

DIVISION OF AIR QUALITY
March 31, 2021

MEMORANDUM

TO: Jeffrey Cole, Environmental Engineer, FRO
Heather Carter, Regional Supervisor, FRO

FROM: Matthew Porter, Meteorologist, AQAB

THROUGH: Tom Anderson, AQAB Supervisor, AQAB

SUBJECT: Review of 1-hour NO₂ NAAQS Dispersion Modeling Analysis for International Tie Disposal, LLC
Facility ID: 7700101
Permit Application ID: 7700101.20A – GREEN - 300
Hamlet, NC Richmond County

I have reviewed the revised 1-hour NO₂ NAAQS dispersion modeling analysis, received March 31, 2021 for the proposed new biochar manufacturing facility owned and operated by International Tie Disposal, LLC (ITD), located in Hamlet, Richmond County, NC. The initial modeling demonstration was submitted March 19, 2021 by ITD, and the full review of the modeling by AQAB was completed on March 24, 2021. The modeling was revised to include 62 biochar kilns instead of the 60 kilns included in the initial modeling. The revised modeling demonstration shows compliance with the 1-hour NO₂ NAAQS on a source-by-source basis.

ITD modeled NO_x emissions from 62 biochar kilns evenly spaced (5x12 grid formation with 2 kilns in a sixth row) on their property to represent the maximum number of kilns operated at any given time. The modeling also included NO_x emissions from the regenerative thermal oxidation (RTO) and regenerative catalytic oxidation (RCO) stacks located at the Enviva Hamlet facility. All sources were modeled as point sources. The stack parameters and hourly NO_x emissions from the electronic modeling files submitted by ITD are shown in the attached Tables A1 and A2, respectively.

Table 1 summarizes the results of the 1-hour NO₂ NAAQS modeling demonstration based on the worst-case permit allowable emission limits proposed for ITD and Enviva.

Table 1.
1-hour NO₂ Impacts from ITD and Enviva Permit Allowable Emissions
International Tie Disposal, LLC, Hamlet, NC

| Pollutant | Averaging Period | Model Concentration⁽¹⁾ | Background Concentration⁽²⁾ | Total Concentration | NAAQS | % of NAAQS |
|------------------|-------------------------|--|---|----------------------------|--------------|-------------------|
| NO ₂ | 1-hour | 158.99 | 15.3 | 174.3 | 188 | 93 % |

(1) Model design value: 5-year average (2014-2018) of the annual 8th highest daily max 1-hour NO₂ concentration modeled.

(2) Monitor design value: 3-year average (2013-2017) of the annual 98th percentile daily max 1-hour NO₂ concentration monitored.

This compliance demonstration assumes the emissions scenarios, sources modeled, point source parameters, and pollutant emission rates used in the dispersion modeling analysis are correct.

cc: Tom Anderson

Table A1. Modeled Release Parameters for Point Sources

| Model ID | Source Description | X-Utm (m) | Y-Utm (m) | Elevation (m) | Stack Height (m) | Temp. (K) | Velocity (m/s) | Stack Diameter (m) | CAPped or HORizontal Release? |
|-----------------|---------------------------|----------------------|----------------------|--------------------------|---------------------------------|----------------------|---------------------------|-----------------------------------|--|
| K1 | Biochar Kiln | 624582.00 | 3865572.10 | 125.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K2 | Biochar Kiln | 624588.00 | 3865565.10 | 125.30 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K3 | Biochar Kiln | 624594.00 | 3865558.10 | 125.00 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K4 | Biochar Kiln | 624600.00 | 3865551.10 | 124.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K5 | Biochar Kiln | 624606.00 | 3865544.10 | 124.50 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K6 | Biochar Kiln | 624612.00 | 3865537.10 | 124.20 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K7 | Biochar Kiln | 624618.00 | 3865530.10 | 124.00 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K8 | Biochar Kiln | 624624.00 | 3865523.10 | 123.90 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K9 | Biochar Kiln | 624630.00 | 3865516.10 | 123.80 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K10 | Biochar Kiln | 624636.00 | 3865509.10 | 123.80 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K11 | Biochar Kiln | 624642.00 | 3865502.10 | 124.00 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K12 | Biochar Kiln | 624648.00 | 3865495.10 | 124.20 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K13 | Biochar Kiln | 624590.00 | 3865583.70 | 125.10 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K14 | Biochar Kiln | 624596.00 | 3865576.70 | 124.80 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K15 | Biochar Kiln | 624602.00 | 3865569.70 | 124.50 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K16 | Biochar Kiln | 624608.00 | 3865562.70 | 124.20 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K17 | Biochar Kiln | 624614.00 | 3865555.70 | 123.90 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K18 | Biochar Kiln | 624620.00 | 3865548.70 | 123.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K19 | Biochar Kiln | 624626.00 | 3865541.70 | 123.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K20 | Biochar Kiln | 624632.00 | 3865534.70 | 123.50 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K21 | Biochar Kiln | 624638.00 | 3865527.70 | 123.40 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K22 | Biochar Kiln | 624644.00 | 3865520.70 | 123.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K23 | Biochar Kiln | 624650.00 | 3865513.70 | 123.90 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K24 | Biochar Kiln | 624656.00 | 3865506.70 | 124.20 | 5.84 | 811.11 | 0.21 | 0.61 | NO |

| Model ID | Source Description | X-Utm (m) | Y-Utm (m) | Elevation (m) | Stack Height (m) | Temp. (K) | Velocity (m/s) | Stack Diameter (m) | CAPped or HORIZONTAL Release? |
|-----------------|---------------------------|------------------|------------------|----------------------|-------------------------|------------------|-----------------------|---------------------------|--------------------------------------|
| K25 | Biochar Kiln | 624597.10 | 3865593.70 | 124.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K26 | Biochar Kiln | 624603.10 | 3865586.70 | 124.40 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K27 | Biochar Kiln | 624609.10 | 3865579.70 | 124.10 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K28 | Biochar Kiln | 624615.10 | 3865572.70 | 123.80 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K29 | Biochar Kiln | 624621.10 | 3865565.70 | 123.50 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K30 | Biochar Kiln | 624627.10 | 3865558.70 | 123.20 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K31 | Biochar Kiln | 624633.10 | 3865551.70 | 123.10 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K32 | Biochar Kiln | 624639.10 | 3865544.70 | 123.00 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K33 | Biochar Kiln | 624645.10 | 3865537.70 | 123.30 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K34 | Biochar Kiln | 624651.10 | 3865530.70 | 123.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K35 | Biochar Kiln | 624657.10 | 3865523.70 | 123.80 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K36 | Biochar Kiln | 624663.10 | 3865516.70 | 124.10 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K37 | Biochar Kiln | 624604.60 | 3865602.80 | 124.30 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K38 | Biochar Kiln | 624610.60 | 3865595.80 | 124.00 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K39 | Biochar Kiln | 624616.60 | 3865588.80 | 123.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K40 | Biochar Kiln | 624622.60 | 3865581.80 | 123.40 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K41 | Biochar Kiln | 624628.60 | 3865574.80 | 123.10 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K42 | Biochar Kiln | 624634.60 | 3865567.80 | 122.80 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K43 | Biochar Kiln | 624640.60 | 3865560.80 | 122.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K44 | Biochar Kiln | 624646.60 | 3865553.80 | 122.90 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K45 | Biochar Kiln | 624652.60 | 3865546.80 | 123.10 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K46 | Biochar Kiln | 624658.60 | 3865539.80 | 123.40 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K47 | Biochar Kiln | 624664.60 | 3865532.80 | 123.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K48 | Biochar Kiln | 624670.60 | 3865525.80 | 124.00 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K49 | Biochar Kiln | 624612.20 | 3865612.80 | 123.90 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K50 | Biochar Kiln | 624618.20 | 3865605.80 | 123.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K51 | Biochar Kiln | 624624.20 | 3865598.80 | 123.30 | 5.84 | 811.11 | 0.21 | 0.61 | NO |

| Model ID | Source Description | X-Utm (m) | Y-Utm (m) | Elevation (m) | Stack Height (m) | Temp. (K) | Velocity (m/s) | Stack Diameter (m) | CAPped or HORIZONTAL Release? |
|-----------------|---------------------------|------------------|------------------|----------------------|-------------------------|------------------|-----------------------|---------------------------|--------------------------------------|
| K52 | Biochar Kiln | 624630.20 | 3865591.80 | 123.00 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K53 | Biochar Kiln | 624636.20 | 3865584.80 | 122.70 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K54 | Biochar Kiln | 624642.20 | 3865577.80 | 122.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K55 | Biochar Kiln | 624648.20 | 3865570.80 | 122.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K56 | Biochar Kiln | 624654.20 | 3865563.80 | 122.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K57 | Biochar Kiln | 624660.20 | 3865556.80 | 122.90 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K58 | Biochar Kiln | 624666.20 | 3865549.80 | 123.20 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K59 | Biochar Kiln | 624672.20 | 3865542.80 | 123.60 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K60 | Biochar Kiln | 624678.20 | 3865535.80 | 123.90 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K61 | Biochar Kiln | 624679.10 | 3865552.60 | 123.40 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| K62 | Biochar Kiln | 624685.10 | 3865545.60 | 123.80 | 5.84 | 811.11 | 0.21 | 0.61 | NO |
| ENVRTO | Enviva RTO Stack | 624480.00 | 3866670.00 | 125.10 | 28.65 | 410.87 | 19.21 | 2.67 | NO |
| ENVRCO | Enviva RCO Stack | 624372.00 | 3866592.00 | 126.80 | 27.43 | 766.71 | 17.01 | 1.91 | NO |

Table A2. 1-hour SO₂ and NO₂ Modeled Emission Rates

| Model ID | Source Description | NO2 (lb/hr) |
|-----------------|---------------------------|--------------------|
| K1 | Biochar Kiln | 0.38 |
| K2 | Biochar Kiln | 0.38 |
| K3 | Biochar Kiln | 0.38 |
| K4 | Biochar Kiln | 0.38 |
| K5 | Biochar Kiln | 0.38 |
| K6 | Biochar Kiln | 0.38 |
| K7 | Biochar Kiln | 0.38 |
| K8 | Biochar Kiln | 0.38 |
| K9 | Biochar Kiln | 0.38 |
| K10 | Biochar Kiln | 0.38 |

| Model ID | Source Description | NO2 (lb/hr) |
|-----------------|---------------------------|--------------------|
| K11 | Biochar Kiln | 0.38 |
| K12 | Biochar Kiln | 0.38 |
| K13 | Biochar Kiln | 0.38 |
| K14 | Biochar Kiln | 0.38 |
| K15 | Biochar Kiln | 0.38 |
| K16 | Biochar Kiln | 0.38 |
| K17 | Biochar Kiln | 0.38 |
| K18 | Biochar Kiln | 0.38 |
| K19 | Biochar Kiln | 0.38 |
| K20 | Biochar Kiln | 0.38 |
| K21 | Biochar Kiln | 0.38 |
| K22 | Biochar Kiln | 0.38 |
| K23 | Biochar Kiln | 0.38 |
| K24 | Biochar Kiln | 0.38 |
| K25 | Biochar Kiln | 0.38 |
| K26 | Biochar Kiln | 0.38 |
| K27 | Biochar Kiln | 0.38 |
| K28 | Biochar Kiln | 0.38 |
| K29 | Biochar Kiln | 0.38 |
| K30 | Biochar Kiln | 0.38 |
| K31 | Biochar Kiln | 0.38 |
| K32 | Biochar Kiln | 0.38 |
| K33 | Biochar Kiln | 0.38 |
| K34 | Biochar Kiln | 0.38 |
| K35 | Biochar Kiln | 0.38 |
| K36 | Biochar Kiln | 0.38 |
| K37 | Biochar Kiln | 0.38 |
| K38 | Biochar Kiln | 0.38 |

| Model ID | Source Description | NO2 (lb/hr) |
|-----------------|---------------------------|--------------------|
| K39 | Biochar Kiln | 0.38 |
| K40 | Biochar Kiln | 0.38 |
| K41 | Biochar Kiln | 0.38 |
| K42 | Biochar Kiln | 0.38 |
| K43 | Biochar Kiln | 0.38 |
| K44 | Biochar Kiln | 0.38 |
| K45 | Biochar Kiln | 0.38 |
| K46 | Biochar Kiln | 0.38 |
| K47 | Biochar Kiln | 0.38 |
| K48 | Biochar Kiln | 0.38 |
| K49 | Biochar Kiln | 0.38 |
| K50 | Biochar Kiln | 0.38 |
| K51 | Biochar Kiln | 0.38 |
| K52 | Biochar Kiln | 0.38 |
| K53 | Biochar Kiln | 0.38 |
| K54 | Biochar Kiln | 0.38 |
| K55 | Biochar Kiln | 0.38 |
| K56 | Biochar Kiln | 0.38 |
| K57 | Biochar Kiln | 0.38 |
| K58 | Biochar Kiln | 0.38 |
| K59 | Biochar Kiln | 0.38 |
| K60 | Biochar Kiln | 0.38 |
| K61 | Biochar Kiln | 0.38 |
| K62 | Biochar Kiln | 0.38 |
| ENVRTO | Enviva RTO Stack | 54.90 |
| ENVRCO | Enviva RCO Stack | 0.92 |