Derenzo and Associates, Inc.
Environmental Consultants

June 14, 2011

Ms. Christy Devore
Professional Engineer II
New Source Review Section
Florida Department of Environmental Protection
2600 Blair Stone Rd.
Tallahassee, FL 32399-2400

Subject: Trail Ridge Energy, L.L.C.
Response to request for additional information
Proposed new engines and requested increase of CO emissions standards for existing engines; Project No. 0310358-012-AC (PSD-FL-374C)

Dear Ms. Devore:

Derenzo and Associates, Inc. (Derenzo and Associates) has prepared this document on behalf of Trail Ridge Energy, LLC (TRE) to respond to the Florida Department of Environmental Protection (FDEP) Request for Additional Information (RAI) correspondence dated April 8, 2011.

TRE has submitted a permit application that requests increases to the allowable (permitted) carbon monoxide (CO) emission rates for its existing landfill gas (LFG) fueled reciprocating internal combustion engine (RICE) generator sets operating at the Trail Ridge Landfill in Baldwin Duval County. In addition, TRE has requested authorization to install four (4) additional LFG-fueled RICE generator sets to combust excess LFG that is (or will be) generated at the Trail Ridge Landfill.

This document was prepared under the direction of Mr. Michael Laframboise, Vice President, Technical Services & Construction for Landfill Energy Systems, which owns Trail Ridge Energy LLC.

RICE MANUFACTURE DATE

The FDEP has requested that TRE provide the manufacture date for the proposed four (4) CAT® G3520C RICE, which will determine applicability of the RICE New Source Performance Standards (NSPS) Subpart JJJJ.

The proposed engines have been ordered by TRE and are expected to have a manufacture date in 2011, which is after the July 1, 2010 applicability date specified in the RICE NSPS. Following permit issuance, the actual engine manufacture date will be provided to the FDEP in the commencement of construction notification.

AIR QUALITY ANALYSIS

One-hour NO_2 Significant Impact

The FDEP has requested that TRE compare its predicted one-hour NO_2 impacts against the significant impact level and that a one-hour NO_2 radius of significant impact be determined. The FDEP correspondence notes that the USEPA recommends that an interim significant impact level of 7.6 $\mu g/m^3$ be used for comparison against predicted one-hour NO_2 impacts (June 28, 2010 memorandum).

Prior to performing the one-hour NO_2 significant impact level modeling analysis the existing receptor grid (as presented in the January 18, 2011 modeling protocol) was expanded. The original receptor grid extended approximately 6 kilometers (km) from the facility and receptors were placed every 70 meters on a Cartesian coordinate system. To determine the radius of significant impact for NO_2 additional receptors were added to the original grid. The additional receptors were placed on a polar grid with arc spacing of 10 degrees and linear spacing of 500 meters. The polar grid of receptors extended from 6 kilometers to 10 kilometers from the facility. Execution of the model resulted in a predicted one-hour NO_2 radius of significant impact (ROI) of 9.2 km from the TRE facility.

Figure 1 presents the maximum predicted radius of impact for the proposed emission units at the TRE facility.

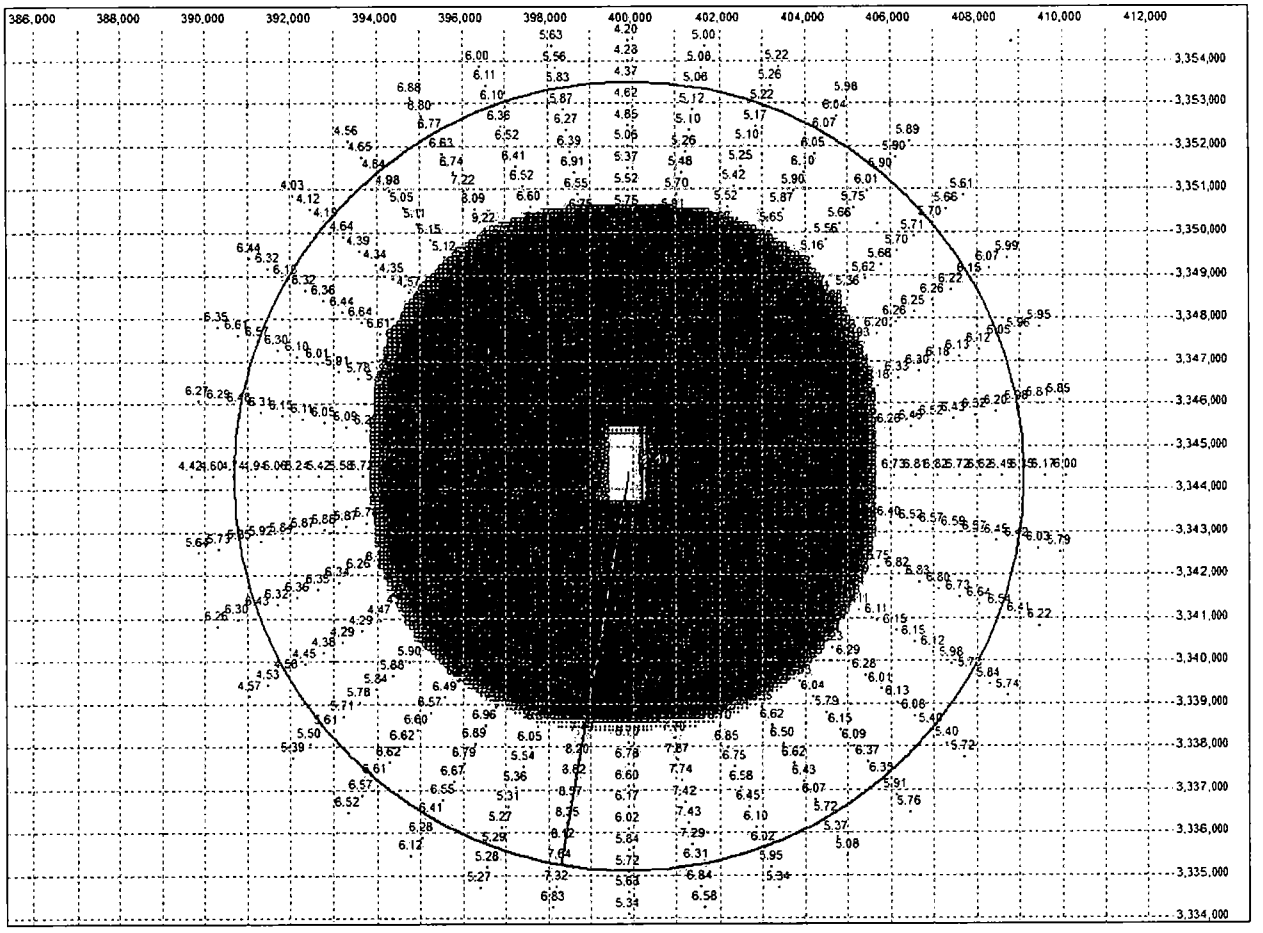

Figure 1. ROI for maximum 1-hr NO_2 impacts from the proposed TRE emission units (9.2 km)

Background Source Evaluation

The FDEP has requested that TRE provide more detailed information regarding the sources chosen for inclusion in the multi-source modeling analysis. To determine which sources are appropriate for inclusion in the multi-source model, the North Carolina '20D approach' was used. The 20D approach is a screening method that considers a source's potential mass emissions and distance from the proposed facility (TRE) to determine whether the source has the potential to significantly contribute to pollutant impacts within the significant impact area for the proposed facility (i.e., whether its emissions should be included in the modeling analysis). The FDEP provided TRE with a database of sources that emit particulate matter and NO_2/NO_x and are located within 61 km of TRE.

The distance between TRE and the individual provided $PM_{2.5}$ and NO_x emitting sources was calculated using the Pythagorean Theorem and the UTM coordinates for the facilities. A base location of 399.77 km easting and 3344.92 km northing (UTM Zone 17) was used for the TRE facility. The distance between each potential background emission source and TRE was calculated as follows:

$$C_i = [(A_i - 399.77)^2 + (B_i - 3344.92)^2]^{0.5}$$

Where:
C_i = The distance (km) between TRE and the selected source, (i);
A_i = The UTM easting coordinate (km) of the selected source, (i); and
B_i = The UTM northing coordinate (km) of the selected source, (i).

The calculated distance for each source was then multiplied by a factor of 20 to determine the 20D value for each source:

$$20D\ Value_i = C_i * 20$$

If the potential $PM_{2.5}$ or NO_2/NO_X annual emission rate (in tons per year, TpY) exceeded the 20D value for that source, the source was included in the multi-source modeling analysis for that pollutant. The potential to emit for each facility was supplied in the database provided by the FDEP. In the event that potential emissions were not listed for a facility then actual reported emissions for the facility were used in the comparison. Only emission units listed as active units were included in the 20D analysis.

Results of the 20D analysis resulted in five (5) background sources required to be included in the NO_2 model and one (1) background source required to be included in the $PM_{2.5}$ model (all potential particulate matter emissions were considered to be $PM_{2.5}$).

Attachment 1 contains a Compact Disc® with a distilled version of the FDEP provided database that contains the calculated 20D value for each source (columns containing extraneous data were removed from the original database).

The selected sources were entered into the multisource model for each respective pollutant. In many cases the selected sources had multiple emission stacks (i.e., emission points). Where applicable, similar emission stacks (i.e., stacks with heights, exhaust flowrates and temperatures within approximately 20% of one another) were merged into a representative emission stack using the SCREEN3 merged stack procedure. For each exhaust stack a merged stack parameter (M) was calculated using the following equation:

$$M = (h_s * V_s * T_s) / Q$$

Where:
h_s = stack height (m)
V_s = stack gas volumetric exhaust flowrate (m^3/s)
T_s = stack gas exit temperature (K)
Q = pollutant emission rate (g/s)

For a group of similar exhaust stacks the exhaust stack with the lowest calculated M value was used as the representative exhaust stack. Maximum potential pollutant emissions from all of the exhaust stacks within the merged group were added together and assigned to the representative (merged) exhaust stack for that group.

Jackson Electric Authority – Northside SJRPP

The Jackson Electric Authority (JEA) – Northside SJRPP source was included in both the NO_2 and $PM_{2.5}$ modeling analyses. The facility is located at 446.9 km easting and 3,359.15 northing, approximately 49.2 km from the TRE facility. The calculated 20D value is 985. Maximum potential annual NO_x and $PM_{2.5}$ emissions for the facility, as reported in the FDEP-provided database (Attachment 1), are 47,618 and 3,315 TpY, respectively.

Emission units that were listed as inactive or that did not have potential pollutant emission rates or actual pollutant emission rates were not included in the modeling demonstration. Ten (10) emission units at the JEA – Northside SJRPP facility have the potential to emit NO_x/NO_2. These ten (10) exhaust stacks were combined into five (5) representative (merged) exhaust points in the modeling analysis. Twenty-eight (28) exhaust stacks at the JEA – Northside SJRPP facility have the potential to emit $PM_{2.5}$. These 28 exhaust stacks were combined into eight (8) representative (merged) exhaust points in the modeling analysis.

Tables 1 and 2 present the JEA – Northside SJRPP stack parameters used in the NO_2 and $PM_{2.5}$ modeling analysis.

Anchor Glass Container Corporation

The Anchor Glass Container Corporation (AGCC) source was included in the NO_2 model. The facility is located at 431.5 km easting and 3,337.5 northing and is 32.6 km from the TRE facility. The calculated 20D value is 683. Maximum potential annual NO_x emissions, as reported in the FDEP-provided database (Attachment 1), are 703 TpY.

Emission units that were listed as inactive or that did not have potential or actual NO_x emission rates were not included in the modeling demonstration. Two (2) emission units at the AGCC facility have the potential to emit NO_x/NO_2. These two exhaust stacks were combined into a single representative (merged) exhaust point in the modeling analysis.

Table 3 presents the Anchor Glass Container Corporation stack parameters used in the NO_2 modeling analysis.

Gerdau Ameristeel, Jacksonville Mill Division

The Gerdau Ameristeel, Jacksonville Mill Division (GAJMD) source was included in the NO_2 model. The facility is located at 405.7 km easting and 3,350.2 northing and is approximately 7.4 km from the TRE facility. The calculated 20D value is 147. Maximum potential annual NO_x emissions for the facility, as reported in the FDEP-provided database (Attachment 1), are 484 TpY.

Emission units that were listed as inactive or that did not have potential or actual NO_x emission rates were not included in the modeling demonstration. Five (5) emission units at the GAJMD facility have the potential to emit NO_x/NO_2. These five exhaust stacks were combined into three (3) representative (merged) exhaust points in the modeling analysis.

Table 4 presents the Gerdau Ameristeel, Jacksonville Mill Division stack parameters used in the NO_2 modeling analysis.

Cedar Bay Generating Company, L.P.

The Cedar Bay Generating Company, L.P. (CBGCLP) source was included in the NO_2 model. The facility is located at 441.66 km easting and 3,365.54 northing and is approximately 46.6 km from the TRE facility. The calculated 20D value is 935. Maximum potential annual NO_x emissions, as reported in the FDEP-provided database (Attachment 1), are 2,219 TpY.

Emission units that were listed as inactive or that did not have potential or actual NO_x emission rates were not included in the modeling demonstration. Five (5) emission units at the CBGCLP facility have the potential to emit NO_x/NO_2. These five exhaust stacks were combined into two (2) representative (merged) exhaust points in the modeling analysis.

Table 5 presents the Cedar Bay Generating Company, L.P. stack parameters used in the NO_2 modeling analysis.

Jacksonville Electric Authority – Brandy Branch Facility

The Jacksonville Electric Authority – Brandy Branch (JEABB) facility was included in the NO_2 model. The facility is located at 408.84 km easting and 3,354.49 northing and is approximately 13.2 km from the TRE facility. The calculated 20D value is 264. Maximum potential annual NO_x emissions, as reported in the FDEP-provided database (Attachment 1), are 504 TpY.

Emission units that were listed as inactive or that did not have potential or actual NO_x emission rates were not included in the modeling demonstration. Three (3) emission units at the JEABB facility have the potential to emit NO_x/NO_2. These three exhaust stacks were combined into a single representative (merged) exhaust point in the modeling analysis.

Table 6 presents the Jacksonville Electric Authority – Brandy Branch Facility stack parameters used in the NO_2 modeling analysis.

Table 1. JEA – Northside/SJRPP emission stack parameters used in the NO_2 model

Emission Unit	Potential NO_x Emissions (lb/hr)	Stack Ht. (ft)	Stack Diameter (ft)	Exhaust Flow (ft^3/min)	Stack Temp. (°F)
NGS Boiler No. 3	***1,510***	***300***	***23***	***1,564,977***	***330***
NGS Combustion Turbine No. 3	***372.9***	***30***	***12.9***	***514,514***	***800***
NGS Combustion Turbine No. 4	372.9	30	12.9	514,514	800
NGS Combustion Turbine No. 5	372.9	30	12.9	514,514	800
NGS Combustion Turbine No. 6	372.9	30	12.9	514,514	800
SJRPP Boiler No. 1	3,686	640	22.3	1,800,000	150
SJRPP Boiler No. 2	***3,686***	***640***	***22.3***	***1,700,000***	***150***
NGS Circulating Fluidized Bed Boiler No. 2	***248.76***	***495***	***15***	***700,300***	***144***
NGS Circulating Fluidized Bed Boiler No. 1	248.76	495	15	700,300	144
NGS Limestone Dryers/ Mills Building	***11.6***	***75***	***3.4***	***41,000***	***165***

Notes:

1. Emission stack listed in ***bolded font*** was selected as the representative exhaust stack for the subgroup.
2. The exhaust gas velocity for the combustion turbines was not listed in the FDEP provided database and therefore assumed to be 20 meters per second.

Table 2. JEA – Northside/SJRPP emission stack parameters used in the $PM_{2.5}$ model

Emission Unit	Potential $PM_{2.5}$ Emissions (lb/hr)	Stack Ht. (ft)	Stack Diameter (ft)	Exhaust Flow (ft^3/min)	Stack Temp. (°F)
NGS Circulating Fluidized Bed Boiler No. 2	***30.4***	***495***	***15.0***	***700,300***	***144***
NGS Circulating Fluidized Bed Boiler No. 1	30.4	495	15.0	700,300	144
NGS Combustion Turbine No. 3	***26.4***	***30.0***	***12.9***	***514,514***	***800***
NGS Combustion Turbine No. 4	26.4	30.0	12.9	514,514	800
NGS Combustion Turbine No. 5	26.4	30.0	12.9	514,514	800
NGS Combustion Turbine No. 6	26.4	30.0	12.9	514,514	800
SJRPP Boiler No. 1	184	640	22.3	1,800,000	156
SJRPP Boiler No. 2	***184***	***640***	***22.3***	***1,700,000***	***156***
NGS Boiler No. 3	***40.5***	***300***	***23.0***	***1,564,977***	***330***
NGS Limestone Dryers / Mills Bldg.	***0.960***	***75.0***	***3.40***	***41,000***	***165***
NGS Bed Ash Silos Bin Vents	0.150	95.0	1.00	2,500	150
NGS Fly Ash Transport Blower Discharge	0.004	60.0	0.50		150
NGS AQCS Pebble Lime Silo	0.014	70.0	0.50	1,500	80.0
Fly Ash Surge Bin Vent	0.035	75.0	8.00	4,121	100
Mineral Additive Storage Bin Vent	0.00033	74.0	32.0	423	100
Gas-Fired Dryer Stack	1.60	88.0	3.00		220
NGS Limestone Silo Bin Vent Filters	***0.035***	***130***	***1.00***	***3,200***	***68.0***
NGS Fly Ash Silos Bin Vents	0.019	120	1.00	2,500	150
NGS Boiler Fuel Silos Dust Collectors	0.005	160	1.00	18,000	77.0
Clean-up Vacuum Vent	0.000004	5.00	4.00	423	100
NGS Crusher House / Bldg. Baghouse Exhaust	***0.022***	***8.00***	***2.00***	***24,000***	***77.0***

Table 2 continued. JEA – Northside/SJRPP emission stack parameters used in the $PM_{2.5}$ model

Emission Unit	Potential $PM_{2.5}$ Emissions (lb/hr)	Stack Ht. (ft)	Stack Diameter (ft)	Exhaust Flow (ft^3/min)	Stack Temp. (^oF)
NGS Limestone Prep Bldg. Dust Collectors	0.047	30.0	1.30	10,500	78.0
Separator A Filter – Receiver Vent	0.068	47.0	14.0	1,796	100
Separator B Filter – Receiver Vent	0.062	47.0	14.0	1,480	100
Separator Dust Collector Vent	***0.131***	***31.0***	***12.0***	***4,226***	***100***
SJRPP Bottom Ash, Flyash & Gypsum Handling	1.40				
SJRPP Materials Handling and Storage	47.0				
SJRPP Cooling Towers	134				

Notes:

1. Emission stack listed in ***bolded font*** was selected as the representative exhaust stack for the subgroup.
2. The exhaust gas velocity for the combustion turbines was not listed in the FDEP provided database and therefore assumed to be 20 meters per second.
3. Where maximum potential $PM_{2.5}$ emissions were not listed in the FDEP provided database, actual $PM_{2.5}$ emissions were used.

Table 3. Anchor Glass Container Corporation emission stack parameters used in the NO_2 model

Emission Unit	Potential NO_x Emissions (lb/hr)	Stack Ht. (ft)	Stack Diameter (ft)	Exhaust Flow (ft^3/min)	Stack Temp. (^oF)
Glass Furnace No. 3	***106***	***113***	***5.00***	***52,500***	***600***
Glass Furnace No. 4	54.3	122	5.00	44,723	419

Table 4. Gerdau Ameristeel, Jacksonville Mill Division emission stack parameters used in the NO_2 model

Emission Unit	Potential NO_x Emissions (lb/hr)	Stack Ht. (ft)	Stack Diameter (ft)	Exhaust Flow (ft^3/min)	Stack Temp. (^oF)
Billet Reheat Furnace	***42.2***	***160***	***6.90***	***43,620***	***900***
Melt Shop EAF / Cont. Caster Bldg.	***52.8***	***110***	***12.0***	***1,000,000***	***230***
Rebar Mill Billet Reheat Furnace	***17.8***	***66.0***	***5.80***	***71,336***	***480***
Wire/Rod Mill Billet Reheat Furnace	17.8	66.0	5.80	71,336	480

Notes:

1. Emission stack listed in ***bolded font*** was selected as the representative exhaust stack for the subgroup.
2. Emissions from the Melt Shop EAF and Continuous Caster Building are combined in the FDEP provided database.

Table 5. Cedar Bay Generating Company, L.P. emission stack parameters used in the NO_2 model

Emission Unit	Potential NO_x Emissions (lb/hr)	Stack Ht. (ft)	Stack Diameter (ft)	Exhaust Flow (ft^3/min)	Stack Temp. (^oF)
Circulating Fluidized Bed Boiler A	***181***	***403***	***13.3***	***1,004,000***	***265***
Circulating Fluidized Bed Boiler B	181	403	13.3	1,004,000	265
Circulating Fluidized Bed Boiler C	181	403	13.3	1,004,000	265
Absorber Dryer System Train – 1	***4.80***	***63.0***	***4.17***	***49,000***	***195***
Absorber Dryer System Train – 2	2.40	63.0	4.17	49,000	195

Table 6. Jacksonville Electric Authority – Brandy Branch Facility emission stack parameters used in the NO_2 model

Emission Unit	Potential NO_x Emissions (lb/hr)	Stack Ht. (ft)	Stack Diameter (ft)	Exhaust Flow (ft^3/min)	Stack Temp. (^oF)
Unit 1 Simple Cycle Combustion Turbine	***318***	***90.0***	***18.0***	***1,623,767***	***1,081***
Unit 2 Combined Cycle Combustion Turbine	119	90.0	18.0	1,623,767	1,081
Unit 3 Combined Cycle Combustion Turbine	119	90.0	18.0	1,623,767	1,081

Notes:

1. Emission stack listed in ***bolded font*** was selected as the representative exhaust stack for the subgroup

NO_2 Modeling Analysis Results

The FDEP has requested that TRE revise or clarify the NO_X emission rates in the NO_2 modeling input and output files originally submitted to the FDEP.

The maximum potential NO_x emission rates for the Jacksonville Electric Authority – Northside SJRPP and Gerdau Ameristeel Jacksonville Mill Division (GAJMD) background emission sources, as presented in the previous section (Tables 1 through 6), have been entered into the model for each of the five years.

The NO_x emission rate for the open flare operated at the Trail Ridge Landfill was verified to be 0.74 g/s as presented in Table 7.7 of the original Air Quality Impact Analysis, dated January 18, 2011. The 0.74 g NO_x/s emission rate was used in the updated NO_2 modeling analysis.

$PM_{2.5}$ Modeling Analysis Results

The FDEP has requested that TRE revise or clarify the $PM_{2.5}$ emission rates in the $PM_{2.5}$ modeling input and output files originally submitted to the FDEP.

The $PM_{2.5}$ emission rate for the open flare operated at the Trail Ridge Landfill was verified to be 0.32 g/s as presented in Table 7.7 of the original Air Quality Impact Analysis, dated January 18, 2011. The 0.32 g $PM_{2.5}$/s emission rate was used in the updated $PM_{2.5}$ model.

Background source information for the $PM_{2.5}$ sources included in the updated $PM_{2.5}$ model is presented in this document. Detailed information for the background $PM_{2.5}$ source included in the model is provided in Table No. 2 of this document.

Tables 7 and 8 present the results of the NO_2 and $PM_{2.5}$ significant impact and NAAQS modeling analysis.

Attachment 1 contains a Compact Disc® that contains the input data files for the AERMOD model.

Table 7. Results of the revised NO_2 and $PM_{2.5}$ significant impact analysis for the proposed TRE engine generators

Pollutant	Engine Emission Rate[1] (g/s per ICE)	Averaging Period	Met Year	SIL ($\mu g/m^3$)	Maximum Predicted Impact ($\mu g/m^3$)	Radius of Impact (km)
NO_x	0.372	1-hr.	2003	7.6	22.6	9.2
$PM_{2.5}$	0.149	Annual	2003	0.3	0.23	-
$PM_{2.5}$	0.149	24-hr	2001	1.2	3.16	1.5

Notes:

1. Emission rates from Table 4.1 of the original Air Quality Impact Analysis, dated January 18, 2011 (included as Appendix K of the air permit application document submitted in March 2011).

Table 8. Results of the NO_2 and $PM_{2.5}$ ambient air quality standards analysis

	Averaging Period	TRE Impact ($\mu g/m^3$)	Flare Impact ($\mu g/m^3$)	Background Source Impact ($\mu g/m^3$)	Representative Background Concentration[1] ($\mu g/m^3$)	Combined Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2[A]	1-hr[B]	31.6	0.93	46.5	82.1	110.3	189
$PM_{2.5}$	24-hr[C]	3.50	0.12	3.68	24.2	28.1	35

Notes:

1. Background monitoring data presented in Table 7.2 of the original Air Quality Impact Analysis, dated January 18, 2011 (included as Appendix K of the air permit application document submitted in March 2011).

A. Tier II NO_2 modeling approach assuming that predicted NO_2 impacts are equivalent to the modeled NO_x impacts multiplied by a factor of 0.75.
B. 1-hr. NO_2 impacts are based on the 98th percentile (8th high) of the 1-hour daily maximum concentrations.
C. 24-hr. PM2.5 impacts are based on the 98th percentile (highest 8th high) value over the five modeled years.

Please contact us at (517) 324-1880 if you have any questions or require additional information.

Sincerely,

DERENZO AND ASSOCIATES, INC.

Andy Rusnak
Environmental Engineer

Robert L. Harvey, P.E.
Engineering Services Manager

Attachments

c: Ms. Kerri Stewart, City of Jacksonville (w/o attachment)
Mr. Scott Salisbury, TRE/Landfill Energy Systems (w/o attachment)
Mr. Richard M. DiGia, TRE/Landfill Energy Systems (w/o attachment)
Mr. Cleve Holladay, FDEP

ATTACHMENT 1

UPDATED MODELING CD