on the next kiln starting its pyrolysis process. This process will continue throughout the day until a total of 160 kilns have completed the pyrolysis process. This would equate to a maximum of 58,400 kilns (160 kilns per day for 365 days per year) per 12 consecutive month period.

The proposed facility will receive logs (untreated lumber) and creosote-treated railroad ties by railcar in the tie unloading and sorting area. Received materials will be offloaded and stacked in the raw material storage area. Raw material staging and handling will be performed using a tracked excavator with a handling arm. All raw material from the storage area is then loaded onto a conveyor and fed into a Chomper (Crusher) where it is reduced in size to 3 to 4-inch by 12 to 18-inch and then loaded by conveyor into individual kilns in the raw material staging area. The crusher is located inside 2 intermodal shipping containers sealed together with foam gaskets and open on 2 ends to accommodate the conveyors. Empty kilns are transported to the kiln loading area for charging with crushed logs (untreated lumber) or crushed ties. The capacity of each kiln will be approximately 2,000 pounds of woody raw material.

A kiln loaded with raw material will then be transported to the processing area using a wheel-loader. Each loaded kiln is then fitted with a removable, refractory-lined exhaust stack/afterburner (0.125 mmBtu/hr natural gas-fired). This exhaust stack allows the mounted afterburners to create a tight seal with the kiln. The afterburner is then started and brought up to operating temperature. Pyrolysis within the kiln is initiated by the natural gas-fired kiln burner that is a component of the kiln itself. The kiln burner is direct fired (natural gas) and has a maximum heat input capacity of 0.0078 mmBtu/hr. Once the pyrolysis is initiated, the kiln burner is turned off as the pyrolysis process is self-sustaining and does not require additional natural gas combustion. The kiln's integral seal-cover lid is then opened, and the afterburner is used to control kiln emissions. The pyrolysis processing period is estimated to last 7 to 8 hours.

At the end of the pyrolysis operation the exhaust stack/afterburner is removed and placed on an adjacent kiln, already loaded with raw material, in preparation for firing. Exhaust stacks/afterburners are handled by a mid-sized loader. The kiln's integral seal-cover lid is then closed. Note that this integral seal-cover lid must be closed shortly after the exhaust stack/afterburner is removed to keep the biochar from combusting and resulting in ash rather than biochar, as desired. The kiln that has completed pyrolysis is then moved to the cooling area for a period for approximately 10 to 18 hours. There are no emissions from the kilns during the cool-down period.

After the cool-down period, the kiln's cover is removed and the kiln containing biochar is transported to the biochar product handling and packaging line by a mid-sized wheel loader. Up to ~500 pounds of biochar will be produced by a single kiln pyrolysis process. The biochar is then loaded into a

hopper equipped with a hood and a dust collection capture vent to capture fugitive dust. This biochar product handling and packaging line is located inside multiple intermodal shipping containers that are sealed with foam gaskets. Each container is equipped with dust collection vents that vent to one of two external bagfilters. The line contains a series of conveyors and is equipped with the following equipment:

- A magnet (to remove bolts and spikes left in the ties through the processing)
- A crusher to reduce the size of the biochar to no greater than 3 inches
- A detwigger which removes any large unconverted wood
- A hammermill to reduce the size of the biochar to no greater than 1 inch
- A drum magnet followed by a 3-deck open screener to separate the biochar into 4 sizes.
- A destoner to separate the good biochar from the smaller unconverted wood
- A rollermill to further reduce the size of the biochar

Still located within the intermodal container-enclosed biochar product handling and packaging line, the biochar then moves into a bucket elevator and moves up to a screener. The biochar then moves into small hoppers in the top of the bagging container. The biochar is then bagged in super sacks which are moved by Bobcat loader to the biochar storage area for loading onto railcars. Packaged product will then be loaded directly onto pallets for shipment by rail offsite. Product trucks will travel to and from the biochar sorting processing line via the product transport route. Emissions from truck transport are shown in the haul road emission calculations.

Other sources of emissions of regulated pollutants may include small fuel tanks, propane storage tanks, and maintenance activities such as welding. The company asserts that these sources, individually and collectively, are negligible sources of emissions and are exempt from permitting requirements.

In terms of odor control, the company has done research to determine whether odor will be a concern with this facility and to develop a plan to minimize any odor issues. Evaluating potential odor issues, the company quoted a scientific paper titled, "Environmental Implications of Increased Biomass Energy Use (National Renewable Energy Laboratory, March 1992) which stated, "Local noise and odor regulations also apply to biomass production facilities. In most cases, these problems have been resolved through appropriate siting and proper drainage and ventilation of fuel storage piles. Wood waste piles of hardwood species with degradable sugars are most susceptible to odor problems." A data search noted that railroad ties are historically made of hardwoods, such as oak, that are then coated with creosote. Company officials sought data on sugars present in weathered railroad ties, but they could not find any information. Additionally, the company stated that they have searched for data on composition studies of aged hardwoods for sugars, but similarly could not find much information. Company officials stated that they visited a NC site where there were thousands of ties stored long-term but stated that they did not observe any obnoxious odor (or really any odor). While long term storage sites might have a subtle mildewy smell associated with wet wood, the proposed International Tie Disposal, LLC - Project Tie facility will store the received wood material stacked in the tie storage area. This wood material will be processed continuously thus long-term storage is not anticipated.

Application Chronology:

- 06/16/20 FRO received the greenfield permit application package. The application package included a check in the amount of \$50 for the permit processing fee. The application appeared to be incomplete for processing as it was missing numerous forms. Also, the emissions estimates showed that the facility would likely be classified synthetic minor (and thus required a \$400 permit application fee) and was not sealed by a P.E.
- 06/17/20 FRO sent the facility a letter acknowledging receipt of the incomplete application and requesting that they resubmit a complete application along with an additional \$350 permit fee.
PERMIT APPLICATION CLOCK OFF
- 08/12/20 FRO received an updated greenfield permit application package. The application package included a check in the amount of \$350 for the additional permit processing fee. The application appeared to be complete, contained a request for a Zoning Consistency Determination, and was sealed by a P.E. However, the associated Form A did not include the facility's 911 address which is required to issue an air quality permit.
- 08/24/20 Ms. Heather Carter, Regional Air Quality Supervisor, Mr. Greg Reeves, Compliance Coordinator, Mr. Cole and Mr. Polivka II participated in a teleconference where the proposed facility was discussed and permitting questions were addressed. Mr. Polivka II noted that the proposed site for the facility had yet to be zoned industrial and the company had an alternate site that was already zoned industrial. Mr. Reeves stated that he believed that the company could submit a second greenfield permit application for the alternate site and could choose either location. Mr. Polivka II stated that the company would submit a duplicate permit application for International Tie Disposal, LLC - Project Tie with the different address. Mr. Cole reminded Mr. Polivka II that a separate \$400 permit application fee would also need to be included as well. Mr. Cole also reminded Mr. Polivka II that the company had not sent DAQ the 911 street address of the proposed facility. Also, Ms. Carter emphasized DEQ's strong suggestion to International Tie Disposal, LLC to start outreach efforts with their proposed facility's county and community. Shortly after this teleconference, Mr. Polivka II emailed Mr. Cole with the proposed facility's 911 street address.
PERMIT APPLICATION CLOCK ON
- 09/24/20 Ms. Heather Carter sent a Permit Additional Information (PAI) letter to Mr. Polivka II asking the company to provide information on the following permitting issues:
- Proof of business registration with the North Carolina Secretary of State's Office.
 - Given the proximity of the locations, what are the intended operations for each location and will they overlap? If so, how will they overlap?
 - Reasoning for why these proposed facilities are not considered one source for permitting classification and rule applicability?
- PERMIT APPLICATION CLOCK OFF**
- 10/06/20 Mr. Polivka II had a TEAMS meeting with DAQ Central Office, FRO Regional Office and Richmond County Economic Development personnel to discuss the company's efforts to reach out to the local community and explain what the facility will do and how the community would benefit from its facility.

- 10/19/20 Mr. Polivka II sent an email to Heather Carter stating that the company is withdrawing the permit application for International Tie Disposal, LLC - Project Tie 2 with the different facility address. A copy of the scanned letter was attached to the email. The original permit application address was rezoned for heavy industrial use; therefore, the facility requested withdrawal of the alternate application.
- 10/23/20 Mr. Polivka II sent the information in the 09/24/20 request.
PERMIT APPLICATION CLOCK ON
- 11/06/20 Mr. Cole sent an email to Mr. Polivka II requesting the following information:
- A process diagram showing how the structures are oriented/connected and showing the emission points of each operation/structure.
 - A detailed description of the shredding operation equipment including how it will be shrouded or enclosed (i.e. what equipment parts are included in the shroud: shredding point, drop point(s), conveyor, etc).
 - Is there any wet suppression used as part of the shredding operation? If so, describe the equipment in detail including where it will be located/positioned and application rate.
 - The manufacturer's name, model numbers and specifications of the shredding equipment.
 - A detailed description of the product handling and packaging processing including which portions of the process are to be enclosed in the shipping containers.
 - A detailed description of the product handling and packaging processing's emission control system including submission of the proper new and/or updated NCDEQ forms reflecting any additional emissions controls.
 - How fugitive dust emissions will be addressed from vehicle traffic and movement of equipment on the property?
- PERMIT APPLICATION CLOCK OFF**
- 12/09/20 Mr. Polivka II sent the information in the 11/06/20 request.
PERMIT APPLICATION CLOCK ON

12/28/20

Mr. Cole sent an email to Mr. Polivka II requesting the following information:

- You noted in all of your permit applications that biochar storage silos would be located near the biochar processing line and your emission calculations include the silos' estimated missions. However, your detailed process description and diagram, submitted recently, do not discuss or show the silos. Are you including the silos in your emission calculations as an option so that you could possibly add them in future?
- I have the 6/10/20 Zoning Consistency Determination noting that, "The determination is pending further information and cannot be made at this time." When did you receive the notice that the land had been rezoned? Did you send me that attached to an email, if so, when was it sent? If not, please scan and attach that document and email it to me.
- I believe that we have spoken about your efforts to address community concerns about possible noise and dust emissions. Have you received any feedback from the public on potential odors generated from your proposed facility? If so, can you describe your efforts to ensure objectionable odors do not leave the site?

PERMIT APPLICATION CLOCK OFF

12/30/20

Mr. Polivka II responded to the questions in the 12/28/20 email from Mr. Cole.

PERMIT APPLICATION CLOCK ON

12/30/20

Mr. Cole sent an email to Mr. Polivka II requesting that he send DAQ a copy of the updated Zoning Consistency Determination from the Richmond County Planning Director.

01/11/21

FRO received an updated Zoning Consistency Determination from the Richmond County Zoning and Planning Department for the proposed International Tie Disposal, LLC - Project Tie facility at 174 Marks Creek Church Road, Hamlet, Richmond. The determination was signed by Tracy R. Parns, Planning Director, dated 01/06/21, indicating that, "*The proposed operation IS consistent with applicable zoning ordinances (within H 1 zoning of parcel).*"

01/28/21

A notice was posted on the DAQ website and published in the Richmond Daily Journal (on 30 January 2021), opening a 30-day comment period on the draft air quality permit. The notice also scheduled a "virtual" public meeting for 02/22/21 to and answer questions about the draft permit and a "virtual" public hearing for 03/01/21 to accept public comments on the draft permit. The meeting and hearing were to be conducted via a Webex meeting online.

PERMIT APPLICATION CLOCK OFF

02/22/21

The virtual public meeting was held.

03/01/21

The virtual public hearing was held and public comments received. DAQ is required to take final action on the permit within 30 days after the hearing, or by 04/02/21.

03/03/21

The public comment period ended for the application at 5:00 PM on this date.

03/19/21

Mr. Polivka II voluntarily submitted 1-hour NO₂ NAAQS Dispersion Modeling.

03/23/21

Ms. Heather Carter sent a Permit Additional Information (PAI) letter to Mr. Polivka II asking the company to provide information on the following permitting issues.

- Describe the process steps in detail from the time when the loaded kiln is moved to the processing area through the end of the kiln cool down period, including at what point the afterburner is engaged and disengaged, the temperature the afterburner will be operating at when engaged and throughout the cycle, opening and closing of the seal/lid between the kiln and the afterburner, etc.
- How much does the temperature of the afterburner fluctuate (up and down) throughout the processing cycle once it reaches the set point?
- How do you determine the weight of shredded ties in each kiln?
- Describe in detail the transport mechanism(s) to move the biochar product to the silos as well as how the material is introduced into the silos. Document the emission factors and calculate potential emissions from this transport activity.
- Describe in detail the design of the intermodal containers for the product handling and packaging process as well as for the railroad tie shredding processing, including details on the following:
 - How will the intermodal containers be connected and are the connections airtight (i.e., seals/gaskets, etc.)?
 - Where are the pickup points located for the bag filters cited as operating on various sources/processes?
 - Is negative pressure induced to facilitate capture of particulate matter throughout the containers?
 - How are the openings of each end of the containers managed for fugitive dust? Are any openings covered or is the size of the openings reduced in some manner (i.e., curtains, shrouds, etc.)?
 - How is the particulate matter capture efficiency/building enclosure efficiency determined and ensured for all sources where those values were applied in the application (especially for the hood associated with the hopper where the biochar is unloaded from the kiln into the product handling and packaging process)?
 - With the exception of input and output areas for each intermodal container line will all of the equipment be housed in the containers?
 - Describe in detail that happens to the “unconverted wood” that is removed from the product handling and packaging processing line?

03/24/21

Matthew Porter, DAQ AQAB Meteorologist, reviewed the submitted modeling and prepared a review memorandum.

- 03/29/21 Heather Carter discussed the modeling inputs with Mr. Polivka II, specifically regarding the number of kilns fired per hour in the submitted modeling being 60 versus the 62 their permit application requests.
- 03/31/21 Mr. Polivka II voluntarily submitted revised 1-hour NO₂ NAAQS Dispersion Modeling, including input revision from 60 to 62 kilns operating per hour.
- 03/31/21 Matthew Porter, reviewed the revised modeling submittal and prepared a review memorandum.
- 03/31/21 Mr. Polivka II responded to the 03/23/21 PAI questions in an email (with a document attached) to Heather Carter.
- 04/01/21 Ms. Heather Carter sent an email to Mr. Polivka II asking for some further clarification on the ITD responses to the 03/23/21 PAI questions, as follows:
- Regarding the kiln seal and the afterburner placement: Is there a removable lid that covers the entire kiln opening? Does the "seal" your response describes cover the entire opening of the kiln (meaning the seal and the lid are one and the same), or is the seal a smaller part of the lid? Is the seal manually removed and then manually moved back into place, or is it an automated movement? Is the afterburner ignited and brought up to temperature BEFORE it is placed on top of the kiln or AFTER it is placed on top of the kiln?
 - Regarding your Continuous Monitoring System (CMS): Is your system able to monitor and record start time and end time of kiln emissions being vented through the afterburner? Does your system record any data from the kiln (i.e. time the fire was initiated in the kiln, CO/O₂/CO₂/or other pollutant readings or concentrations, removal of seal, replacement of seal, etc.)?
 - Regarding the afterburner temperature fluctuation: Your response indicated that the afterburner temperature may increase by 50 degrees F before system adjusts to bring the temperature back to the target 1,650 degrees F, but we need to understand if the temperature also can decrease throughout the cycle and if so in what range and how is it brought back up to the target temperature.
- 04/01/21 Mr. Polivka II responded to the 04/01/21 email questions from Heather Carter.
- 04/08/21 The hearing officer for the public hearing submitted the hearing report to DAQ management.
- 04/12/21 The DAQ Director submitted final recommendations to the permit engineer for incorporation of changes to the permit.
- 04/13/21 The permit was issued.

3. Zoning

The permit application received on 8/12/20 included a request for a Zoning Consistency Determination from the Richmond County Zoning and Planning Department dated 6/10/20.

But then, on 01/11/21, FRO received an updated, completed, Zoning Consistency Determination, dated 01/06/21, from the Richmond County Zoning and Planning Department. The determination was signed by Tracy R. Parns, Planning Director, dated 01/06/21, indicating that *“The proposed operation IS consistent with applicable zoning ordinances (within H-1 zoning of parcel).”*

4. Changes in Equipment, Emissions and Regulations and PE Review Requirements

A PE Seal was required for this permit under 15A NCAC 02Q .0112. The permit application contained Form D5 that was sealed and signed by Nicole Saniti, P.E. (N.C. Seal #038716) on 08/11/20.

This is a request for a Greenfield air permit. New equipment to be installed is as follows:

- Biochar Kilns (ID No. ES-1)
- Afterburners (Natural Gas-fired; 0.125 mmBtu/hr each) (ID No. CD-1) to control emissions from individual Biochar Kilns ID No. ES-1
- Crusher and Kiln Loading (ID No. IES-EX-1)
- Product Handling and Packaging (ID No. IES-EX-2)
- Haul Roads (ID No. IES-EX-3)
- Diesel Storage Tank (ID No. IES-EX-4)
- Maintenance Welding (ID No. IES-EX-5)

The facility's permitted emission sources and controls are as follows:

Emission Source ID	Emission Source Description	Control System ID	Control System Description
ES-1	Biochar Kilns (426 Units) each with integral Natural Gas-Fired Kiln Burner (0.0078 mmBtu/hr maximum heat input)	CD-1	Afterburners (62 units) Natural Gas-Fired (0.125 mmBtu/hr each maximum heat input)

The facility's Insignificant / Exempt Activities are as follows:

Source	Exemption Regulation	Source of TAPs?	Source of Title V Pollutants?
IES-EX-1 Crusher and Kiln Loading	2Q .0102 (h)(5)	Yes	Yes
IES-EX-2 Product Handling and Packaging (System housed in intermodal shipping containers equipped with dust collection vents that vent to one of two external cartridge-type bagfilters [3,048 square feet of filter area, each].)	2Q .0102 (h)(5)	Yes	Yes
IES-EX-3 Haul Roads	2Q .0102 (h)(5)	No	Yes
IES-EX-4 Diesel Storage Tank	2Q .0102 (h)(5)	Yes	Yes
IES-EX-5 Maintenance Welding	2Q .0102 (h)(5)	Yes	Yes

5. NSPS, NESHAP, PSD, Attainment Status, and 112(r)

- **NSPS**

- ✓ None of the emission sources at the facility are subject to any current NSPS regulation.
- ✓ The natural gas-fired Afterburners (0.125 mmBtu/hr each) (ID No. CD-01) and the 0.0078 mmBtu/hr kiln burners (one located in each kiln) do not involve incineration of solid waste, and therefore are not subject to NSPS CCCC or DDDD.
- ✓ The natural gas-fired Afterburners (0.125 mmBtu/hr each) (ID No. CD-01) are not subject to NSPS Subpart CCCC since they are control devices and therefore do not meet the definition of a CISWI unit in 40 CFR 60.2265.

- **NESHAP**

- ✓ None of the emission sources at the facility are subject to any current NESHAP regulation.

- **PSD** – Potential emissions of NO_x and VOC both exceed PSD thresholds. The facility is accepting a PSD Avoidance condition to avoid PSD permitting. PSD minor-source increment tracking has been triggered in Richmond County for PM₁₀, SO₂ and NO_x. This application will consume 1.1 lb/hr of PM₁₀, 0.01 lb/hr of SO₂ and 22.3 lb/hr of NO_x.
- **Attainment Status** – Richmond County is in attainment
- **112(r)** – The facility does not store any of the subject materials above the 112(r) threshold quantities and is therefore not required to maintain a written Risk Management Plan (RMP).

6. Facility Emissions Review:

Pollutant	Expected Actual Emissions (tons/yr)	Potential Emissions Before Controls (tons/yr)	Potential Emissions After Controls (tons/yr)
PM	7.19	53.64	7.19
PM ₁₀	4.75	35.25	4.75
PM _{2.5}	3.51	25.61	3.51
SO ₂	0.03	0.15	0.03
NO _x	97.84	699.71	97.84
CO	19.57	139.94	19.57
VOC	13.12	321.86	13.12
Highest Individual HAP (Methanol)	2,050 lbs/yr	5,470 lbs/yr	2,050 lbs/yr
Total HAP	2,180 lbs/yr	6,360 lbs/yr	2,180 lbs/yr

The Expected Actual Emissions in the table above are taken from the permit application. The biochar kiln emissions for CO, NO_x, VOC and Methanol were estimated based on emission factors derived from a source test report for a similar pyrolysis operation in Weld County, Colorado (Biochar Now; conducted on 12/22/15) including an additional 25% safety factor. This 2015 source test was conducted using creosote treated railroad ties. The biochar kiln emissions for PM, PM₁₀ and PM_{2.5} were estimated based on emission factors derived from a source test report at Biochar Now, Berthoud, CO (conducted from 10/08/19 to 10/14/19) including an additional 25% safety factor. This 2019 source test was conducted using untreated wood. Sulfur dioxide (SO₂), HAP and TAP emissions from the process initiation combustion and afterburners are calculated using DEQ's Natural Gas Combustion Emissions Calculator, Revision N (Jan 2017).

Emissions of all other pollutants (i.e., all HAPs/TAPs except: Chromium, 1,4-Dichlorobenzene, 2,3,7,8-Tetrachlorodibenzo-p-dioxins, Bis-[2-ethylhexyl] phthalate, Creosol isomers (m, p, o) and Pentachlorophenol) from the biochar kilns were calculated based on emission factors from AP-42, 5th Edition, Section 1.6 Wood Residue Combustion in Boilers, Tables 1.6-3 and 1.6-4 (Sept 2003). Emission of Chromium, 1,4-Dichlorobenzene, 2,3,7,8-Tetrachlorodibenzo-p-dioxins, Bis-[2-ethylhexyl] phthalate, Creosol isomers (m, p, o) and Pentachlorophenol, were estimated using test data from the Craven County Wood Energy facility in North Carolina (Oct 2013). These test data are from creosote treated wood combustion taken from a publicly available permit application submitted by Carolina Coastal Clean Power, LLC to NCDAQ, PSD Air Quality Construction and

operating permit Application (Oct 2013) (NC facility ID 3100116). The permitted combustion sources that were located at Coastal Carolina Clean Power, LLC (later known as Duplin BioEnergy, LLC) were two coal/natural gas/No. 2 and No. 4 fuel oil/tire derived fuel/pelletized paper fuel/flyash briquette/unadulterated wood/adulterated wood including wood waste, railroad ties and engineered wood - fired steam, electric generating, boilers each of (215 million Btu per hour maximum heat input rate). For all of these pollutants, potential emissions were calculated using the maximum of the test data and AP-42 emission factor or the test data if an AP-42 factor was not available. The afterburner control efficiency of 95% was applied to all uncontrolled VOC and volatile HAP and TAP emission rates.

Emissions from feedstock handling (crushing and kiln loading) are calculated based on the maximum throughput of feedstock, and emission factors obtained from the table in the memorandum "Particulate Matter Potential to Emit Emission Factors from Activities at Sawmills, Excluding Boilers, Located in Pacific Northwest Indian Country", May 8, 2014, from Dan Meyer, US EPA Region 10. A capture efficiency of 90% is applied for the crusher being located in an intermodal shipping container with openings at 2 ends, which reduce PM emissions to the atmosphere.

Emissions from product handling and packaging are calculated based on published factors in AP-42 Section 11.19.2 – Crushed Stone Processing and Pulverized Mineral Processing. Emission factors in lb/ton are multiplied by the maximum material throughput in tons. This biochar sorting processing line will utilize a conveyor system housed in intermodal shipping containers that are sealed with foam gaskets. Each container is equipped with dust collection vents that vent to one of two external cartridge-type bagfilters. A capture efficiency of 90% and a control efficiency of 99% is applied for enclosures and bagfilters, respectively, which reduce PM emissions to the atmosphere. There will be no biochar-related emissions associated with the biochar-filled super sacks as they will have already been filled at the bagging station inside the product handling and packaging system. The biochar-filled super sacks are then moved by Bobcat loader to the biochar storage area for loading onto railcars. Packaged product will then be loaded directly onto pallets for shipment by rail offsite.

Potential emissions from haul roads were calculated using the methods presented in AP-42, 5th Edition, Section 13.2.2 Unpaved Roads (Nov 2006).

7. Facility Wide Air toxics:

Toxic pollutant emissions from the facility operations are detailed in the table below. There are no toxic pollutant emissions that exceed the toxic air pollutant permitting emissions rates (TPERs). Therefore, no air dispersion modeling demonstration is required. There will be a 02Q .0711 toxics condition in the permit, but there is not a 02D .1100 toxics condition in the permit.

Pollutant	Expected Actual Emissions After Controls	TPER (02Q .0711(b))	% TPER	Exceed TPER?
Acetaldehyde	3.35 x 10 ⁻⁷ lb/hr	28.43 lb/hr	1.18 x 10 ⁻⁸	No
Acrolein	5.31 x 10 ⁻⁷ lb/hr	0.08 lb/hr	6.64 x 10 ⁻⁶	No
Ammonia (as NH3)	6.27 x 10 ⁻² lb/hr	2.84 lb/hr	0.0221	No
Arsenic & Compounds (total mass of elemental AS, arsine and all inorganic compounds)	1.03 x 10 ⁻² lb/yr	0.194 lb/yr	0.0531	No

Pollutant	Expected Actual Emissions After Controls	TPER (02Q .0711(b))	% TPER	Exceed TPER?
Benzo(a)pyrene (Component of 83329/POMTV & 56553/7PAH)	1.38 x 10 ⁻⁴ lb/yr	3.044 lb/yr	4.53 x 10 ⁻⁵	No
Beryllium Metal (unreacted) (Component of BEC)	5.14 x 10 ⁻⁴ lb/yr	0.378 lb/yr	1.36 x 10 ⁻³	No
Cadmium Metal, elemental, unreacted (Component of CDC)	1.92 x 10 ⁻³ lb/yr	0.507 lb/yr	3.79 x 10 ⁻³	No
Carbon tetrachloride	1.05 x 10 ⁻³ lb/yr	618.006 lb/yr	1.70 x 10 ⁻⁶	No
Chlorine	7.03 x 10 ⁻⁷ lb/hr	0.95 lb/hr	7.40 x 10 ⁻⁷	No
Chlorine	1.01 x 10 ⁻³ lb/day	1.6 lb/day	6.31 x 10 ⁻⁴	No
Chlorobenzene	2.11 x 10 ⁻⁶ lb/day	92.7 lb/day	2.28 x 10 ⁻⁸	No
Chloroform	6.54 x 10 ⁻⁴ lb/yr	396.631 lb/yr	1.65 x 10 ⁻⁶	No
Chromium (VI) Non-Specific Compounds, as Chrom(VI) (Component CRC)	1.64 x 10 ⁻³ lb/yr	0.008 lb/yr	0.205	No
Cresol (mixed isomers)	1.22 x 10 ⁻¹⁰ lb/hr	2.32 lb/hr	5.26 x 10 ⁻¹¹	No
DEHP (Di(2-ethylhexyl)phthalate)	2.72 x 10 ⁻⁷ lb/day	1.3 lb/day	2.09 x 10 ⁻⁷	No
1,4 - Dichlorobenzene(p)	3.87 x 10 ⁻¹¹ lb/hr	69.50 lb/hr	5.57 x 10 ⁻¹³	No
Ethylene dichloride (1,2-dichloroethane)	6.77 x 10 ⁻⁴ lb/yr	350.511 lb/yr	1.93 x 10 ⁻⁶	No
Formaldehyde	1.47 x 10 ⁻³ lb/hr	0.16 lb/hr	9.19 x 10 ⁻³	No
n-Hexane	0.317 lb/day	46.3 lb/day	6.85 x 10 ⁻³	No
Hydrogen chloride (hydrochloric acid)	1.69 x 10 ⁻⁵ lb/hr	0.74 lb/hr	2.28 x 10 ⁻⁵	No
Manganese & compounds	2.05 x 10 ⁻³ lb/day	1.3 lb/day	1.58 x 10 ⁻³	No
Mercury, vapor (Component of HGC)	4.48 x 10 ⁻⁶ lb/day	0.025 lb/day	1.79 x 10 ⁻⁴	No
Methylene chloride	1.29 x 10 ⁻⁸ lb/hr	1.79 lb/hr	7.21 x 10 ⁻⁹	No
Methylene chloride	6.77 x 10 ⁻³ lb/yr	2,213.752 lb/yr	3.06 x 10 ⁻⁶	No
Nickel metal (Component of NIC)	4.22 x 10 ⁻⁵ lb/day	0.3 lb/day	1.41 x 10 ⁻⁴	No
PCB (polychlorinated biphenyls)	1.85 x 10 ⁻⁷ lb/yr	7.656 lb/yr	2.42 x 10 ⁻⁸	No
Pentachlorophenol	1.01 x 10 ⁻¹⁰ lb/hr	0.03 lb/hr	3.37 x 10 ⁻⁹	No
Pentachlorophenol	1.45 x 10 ⁻⁷ lb/day	0.1 lb/day	1.45 x 10 ⁻⁶	No
Phenol	2.27 x 10 ⁻⁹ lb/hr	1.00 lb/hr	2.27 x 10 ⁻⁹	No
Styrene	8.45 x 10 ⁻⁸ lb/hr	11.16 lb/hr	7.57 x 10 ⁻⁹	No
TCE (trichloroethylene)	8.88 x 10 ⁻⁴ lb/yr	5,442.14 lb/yr	1.63 x 10 ⁻⁷	No
Tetrachlorodibenzo-p-dioxin, 2,3,7,8- (Component of CLDC & 83329/POMTV)	9.13 x 10 ⁻¹⁰ lb/yr	0.0002767 lb/yr	3.30 x 10 ⁻⁶	No

Pollutant	Expected Actual Emissions After Controls	TPER (02Q .0711(b))	% TPER	Exceed TPER?
Toluene	6.67×10^{-5} lb/hr	58.97 lb/hr	1.13×10^{-6}	No
Toluene	6.59×10^{-4} lb/day	197.96 lb/day	3.33×10^{-6}	No
Vinyl chloride	4.20×10^{-4} lb/yr	35.051 lb/yr	1.20×10^{-5}	No
Xylene (mixed isomers)	1.11×10^{-9} lb/hr	68.44 lb/hr	1.62×10^{-11}	No
Xylene (mixed isomers)	1.60×10^{-6} lb/day	113.7 lb/day	1.41×10^{-8}	No

8. Facility Compliance Status:

This is a greenfield facility and has no previous compliance history. The facility has not commenced construction.

9. Stipulation Review:

The following regulations are applicable to this facility:

Regulation	Affected Sources	Emission Limit or Requirement
15A NCAC 02D .0202	Facility-wide	Permit Renewal and Emission Inventory Requirement
Compliance with Emission Control Standards Ad-Hoc 15A NCAC 02D .0501(c)	Biochar Kilns ES-1 Afterburners CD-1	Operations/Restrictions: The Permittee shall be limited to biochar production of a maximum of 62 kiln operations per hour. Recordkeeping (record daily): The number of kiln operations per hour. Annual Reporting: Hourly periods where production exceeded 62 kiln operations per hour for the previous calendar year
15A NCAC 02D .0515	Biochar Kilns ES-1 Crusher and Kiln Loading IES-EX-1 Product Handling and Packaging IES-EX-2	$E = 4.10 * (P)^{0.67}$ for $P \leq 30$ tons/hr $E = 55 * (P)^{0.11} - 40$ for $P > 30$ tons/hr
15A NCAC 02D .0516	Facility-wide	$SO_2 \leq 2.3$ lb/mmBtu
15A NCAC 02D .0521	Facility-wide	20% opacity
15A NCAC 02D .0535	Facility-wide	Notification requirement
15A NCAC 02D .0540	Facility-wide	Fugitive Dust Control Requirement

Regulation	Affected Sources	Emission Limit or Requirement
Equipment Labeling Ad-Hoc 15A NCAC 02D .0605	Biochar Kilns ES-1 Afterburners CD-1	All onsite permitted equipment shall be labeled with the emission source ID number listed in the Emission Source Table of this permit and a numerical sequence number that differentiates each biochar kiln from the others onsite and each afterburner from the others onsite. This shall be completed upon startup of the sources and control devices.
Initial Testing Requirement Ad-Hoc 15A NCAC 02D .0605	Biochar Kilns ES-1	<p style="text-align: center;">Testing Requirements</p> <p>Test for PM (Filterable and Condensable Particulate Matter), NOx, CO, VOC, Visible Emissions (VE), and HAPs/TAPs emitted.</p> <p>Source testing shall be conducted on the exhaust stacks of four (4) different kilns and afterburners for each raw material type, creosote treated railroad ties and untreated lumber, for a total of eight (8) different kilns and afterburners being tested. Testing within 90 days of startup for each raw material type to verify emission factors and confirm the operating temps of the afterburners.</p> <p style="text-align: center;">Submit Test Report within 30 days after testing completed along with permit modification application to incorporate afterburner operating temperature into permit. 15 day notice of testing</p>
Subsequent Testing Requirement Ad-Hoc 15A NCAC 02D .0605	Biochar Kilns ES-1	<p style="text-align: center;">Subsequent Testing Requirements</p> <p>Test for PM, NOx, CO, VOC, Visible Emissions (VE), and HAPs/TAPs emitted.</p> <p>Source testing shall be conducted on the exhaust stacks of four (4) different kilns and afterburners for each raw material type, creosote treated railroad ties and untreated lumber, for a total of eight (8) different kilns and afterburners that have not been previously tested.</p> <p>Subsequent testing within no more than 13 months after the previous performance test to verify emission factors and confirm or reestablish operating temps of the afterburners Submit Test Report within 30 days after testing completed. May request change in frequency of testing after 3 consecutive annual tests show compliance with emission limits.</p>

Regulation	Affected Sources	Emission Limit or Requirement
15A NCAC 02D .0611	Afterburners CD-1	<p style="text-align: center;">Afterburner Requirements</p> <p>Until testing establishing minimum/maximum temperature(s) for the afterburner is approved by DAQ, all afterburners shall maintain a 3-hour rolling average temperatures at or above 1,650 degrees F.</p> <p>Maintain minimum combustion zone operating temperature (rolling average over 3 hours) established during initial source testing.</p> <p>Continuously record rolling 3-hour combustion zone operating temperature(s).</p> <p>CMS downtime shall not exceed 3% of the time each kilns is operational, per semi-annual period.</p> <p>Annual internal I&M and calibration of instrumentation.</p> <p>Recordkeeping: Document all periods, including date and duration, during which the CMS was not operational and the reason for each CMS downtime event and document each batch start and end times, defined as when the kiln's burner is turned on (startup) and when the afterburner is removed from the kiln (shutdown).</p> <p>Annual Reporting: The percentage of CMS downtime per kiln including specific dates, durations and reasons for each CMS downtime event.</p>
15A NCAC 02D .1806	Facility-wide	Odor Requirement
15A NCAC 02Q .0309	Facility-wide	Written Startup Notification within 15 days after startup of process.
15A NCAC 02Q .0315 Synthetic Minor	Facility-wide	<p style="text-align: center;">NO_x < 100 TPY CO < 100 TPY VOC < 100 TPY</p> <p>Operations/Restrictions: No more than 58,400 kilns will process biochar in the kilns per 12 consecutive months. No more than 58,400 tons of raw material will be processed in the kilns per 12 consecutive months. The Permittee shall perform inspections and maintenance per the requirements of 15A NCAC 2D .0611 "Afterburner Requirements."</p> <p>Recordkeeping (record monthly and total annually): Number of kiln operations per month on each type of raw material.</p> <p>The amounts of each raw material processed per month, in tons.</p> <p>Semi-Annual Reporting (12-month rolling totals): Number of kiln operations on each type of raw material. The amounts of each raw material processed, in tons. Emissions of NO_x, CO and VOC, in tons.</p>
15A NCAC 02Q .0317	Facility-wide	<p style="text-align: center;">PSD Avoidance</p> <p>NO_x < 250 tons per consecutive 12-month period VOC < 250 tons per consecutive 12-month period Comply by meeting the requirements of the Synthetic Minor limitations</p>

Regulation	Affected Sources	Emission Limit or Requirement
15A NCAC 02Q .0711	Facility-wide	Toxics Emissions exceeding TPERs requires permitting

10. Conclusions, Comments, and Recommendations:

I recommend that air permit 10636R00 be issued to International Tie Disposal, LLC - Project Tie.

- The following modifications have been made to IBEAM Permit Writer:
 - ✓ Adjusted column widths, bolded and shaded to improve appearance.
 - ✓ In the cover letter, added a note to indicate that source testing is required to be conducted no later than 90 days after startup of the biochar production processes.
 - ✓ In the cover letter, added a note to indicate that subsequent source testing is required to be conducted no more than 13 months after the previous performance test.
 - ✓ In the cover letter, added a note to indicate that a startup notification is required within 15 days after startup of the biochar production processes.
 - ✓ Added an Ad-Hoc condition that addresses: *“COMPLIANCE WITH EMISSION CONTROL STANDARDS - As required by 15A NCAC 2D .0501(c) any source of air pollution shall be operated with such control or in such manner that the source shall not cause the ambient air quality standards pursuant to 15A NCAC 02D .0400 to be exceeded at any point beyond the premises on which the source is located. When controls more stringent than those named in the applicable emission standards in this Section are required to prevent violation of the ambient air quality standards or are required to create an offset, the permit shall contain a condition requiring these controls.*
 - *Production Limitations - To establish compliance with 15A NCAC 02D .0501(c), the Permittee shall be limited to kiln operations, which includes the operation of a Natural Gas-Fired (0.125 mmBtu/hr maximum heat input) Afterburner (CD ID No. CD-1), under this scenario.*
 - *Facility is limited to no more than 62 kiln operations per hour.*
 - *Recordkeeping Requirements - The Permittee shall record the number of kiln operations per hour.*
 - *Reporting Requirements - For compliance purposes, within 30 days after each calendar year, a report listing all hourly periods where production exceeded 62 biochar kiln operations per hour for the previous calendar year shall be submitted in writing to the Regional Supervisor, DAQ.”*

- ✓ Added an Ad-Hoc condition that addresses equipment labeling as follows: “EQUIPMENT LABELING - Under the provisions of North Carolina General Statute 143-215.108 and in accordance with 15A NCAC 2D .0605, All onsite permitted equipment shall be labeled with the emission source ID number listed in the Emission Source Table of this permit and a numerical sequence number that differentiates each biochar kiln from the others onsite and each afterburner from the others onsite. This shall be completed upon startup of the sources and control devices.”
- ✓ Added an Ad-Hoc condition for initial source testing of Biochar Kilns to include testing for PM (Filterable and Condensable Particulate Matter), NOx, CO, VOC, Methanol, HAP/TAP and visible emissions.
- ✓ Added an Ad-Hoc condition for subsequent source testing of Biochar Kilns to include testing for PM (Filterable and Condensable Particulate Matter), NOx, CO, VOC, Methanol, HAP/TAP and visible emissions.
- ✓ Changed the title of 15A NCAC 02D .0611 Stipulation from “Thermal Oxidizer Requirements” to read “Afterburner Requirements.”
- ✓ Removed the text, “of each primary heat exchanger and associated inlet/outlet valves to ensure structural integrity.” from the 15A NCAC 02D .0611 Thermal Oxidizer stipulation.
- ✓ Deleted the sentence in the 02Q 0309 Startup Notification condition that states that “...Any existing equipment being replaced is permitted to operate in compliance until the replacement equipment is operational...”
- ✓ In the 2Q .0317 PSD Avoidance permit condition, changed “Operations Restrictions” subsection to read “Operations Restrictions, Recordkeeping Requirements, and Reporting Requirements”.

Review Engineer: _____ Date: _____

Permit Coordinator: _____ Date: _____

AQ Supervisor: _____ Date: _____

\jdc
cc: FRO Files