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August 23, 2010

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BUREAU OF
AIR REGULATION

Ms. Trina Vielhauer
Chief, Bureau of Air Regulation
Florida Department of Environmental Protection
Twin Towers Office Building,
2600 Blair Stone Road
Tallahassee, FL 32301

Re: Solid Waste Authority of Palm Beach County,
Palm Beach County Renewable Energy Facility No. 2
Supplemental Air Modeling Protocol for 1-hour NO_2 and SO_2 NAAQS

Dear Ms. Vielhauer:

The Solid Waste Authority of Palm Beach County (the Authority) is pleased to submit two copies of our proposed supplemental air quality modeling protocol for the Palm Beach Renewable Energy Facility No. 2 (Proposed Facility, PBREF2) requested in items 8, 10, and 11 of the June 15, 2010 Request for Additional Information (RAI) from your office. This protocol describes the procedures proposed to be followed to address the new 1-hour National Ambient Air Quality Standards (NAAQS) for NO_2 and SO_2 for the Proposed Facility.

As you know, the new 3,000 ton per day mass burn waste-to-energy facility will be constructed at the Authority's Palm Beach Renewable Energy Park in West Palm Beach, adjacent to its existing renewable energy facility, the North County Resource Recovery Facility. In addition to complementing the services provided by the existing renewable energy facility, the Proposed Facility will also serve to meet one of the goals of the Authority's 2006 Integrated Solid Waste Management Plan to develop programs and facilities to effectively and economically manage solid waste, by providing expanded combustion capacity in order to extend the life of the existing landfill beyond its currently anticipated lifespan.

If you have any questions concerning the protocol, please do not hesitate to contact me at (914) 641-2646 or via e-mail at pdiosey@pirnie.com.

Very truly yours,
MALCOLM PIRNIE, INC.

Phyllis G. Diosey

Phyllis G. Diosey, Ph.D., QEP
Associate, Air Quality Services

Enclosures: Two (2) copies, Supplemental Air Quality Modeling Protocol
Palm Beach County Renewable Energy Facility No. 2

cc:
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Supplemental Air Quality Modeling Protocol for 1-hour NO_2 and SO_2 NAAQS

Palm Beach Renewable Energy Facility No. 2

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1. Background

The Solid Waste Authority of Palm Beach County (the Authority) is planning to expand its waste processing capacity by constructing a mass burn waste-to-energy facility in West Palm Beach, Florida, adjacent to its existing renewable energy facility. The new facility, the Palm Beach Renewable Energy Facility No. 2 (Proposed Facility, PBREF2), will have a total facility throughput of 3,000 tpd of municipal solid waste (MSW). State-of-the-art emissions control systems will be included in the Proposed Facility to minimize air pollutant emissions. In addition, continuous emissions monitoring equipment will be used to ensure on-going compliance with state and federal air regulations.

The Authority's 1,320 acre campus (Palm Beach Renewable Energy Park, PBREP) includes the existing renewable energy facility (the North County Resource Recovery Facility (NCRRF)), a refuse-derived fuel (RDF) facility which has two identical MWC units, and a total nominal design capacity of 2,000 tons per day of MSW. The construction of the Proposed Facility will complement services that are being provided by the existing facilities at the PBREP, and will also serve to implement the Authority's 2006 Integrated Solid Waste Management Plan (ISWM Plan) to develop a system of programs and facilities to effectively and economically manage solid waste through source reduction, recycling, composting, combustion, and landfilling. The ISWM Plan also calls for the expanded combustion capacity in order to extend the life of the existing landfill beyond its currently anticipated lifespan.

The original modeling protocol, for the Proposed Facility was submitted and approved in 2009, and it included all applicable standards and criteria, including National Ambient Air Quality Standards (NAAQS), Florida Ambient Air Quality Standards (FAAQS), and Prevention of Significant Deterioration (PSD) increments (40 CFR Part 51.166) in effect at the time. This supplemental protocol describes the methodology that will be used in the air quality modeling analysis for demonstrating compliance with the new 1-hour nitrogen dioxide (NO_2) national ambient air quality standard as requested by Florida Department of Environmental Protection (FDEP) in their Request for Additional Information (RAI) dated June 15, 2010 (FDEP, 2010). This supplemental modeling analysis also addresses the newly promulgated 1-hour sulfur dioxide (SO_2) national ambient air quality standard (effective August 23, 2010) as requested by FDEP.

Specific project information can be found in the *Air Quality Modeling Report* (Malcolm Pirnie, 2010). The information provided in this supplemental protocol will focus on the additional information to be used in the modeling analyses for the 1-hour NO_2 and SO_2

standards. The protocol will follow recent regulatory guidance provide by the United States Environmental Protection Agency (USEPA) Office of Air Quality Planning and Standards (OAQPS) (USEPA, 2010a, b, c), and FDEP.

2. 1-hour NO_2 and SO_2 NAAQS

The new national ambient air quality standards for 1-hour NO_2 and SO_2 are shown in Table 2-1. For the 1-hour NO_2 standard, conversion from the ppb (parts per billion) standard to micrograms per cubic meter ($\mu g/m^3$) was based upon guidance provided by USEPA (USEPA/AQMG, 2010a). Conversion from ppb to $\mu g/m^3$ for the 1-hour SO_2 standard was based upon the conversion used for the 3-hour secondary NAAQS for SO_2.

Table 2-1.
1-Hour NO_2 and SO_2 NAAQS

Pollutant	NAAQS (ppb)	NAAQS ($\mu g/m^3$)
Nitrogen dioxide (NO_2)	100 [1]	189
Sulfur dioxide (SO_2)	75 [2]	195

Notes:

[1] 40 CFR Parts 50 and 58

[2] 40 CFR Parts 50, 53, and 58

3. Modeling Methodology

The modeling will be performed using the most recent version of AERMOD (version 09292), and pre-processing programs, AERMAP (version 09040), and AERMET (version 06341) as was used for the PSD permit modeling, and was also recommended in the 1-hour NO_2 guidance memoranda from USEPA.

Following USEPA guidance (USEPA, 1990), the air quality analyses for both the 1-hour NO_2 and 1-hour SO_2 standards will consist of two distinct phases:

- a preliminary analysis to determine if facility emissions will result in a significant impact on ambient air quality, and

- a full impact, or multisource analysis that includes modeling emissions from the proposed source, other existing sources, and the emissions due to planned growth that accompanies the new source. A full impact analysis is required for any pollutant where the estimated pollutant concentration equals or exceeds the applicable significant impact level.

3.1. Meteorological Data

Five years of AERMOD-ready data provided by FDEP will be used for the analyses. The data from 2001 through 2005 is based on hourly surface data from Palm Beach International Airport and upper air data from Florida International University, Miami. Palm Beach International Airport, the nearest National Weather Service (NWS) station is approximately 6.9 miles southeast of the site. Information on the terrain and meteorological data used in the AERMOD set-up can be found in the original protocol.

3.2. Receptor Locations

The modeling for the 1-hour NO_2 and SO_2 standards will be performed using the same receptor grid locations as were used for the Class II modeling analysis; namely, receptors were placed on a Cartesian grid network designed to ensure that the maximum impact was captured. A fine 100 meter (m)-spaced grid was placed out to 3 kilometers (km). A coarser grid with 500-m spacing was placed from 3-km to 10-km, followed by a coarser 1,000-m spaced grid from 10-km out to 30-km. Receptors were also placed around the Proposed Facility fence line at a spacing of 50 meters. Because the public will have limited access within the fence lines of both the existing NCRRF and the Proposed

Facility (for example, at drop-off areas and at visitor centers), grid receptors within the fence line were also included in the model.

3.3. Source Data

Sources of NO_2 and SO_2 emissions at the Proposed Facility include the MWC units (MWC emissions are exhausted from a tall stack which contains three identical flues, one for each of the three identical MWC units), one (1) 250 kW diesel-fired emergency generator, and two (2) 250 HP diesel-fired fire pumps. Based on the guidance provided by USEPA in the 1-hour NO_2 guidance memoranda, no exemptions have been provided for the operation of emergency equipment for compliance with the 1-hour NO_2 standard. Based upon the rationale provided in the 1-hour NO_2 guidance memoranda, it is presumed that similar guidance regarding emergency operation will also apply for the 1-hour SO_2 regulation. Therefore, the analyses will also consider the short-term (hourly) emissions of NO_2 and SO_2 from the diesel-fired emergency generator and from the emergency fire pumps. This equipment will be included based on the proposed operation of the facility as discussed below.

As in the Air Quality Dispersion Report, the three identical MWC flues will be adjacent to each other within an outer concrete shell; and will be modeled as a single merged stack with an equivalent diameter following regulatory guidance. Under the current design, the exhausts from the emergency equipment (emergency generator and fire pump) will be combined and routed to separate 1 ft. (inside diameter) stack that will be placed within the outer shell stack and which will exhaust at the same height above grade as the MWC flues (i.e., 310 feet.).

3.4. Operating Scenarios

Planned operations of the Proposed Facility include normal operation of the MWC units and routine testing of the emergency equipment. Following the recent USEPA guidance on the 1-hour NO_2 NAAQS, emergency operation is also a consideration. Therefore, there are three potential operational scenarios.

1. Normal MWC Operation – The proposed MWC unit can operate at varying loads. Based on a worst case load analysis, Scenario 1a resulted in the highest 1-hour impacts for comparison to the SILs. Therefore, this scenario will be used as the basis for operation of the MWC units for the 1-hour modeling analyses.

2. Routine Emergency Equipment Testing – During the routine testing of the emergency diesel-fired generator and diesel-fired fire pumps, either the emergency generator, or one (1) of the fire pumps will operate in conjunction with MWC units (i.e., the generator and fire pump(s) will not be tested at the same

time). The exhausts from the emergency equipment will be routed to the separate stack within the shell stack and adjacent to the MWC flues. Under the routine testing scenario, the contribution of the emissions from the emergency generator has greater emissions than the fire pump. Therefore, the routine testing of the emergency generator when the MWC units are operating under Scenario 1a will be used in both the 1-hour analyses.

3. Emergency Operation – During an emergency, the MWC units will not operate and, in general, only the emergency generator will operate in order to supply power to the control room. However, if the emergency is due to fire, then the emergency generator and one (1) fire pump may be used concurrently. The second fire pump serves as a backup and will be operated only if the primary fire pump does not function correctly during the emergency. Therefore, a worst-case emergency scenario includes the potential impacts of the diesel generator and one (1) fire pump engine operating concurrently and exhausting through the emergency stack. Both the emergency diesel generator and fire pumps operate under a single operating load.

Therefore, two operational scenarios will be evaluated: (1) routine testing of the emergency diesel generator during the worst-case operating load of the MWCs (Scenario 1a); and (2) a fire emergency, when both the diesel generator and one fire pump are operational (no MWC operation).

3.5. Preliminary (Significant Impact) Analysis

The preliminary analysis uses the concept of a significant impact level (SIL) to screen for the need for further analysis. The SIL is used to determine if a source has the potential to cause or contribute to an exceedance of an ambient air quality standard. If the maximum modeled impact for a given pollutant and averaging time is below the applicable SIL, then no further analysis is required. If the maximum predicted impacts equals or exceeds a SIL, then a full impact analysis that includes the Proposed Facility along with other nearby sources and background concentration may be performed for that pollutant for compliance with the standard.

USEPA has developed SILs for a number of pollutants and averaging times (see Table 3-1). The SILs for PM, CO, annual NO_2 and 3-hour, 24-hour, and annual SO_2 were evaluated in the *Air Quality Modeling Report* (Malcolm Pirnie, 2010), and it was demonstrated that the maximum impacts from the Proposed Facility were well below the significance levels for these pollutants and averaging times.

The current analysis will look at the impacts for comparison to the newly promulgated 1-hour NO_2 and SO_2 standards. In the case of the new 1-hour NO_2 standard, USEPA has only recently provided an interim SIL (USEPA, 2010b). According to this guidance, the recommended SIL for the 1-hour NO_2 standard is 4 ppb. Using the recommended conversion to a mass-based value (USEPA, 2010a), and rounding to a whole number following the convention of the other Class II SILs, the 1-hour NO_2 SIL is 8 $\mu g/m^3$. USEPA has noted that the interim 1-hour NO_2 SIL is a *non-binding* interim value which may change once formally promulgated; however, FDEP has indicated that while each project is assessed "case-by-case," FDEP is inclined to use this value in modeling analyses, based on their experience with recent projects. USEPA has not yet provided a SIL for the 1-hour SO_2 NAAQS. If the same NO_2 rationale is followed for the 1-hour SO_2 NAAQS, a draft 1- hour SIL for SO_2 would be 8 $\mu g/m^3$.

Table 3-1
Class II Significant Impact Levels

Pollutant	Averaging Time	Class II Significant Impact Levels ($\mu g/m^3$)
Nitrogen dioxide (NO_2)	Annual ***1-hour***	1 ***8 (interim - proposed)***
Sulfur dioxide (SO_2)	Annual 24-hour 3-hour ***1-hour***	1 5 25 ***8 (proposed)***
Particulate matter < 10 µm (PM_{10})	Annual 24-hour	1 5
Carbon monoxide (CO)	8-hour 1-hour	500 2,000

Sources: 40 CFR 51.165, USEPA/OAQPS Memorandum (June 29, 2010).

A preliminary analysis will be performed using AERMOD to determine if predicted 1-hour impacts of NO_2 are below the 1-hour SIL identified in Table 3-1. Following the recent USEPA guidance, the highest of the 5-year average of the maximum modeled 1-hour NO_2 concentrations predicted at each receptor will be compared to the 1-hour SIL of 8 $\mu g/m^3$. If the highest of the 5-year average of the maximum modeled 1-hour NO_2 impact is below the SIL, no further analysis will be performed. If the highest of the 5-year average of the maximum modeled 1-hour NO_2 impact is equal to or exceeds the SIL, then a full impact analysis may be required for the 1-hour NO_2 standard.

USEPA has not yet issued guidance on modeling for the 1-hour SO_2 NAAQS; however, based upon the discussions provided in the recent NO_2 guidance memoranda, it is assumed that similar procedures will apply. Therefore, a preliminary analysis for comparison to the proposed SIL shown in Table 3-1 will be performed. If the highest of the 5-year average of the maximum modeled 1-hour SO_2 concentrations at each receptor is below the proposed SIL, no further analysis will be performed. If the highest of the 5-year average of the maximum modeled 1-hour SO_2 impacts is equal to or exceeds the proposed SIL, then a full impact analysis may be required for the 1-hour SO_2 standard.

3.6. Full Impact Analysis

In the event that a full impact analysis is required, and depending upon the pollutant (NO_2 or SO_2), an inventory of sources will be requested from FDEP out to approximately 50 km beyond the significant impact area (SIA). The inventory(ies) will be reviewed and modified as necessary for the appropriate short-term emission rates and operating parameters based on readily available sources, such as the air permitting website of the FDEP. Prior to inclusion in the multisource modeling, the inventories will be screened using the 20D Method (for short-term analyses) (NCDNRCD, 1985). Sources which are identified using this method may be further screened using conventional screening techniques or included in the final inventory modeling.

The receptor locations in the full impact analysis will be limited to those receptor locations where the SIL is equaled or exceeded. This will allow for the identification of any potential exceedances caused by or contributed to by the Proposed Facility, while keeping the size of the data files within reason. In the event that the full impact analysis for either NO_2 or SO_2 indicates a potential modeled exceedance, the determination as to whether Proposed Facility may potentially cause or contribute to this modeled exceedance may be determined both spatially (at locations where the SIL is exceeded) and temporally (at the time of a potential modeled exceedance in terms of year, month, day, and hour) as recommended by USEPA. If the modeling indicates that there is no exceedance of a standard where the Proposed Facility is determined to be significant (both spatially and temporally), then the Proposed Facility will be assumed not cause or contribute to an exceedance of a standard.

4. Modeling for 1-Hour NO_2 NAAQS

As recommended by recent USEPA guidance, modeling for compliance with the 1-hour NO_2 NAAQS will use the three (3)-tiered screening approach. Tier 1 and Tier 2 are likely to over-estimate the 1-hour NO_2 impacts from the proposed facility since the hourly impacts occur relatively close to the stack, so that neither full conversion of NO to NO_2, nor the equilibrium of NO to NO_2 are likely to occur. Tier 3, on the other hand, accounts for the chemical reactions that convert NO to NO_2 in the presence of ozone, and additionally, allow for the use of site-specific ozone data. Therefore, if needed, the NO_2 analysis will be performed using the PVMRM mode within AERMOD for the preliminary analysis, and for the full impact analysis.

4.1. NO_2/NOx Ratios (for Tier 3)

Based on information provided by vendors, a typical in-stack ratio for mass burn waste-to-energy combustion units is 0.1 (NO_2 to NOx). The ambient equilibrium NO_2/NOx ratio will be set to 0.9, the default equilibrium ratio within the PVMRM mode.

4.2. Background Ozone Concentrations (for Tier 3)

Hourly ozone data from a nearby representative monitoring stations for the same years as the meteorological data used in the model (2001 to 2005) were requested from FDEP and will be used in both preliminary and full impact analyses. The ozone data provided by FDEP were collected at a number of stations within Palm Beach County. The primary ozone monitoring station used was located at the Royal Palm WWTP (980 Crestwood Blvd N) and was the closest monitor to Proposed Facility. The other monitoring stations were used to replace extended periods of missing data. Procedures for filling in missing hourly ozone data are described in Attachment A of this protocol.

4.3. Background NO_2 Concentrations

While USEPA has proposed a first-tier assumption of adding the overall highest hourly background NO_2 concentration from a representative monitor to the modeled design value at those receptors above the SIL, it also considered the use of further refinement through temporal pairing of modeled and monitored background values. In the event that a full impact analysis is required, hourly NO_2 background data (also for the same five years of meteorological data, 2001 to 2005) may also be used in order to refine the

NAAQS analysis both spatially and temporally. The hourly NO_2 data provided by FDEP will be reviewed. In the event of missing data, procedures will be followed to fill in gaps in the hourly NO_2 data. These procedures are summarized in Attachment B of this protocol.

4.4. Comparison to 1-hour NO_2 NAAQS

The 1-hour NO_2 standard is in the form of the 98th percentile of the annual distribution of the daily maximum 1-hour concentration averaged over the 5 years of meteorological data used for the analysis. In the modeling analysis, this is interpreted as the average of the 8th highest daily maximum1-hour concentrations at every receptor averaged over the 5 years of meteorological data. The AERMOD program does not currently have the capability to perform the necessary post-processing to provide this form of output, and USEPA is currently in the process of developing and testing post-processing program needed to process the AERMOD output for this format. If needed, post-processing will be performed following USEPA guidance. A number of software vendors have developed 1-hour NO_2 post-processing capability as part of their model software package. Post-processing for comparison to the statistical form of the 1-hour NO_2 standard may also use this post-processing software (BREEZE software). This post-processing software was designed to follow USEPA guidance provided in their 1-hour NO_2 modeling notice (USEPA, 2010c).

5. Modeling for 1-Hour SO_2 NAAQS

Although USEPA has not issued specific modeling guidance for the 1-hour SO_2 NAAQS, it has been assumed that this USEPA guidance would be similar to that provided in their recent memoranda for the 1-hour NO_2 standard. Therefore, general procedures to those discussed above will be followed. Unlike NO_2, however, there is no chemistry component to the AERMOD model when modeling for the emissions of SO_2.

If the maximum predicted impacts (highest of the 5-year average of the maximum modeled 1-hour SO_2 concentrations) are below the proposed SIL (Table 3-1), then the facility impacts will be deemed insignificant, and no further analysis will be performed for the 1-hour SO_2 standard. If the proposed SIL is exceeded, then a full multisource analysis may be performed. The multisource SO_2 analysis would use the inventory of sources provided by FDEP.

5.1. Comparison to the 1-Hour SO_2 Standard

The 1-hour SO_2 standard is in the form of the 99th percentile of the annual distribution of the daily maximum 1-hour concentrations. In the modeling analysis, this is represented as the 4th highest daily maximum 1-hour concentration at each receptor averaged over the five years of meteorological data. Until USEPA provides the necessary post-processing software for the 1-hour SO_2 standard, post-processing of the AERMOD output results will be performed using procedures adapted from those outlined by USEPA in their 1-hour NO_2 modeling notice (USEPA, 2010a). Commercial software (BREEZE software) developed to process the 1-hour SO_2 model output may also be used.

If a full impact analysis is performed, the modeled 1-hour SO_2 impacts may be combined initially with the maximum 1-hour SO_2 concentration from the previous three (3) years from the nearest representative monitoring station for comparison to the standard. Further refinement may also be applied both spatially and temporally using available hourly SO_2 monitoring data from a nearby representative monitoring station as discussed above for NO_2.

6. Documentation

The results of the analysis will be documented in a report that describes the analysis and provides the modeling results and conclusions of the analyses. Copies of the model input and output files in electronic format will also be provided to FDEP for their review.

7. References

FDEP, 2010. *Request for Additional Information. DEP File No. 0990234-017-AC (PSD-FL-413*. Florida Department of Environmental Protection. Letter dated June 15, 2010.

Malcolm Pirnie, 2010. *Air Quality Modeling Report. Palm Beach Renewable Energy Facility No. 2.* Submitted as Appendix F of the PSD Permit Application. April 2010.

NCDNRCD, 1985. *Screening Threshold Method for PSD Modeling.* North Carolina Department of Natural Resources and Community Development. Division of Environmental Management.

USEPA, 1990. *New Source Review Workshop Manual – Prevention of Significant Deterioration and Nonattainment Area Permitting – DRAFT.* Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

USEPA, 2010a. *Notice Regarding Modeling for New Hourly NO_2 NAAQS.* Office of Air Quality Planning and Standards (OAQPS), Air Quality Modeling Group (AQMG). February 25, 2010.

USEPA, 2010b. *Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard.* Office of Air Quality Planning and Standards (OAQPS), Air Quality Modeling Group (AQMG). Memorandum from Tyler Fox to Regional Air Division Directors dated June 28, 2010.

USEPA, 2010c. *Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program.* Office of Air Quality Planning and Standards (OAQPS). Memorandum from Stephen D. Page to Regional Air Division Directors dated June 29, 2010.

Attachment A: Methodology for Filling in Missing Hourly Ozone Data

If the Plume Volume Molar Ratio Method (PVMRM) mode of AERMOD is used for estimating the 1-hour NO_2 concentrations, ambient ozone concentrations from the monitoring station at Royal Palm WWTP (980 Crestwood Blvd N, the monitoring site nearest to the project site) during the 2001-2005 period modeled in the PSD analysis will be used to represent hourly background ozone levels.

These hourly ozone data are used within the PVMRM option of AERMOD in order to simulate the atmospheric chemistry of ozone reacting with nitric oxide (NO) emitted from the stack to form NO_2. The model disperses the initial NO_X emissions (which are mostly NO), each hour of the day over each year of meteorological data (e.g., 8,760 hours a day in a 365-day year). AERMOD allows replacement of any missing data in the ozone data file using a single value or to import an ozone data file where the missing hourly ozone concentrations have already been filled. In order to more realistically predict downwind NO_2 concentrations based on the ozone diurnal pattern, missing hours of ambient ozone concentration will be filled using the hourly background O_3 data according to the following procedures.

1. If three or fewer consecutive hours of ambient ozone concentrations are missing, linear interpolation will be used to fill in the missing concentrations based on the previous and subsequent hour concentrations from the same day as follows:

    a. If only one value (A_n) is missing, then A_n = arithmetic mean of A_{n-1} and A_{n+1}, where A_{n-1} is the previous concentration and A_{n+1} is the subsequent concentration.

    b. If A_n and A_{n+1} (two values) are missing, then $A_n = A_{n-1} * 0.67 + A_{n+2} * 0.33$ and $A_{n+1} = A_{n-1} * 0.33 + A_{n+2} * 0.67$.

    c. If A_{n-1}, A_n and A_{n+1} (three values) are missing, then $A_{n-1} = A_{n-2} * 0.75 + A_{n+2} * 0.25$, $A_n = A_{n-2} * 0.5 + A_{n+2} * 0.5$, $A_{n+1} = A_{n-2} * 0.25 + A_{n+2} * 0.75$.

2. If four or more consecutive hours of ambient ozone concentrations are missing, then substitution for each missing concentration will be filled by concentrations from another nearby alternate monitor from the same hours that were missing. [Alternate ozone data from a nearby waste water treatment plant in Palm Beach County (Monitor #120992004) was used for the years 2001, 2002, 2003 and up to

August 4^{th}, 2004. After August 4^{th}, 2004, available ozone data from the Lantana monitor (Monitor #120990020) was used as the replacement data source for periods of four or more hours.]

3. If there are four or more consecutive hours of missing ambient ozone data for both the main and alternate monitoring stations, then data for the same hours from the previous day prior to the missing data will be used to replace the missing hours.

Attachment B: Methodology for Filling In Missing Hourly NO_2 Background Data

If pairing impacts and background concentrations spatially and temporally, hourly ambient monitored NO_2 concentrations will be combined with the predicted NO_2 impacts from the multi-source analysis in order to estimate the total predicted 1-hour NO_2 concentrations. Background ambient NO_2 concentrations from the monitoring station in Palm Beach County (Belvedere Rd site, Monitor No. 099-1004), during the 2001-2005 period used in the air quality analysis were obtained from FDEP.

Missing hours of ambient NO_2 concentration will be filled using a method similar to the methodology described in Attachment A for ozone data. The methodology is based on the following procedures.

1. If three or fewer consecutive hours of ambient NO_2 concentrations are missing, linear interpolation will be used to fill in the missing concentrations based on the previous and subsequent hour concentrations from the same day as follows:

   a. If only one value (A_n) is missing, then A_n = arithmetic mean of A_{n-1} and A_{n+1}, where A_{n-1} is the previous concentration and A_{n+1} is the subsequent concentration.

   b. If A_n and A_{n+1} (two values) are missing, then $A_n = A_{n-1} * 0.67+A_{n+2}*0.33$ and $A_{n+1}= A_{n-1} * 0.33+A_{n+2} * 0.67$.

   c. If A_{n-1}, A_n and A_{n+1} (three values) are missing, then $A_{n-1} = A_{n-2} * 0.75 + A_{n+2}*0.25$, $A_n = A_{n-2} * 0.5 + A_{n+2} * 0.5$, $A_{n+1} = A_{n-2} * 0.25 + A_{n+2} * 0.75$.

2. If four or more consecutive hours of ambient NO_2 concentrations are missing, then other substitution methods will be applied to fill in the missing values:

   a. If four to ten missing values are present in a row, subjective substitution methods were used while accounting for both the hours prior to and after the period of missing data.

   b. If ten or more values in a continuous period are missing, the filled concentrations are derived from either the specific hours of the day missing using the seasonal diurnal average (or maximum) of monitored

NO_2 values from the same year for which the data is missing. The concentration values from both the period prior to and after the missing data will be reviewed to determine if seasonal or maximum diurnal values are appropriate for the filling process. The only exception to this method occurred for the autumn season from 2004 where no monitoring concentrations were reported. NO_2 values from a bordering year would be used. In this case, monitoring concentrations from the previous autumn (2003) was used for data replacement since the following year (2005) had more periods of missing data.

Overall, NO_2 concentrations appear to be trending downward from 2001 to 2009, probably due to increased NO_X control regulations in the area; therefore, use of the earlier NO_2 background data (i.e., 2001 through 2005) should be considered to provide conservative impacts when added to the modeled concentrations from the proposed facility and the inventory sources.

Similar data-filling procedures will be applied for the hourly SO_2 data if needed.