JACKSONVILLE LIME FACILITY

PREVENTION OF SIGNIFICANT DETERIORATION/AIR CONSTRUCTION PERMIT APPLICATION

(VOLUME 2, Sections 6.0 through 10.0)

Prepared for:

Jacksonville Lime, LLC

A Carmeuse Lime & Stone and Keystone Properties JV

Jacksonville, Florida

Prepared by:

Environmental Consulting & Technology, Inc.

3701 Northwest 98th Street
Gainesville, Florida 32606

ECT No. 120604-0200

October 2013

ECT
Environmental Consulting & Technology, Inc.

RECEIVED
OCT 25 2013
DIVISION OF AIR
RESOURCE MANAGEMENT

October 24, 2013
ECT No. 120604-0200

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

Re: Jacksonville Lime, LLC–Duvall County, Jacksonville, Florida
Prevention of Significant Deterioration (PSD) of Air Quality Permit Application

Dear Ms. Pell:

In accordance with Florida Department of Environmental Protection (FDEP) regulations regarding preconstruction review of stationary sources, enclosed please find four copies of Volume 2 of the PSD of Air Quality Permit Application for the proposed Jacksonville Lime facility to be located in Jacksonville, Florida. Volume 1 (previously submitted on August 28, 2013) included the project description, regulatory assessment, and best available control technology analysis required under PSD rules. Volume 2 includes the various air quality modeling demonstrations and analysis of other impacts.

Thank you in advance for FDEP's reviews of this state-of-the-art lime manufacturing facility.

Should you or your staff have any questions regarding this permit application or the Jacksonville Lime facility, please feel free to contact Mr. Bill Harris of Environmental Consulting & Technology, Inc. (ECT), at 404/626-2990 or wharrisco@aol.com, or Ms. Jackie Padgett of Carmeuse at 205/664-7129 or Jackie.Padgett@carmeusena.com. You may also contact me at 352/248-3396 or at jshrock@ectinc.com.

Sincerely,

ENVIRONMENTAL CONSULTING AND TECHNOLOGY, INC.

John E. Shrock

John E. Shrock
Senior Scientist

JES/dlm

Enclosures:

cc: J. Padgett, Carmeuse
W. Harris, ECT
T.W. Davis, ECT
M.P. Trammell, ECT
J.L. Parker, ECT

Y:\GDP-13\PRJ\JES1024.DOCX.1

3701 Northwest
98th Street
Gainesville, FL
32606

(352)
332-0444

FAX (352)
332-6722

VOLUME 1

TABLE OF CONTENTS

(Submitted previously on August 28, 2013)

RECEIVED
OCT 25 2013
DIVISION OF AIR
RESOURCE MANAGEMENT

VOLUME 1

TABLE OF CONTENTS

(Continued, Page 2 of 4)

(Submitted previously on August 28, 2013)

Section | Page

VOLUME 1

TABLE OF CONTENTS
(Continued, Page 3 of 4)
(Submitted previously on August 28, 2013)

VOLUME 1

TABLE OF CONTENTS
(Continued, Page 4 of 4)
(Submitted previously on August 28, 2013)

VOLUME 2
TABLE OF CONTENTS

VOLUME 2

TABLE OF CONTENTS
(Continued, Page 2 of 2)

LIST OF TABLES

LIST OF TABLES
(Continued, Page 2 of 3)

LIST OF TABLES
(Continued, Page 3 of 3)

LIST OF FIGURES

LIST OF ACRONYMS AND ABBREVIATIONS

°	degree
$\mu g/m^3$	microgram per cubic meter
AAQS	ambient air quality standard
AERMAP	AERMOD modeling system terrain preprocessing program
AERMET	AERMOD modeling system meteorological preprocessing program
AERMIC	American Meteorological Society/U.S. Environmental Protection Agency Regulatory Model Improvement Committee
AERMOD	American Meteorological Society/U.S. Environmental Protection Agency Regulatory Model Improvement Committee model
AQRV	air quality-related value
BPIP	Building Profile Input Program
BPIPPRM	Building Profile Input Program for plume rise model enhancements
CAA	Clean Air Act
CaO	calcium oxide
Carmeuse	Carmeuse Lime & Stone
CFR	Code of Federal Regulations
CO	carbon monoxide
ECT	Environmental Consulting & Technology, Inc.
EPA	U.S. Environmental Protection Agency
F.A.C.	Florida Administrative Code
F.R.	Federal Register
FDEP	Florida Department of Environmental Protection
FLAG	Federal Land Managers' Air Quality-Related Values Workgroup
FLM	Federal Land Manager
ft-agl	foot above ground level
ft-msl	foot above mean sea level
GAQM	Guideline for Air Quality Models
GeoTIFF	georeferenced tagged image file format
GEP	good engineering practice
GHG	greenhouse gas
H_2SO_4	sulfuric acid
H8H	highest eighth-highest
IWAQM	Interagency Workgroup on Air Quality Modeling
Jacksonville Lime	Jacksonville Lime, LLC
JAX	Jacksonville International Airport
Keystone	Keystone Properties, LLC
km	kilometer
lb/hr	pound per hour
MMBtu/hr	million British thermal units per hour

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued, Page 2 of 2)

NAAQS	national ambient air quality standard
NED	National Elevation Dataset
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NPS	National Park Service
NSR	new source review
NWA	National Wilderness Area
NWS	National Weather Service
PFR	parallel flow regenerative
PM	particulate matter
PM_{10}	particulate matter less than or equal to 10 microns in aerodynamic diameter
$PM_{2.5}$	particulate matter less than or equal to 2.5 microns in aerodynamic diameter
ppb	part per billion
ppb	part per billion
ppm	part per million
ppmv	part per million by volume
PRIME	plume rise model enhancements
PSD	Prevention of Significant Deterioration
SER	significant emissions rate
SIL	significant impact level
SMC	significant monitoring concentration
SO_2	sulfur dioxide
SO_x	sulfur oxides
tpy	ton per year
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Survey
VISTAS	Visibility Improvement–State and Tribal Association of the Southeast
VOC	volatile organic compound
WBAN	Weather-Bureau-Army-Navy

NOTE TO READER

This report supplements Volume 1 of the Jacksonville Lime Facility Prevention of Significant Deterioration (PSD)/Air Construction Permit Application, which was submitted to the Florida Department of Environmental Protection (FDEP) on August 28, 2013. Volume 1 included the description of the proposed facility, air pollutant emissions estimations, control technology assessment, regulatory assessment, and FDEP air permit application forms. This Volume 2 submittal completes the PSD/air construction permit application and contains the air quality evaluations for Class I and II areas required by the PSD and FDEP rules. Although the section numbering is a continuation from Volume 1, some information has been repeated to make it easier for the reader to follow if he/she does not have access to Volume 1.

6.0 MODELING AND MONITORING REQUIREMENTS

Carmeuse Lime & Stone (Carmeuse) and Keystone Properties, LLC (Keystone), are entering into a joint venture agreement to construct and operate a lime manufacturing operation in Jacksonville, Florida. The joint venture is hereinafter referred to as Jacksonville Lime, LLC (Jacksonville Lime). The facility will include two parallel flow regenerative (PFR) vertical lime kilns and associated raw material, product, and fuel handling systems. With the application of heat the kilns will calcine limestone (primarily, calcium carbonate, but also may contain magnesium carbonate) into lime (calcium oxide [CaO]). Figure 6-1 shows the general location of the subject property and surrounding areas. Figure 6-2 provides the layout of the Keystone property and the proposed Jacksonville Lime facility showing the lime kilns and related materials handling equipment. Figure 6-3 provides a more detailed site layout of the Jacksonville Lime facility.

6.1 MODELING REQUIREMENTS

Areas of the country in violation of national ambient air quality standards (NAAQS) are designated as being in nonattainment, and new sources to be located in or near these areas may be subject to more stringent air permitting requirements. The proposed Jacksonville Lime project will be located in Duval County, which is designated as in attainment, or unclassifiable, of the NAAQS. Table 6-1 contains the NAAQS and Florida air quality standards.

The project will have potential emissions of one or more PSD-regulated pollutants in excess of the prevention of significant deterioration (PSD) significant emissions rates (SERs). Project potential annual emissions of volatile organic compounds (VOC), used as a surrogate for ozone, are projected to be below the SER of 40 tons per year (tpy). The project will have potential emissions of nitrogen oxides (NO_x) and sulfur oxides (SO_x) greater than the 40-tpy SER and carbon monoxide (CO) emissions greater than the 100-tpy SER. Particulate matter less than or equal to 10 microns in aerodynamic diameter (PM_{10}) and particulate matter less than or equal to 2.5 microns in aerodynamic diameter ($PM_{2.5}$) will exceed the SERs of 15 and 10 tpy, respectively. Since the project will have potential emissions of one or more PSD-regulated pollutants in excess of the PSD SERs,

FIGURE 6-1.
LOCATION MAP (2011AERIAL)

Sources: ESRI, 2011; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

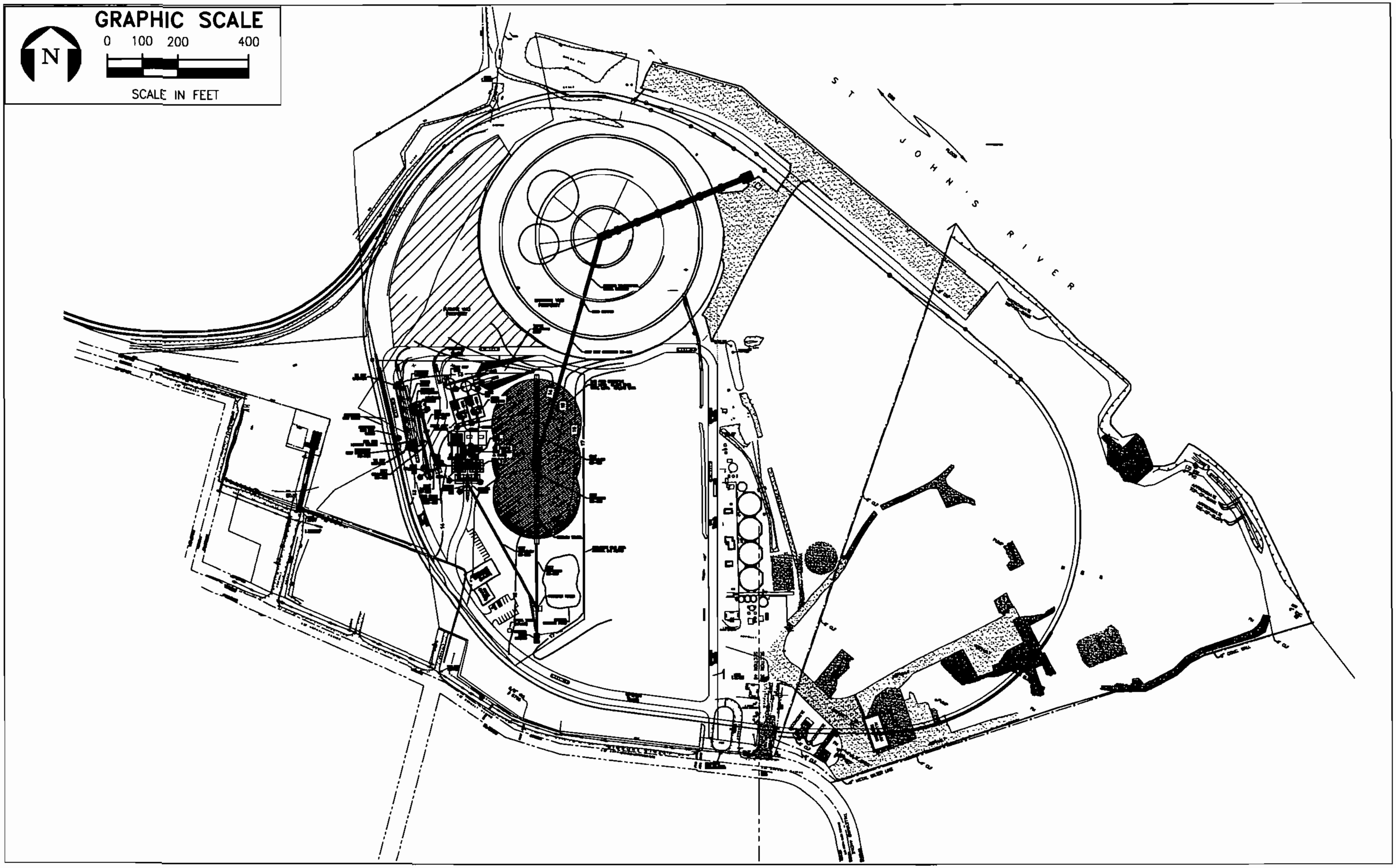


FIGURE 6-2.
OVERALL SITE LAYOUT

Sources: LB&W Engineering, Inc., 2013; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

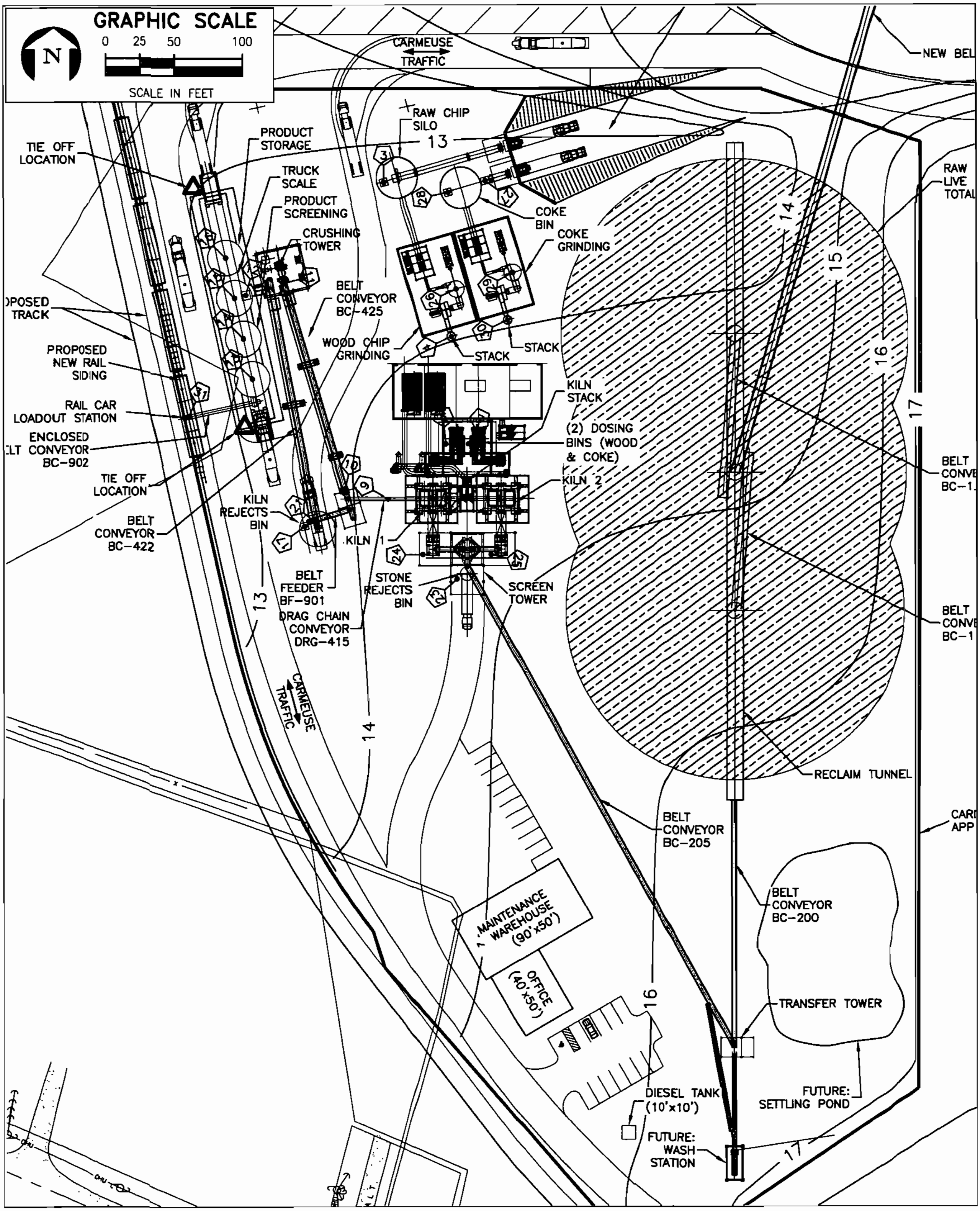


FIGURE 6-3.

DETAILED SITE LAYOUT

Sources: LB&W Engineering, Inc., 2013; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

Table 6-1. National and Florida AAQS

Pollutant (units)	Averaging Periods	National and Florida Standards	
		Primary	Secondary
SO_2 (ppb)	1-hour*	75	
	3-hour†		500
PM_{10} ($\mu g/m^3$)	24-hour§	150	150
$PM_{2.5}$ ($\mu g/m^3$)	24-hour**	35	35
	Annual††	12	15
CO (ppm)	1-hour†	35	
	8-hour†	9	
Ozone (ppmv)	8-hour§§	0.075	0.075
NO_2 (ppb)	1-hour**	100	
	Annual☼	53	53
Lead ($\mu g/m^3$)	Rolling 3-month average	0.15	0.15

Note: $\mu g/m^3$ = microgram per cubic meter.
ppb = part per billion.
ppm = part per million
ppmv = part per million by volume.

*99th percentile of 1-hour daily maximum concentrations, averaged over 3 years.
†Not to be exceeded more than once per year.
§Not to be exceeded more than once per year on average over 3 years.
**98th percentile, averaged over 3 years.
††Annual arithmetic mean, averaged over 3 years.
§§Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years.
☼Annual arithmetic mean.

Sources: 40 CFR 50.
ECT, 2013.

the project will qualify as a major source and will be subject to the PSD preconstruction requirements of Chapter 40, Part 52.21, Code of Federal Regulations (CFR), for those pollutants that are emitted at or above the specified PSD SER levels. Among the PSD preconstruction review requirements is the need to conduct an ambient impact analysis, including an air dispersion modeling study.

Detailed emissions estimates and supporting calculations have been included in Volume 1 of the Jacksonville Lime facility PSD air construction permit application (Environmental Consulting & Technology, Inc. [ECT], 2013a). There are no ambient air quality standards (AAQS) or PSD increments for greenhouse gases (GHGs). Accordingly, with respect to PSD new source review (NSR) (which includes NAAQS assessments), the project air quality analysis will only evaluate impacts for nitrogen dioxide (NO_2), sulfur dioxide (SO_2), CO, PM_{10}, and $PM_{2.5}$.

6.2 MONITORING REQUIREMENTS

PSD review may require continuous ambient air monitoring data to be collected in the area of the proposed source for pollutants emitted in significant amounts. Because several PSD pollutants will be emitted from the project in excess of their respective SERs, preconstruction monitoring may be required. However, 40 CFR 52.21(i)(5)(i) provides for an exemption from the preconstruction monitoring requirement for sources with *de minimis* air quality impacts. To assess the appropriateness of monitoring exemptions, dispersion modeling analyses were performed to determine the maximum pollutant concentrations caused by emissions from the project. In cases where the predicted ambient impacts exceed the *de minimis* levels, regulatory agencies have the authority to allow data from existing monitoring stations to substitute for preconstruction monitoring. The U.S. Environmental Protection Agency (EPA) has established several *de minimis* levels, also referred to as significant monitoring concentrations (SMCs). Although a recent court case has resulted in the remand of the $PM_{2.5}$ SMCs, EPA expects that data from existing monitoring stations should be adequate to support PSD permitting in most instances.

Section 8.0 presents in detail the results of the ambient impact analyses. The following sections summarize the dispersion modeling results as applied to the preconstruction ambient air quality monitoring exemptions.

6.2.1 PM_{10}/$PM_{2.5}$

The maximum 24-hour PM_{10} impact from the project was predicted to be 13.8 micrograms per cubic meter ($\mu g/m^3$). Although this concentration is above the 24-hour average PM_{10} SMC of 10 $\mu g/m^3$, there is adequate PM_{10} monitoring data available from the Kooker Park monitor located within 1 mile of the Jacksonville Lime project.

The maximum 24-hour $PM_{2.5}$ impact was predicted to be 2.2 $\mu g/m^3$, is well below the previously established 24-hour average $PM_{2.5}$ SMC of 4 $\mu g/m^3$, and provides justification for use of existing FDEP monitoring to satisfy the preconstruction monitoring requirement. Although secondary $PM_{2.5}$ emissions were not included in the modeling, the impacts would not be expected to be more than those from the direct $PM_{2.5}$ emissions. Secondary $PM_{2.5}$ occurs as a result of chemical transformations with NO_x and SO_2. Although NO_x and SO_x emissions are above the SERs, only a portion of those pollutants would be involved in chemical transformation to create secondary $PM_{2.5}$. Also, the transformation occurs gradually over time, and, as the plume becomes more diffused, the impacts from secondarily formed particulates should be less than impacts from the direct emissions of $PM_{2.5}$. Since the transformations occur slowly over hours or even days, they are unlikely to overlap with nearby maximum $PM_{2.5}$ impacts. This opinion was expressed in EPA's Region 10 Statement of Basis for the Sierra Pacific Industries – Anderson PSD Permit (EPA, 2012).

6.2.2 NO_2

The maximum annual NO_2 impact was predicted to be 1.1 $\mu g/m^3$. This concentration is well below the annual average NO_2 SMC of 14 $\mu g/m^3$. Therefore, the project qualifies for a preconstruction monitoring exemption for NO_2 in accordance with the PSD regulations. Since background air quality levels will be required for modeling of the NO_2 1-hour averaging time to show compliance with NAAQS, development of NO_2 background levels is further discussed in the following Section 7.0 and in the Tier 3 modeling protocol document contained in Appendix G of this report.

6.2.3 SO_2

The maximum 24-hour SO_2 impact was predicted to be 11.1 μg/m^3. This concentration is below the 24-hour average SO_2 SMC of 13 μg/m^3. Therefore, the project qualifies for a preconstruction monitoring exemption for SO_2 in accordance with PSD regulations.

6.2.4 CO

The maximum 8-hour CO impact was predicted to be 44 μg/m^3. This concentration is well below the 8-hour average CO SMC of 575 μg/m^3. Therefore, the project qualifies for a preconstruction monitoring exemption for CO in accordance with PSD regulations.

6.3 EXISTING AMBIENT AIR QUALITY MONITORING DATA

There are several ambient air quality monitoring stations in the vicinity of the Jacksonville Lime site that can be considered representative of air quality for the purpose of the PSD monitoring and modeling requirements. Following is a discussion of the monitors and air quality measurements pertaining to each of the pollutants being evaluated. The monitored values are based on the most recent available quality-assured data. Several of the pollutants, including NO_2, SO_2, and $PM_{2.5}$, are based on the 3-year average (i.e., 2010 through 2012). Figure 6-4 shows the location of the existing monitors in relation to the Jacksonville Lime site.

6.3.1 PM_{10}/$PM_{2.5}$ MONITORING DATA

As can be seen in Figure 6-4, $PM_{2.5}$ and PM_{10} data is available from the nearby Kooker Park monitor. As shown in Table 6-2, the annual and 24-hour $PM_{2.5}$ monitored values are fairly uniform across the region. The 3-year average $PM_{2.5}$ 24-hour concentrations measured at the three monitoring sites only varied by 3.7 μg/m^3. This indicates that $PM_{2.5}$ concentrations at these locations may not be overly affected by local sources. A 24-hour $PM_{2.5}$ background value of 20.6 μg/m^3 from the Kooker Park monitor is considered to be representative of the Jacksonville Lime site.

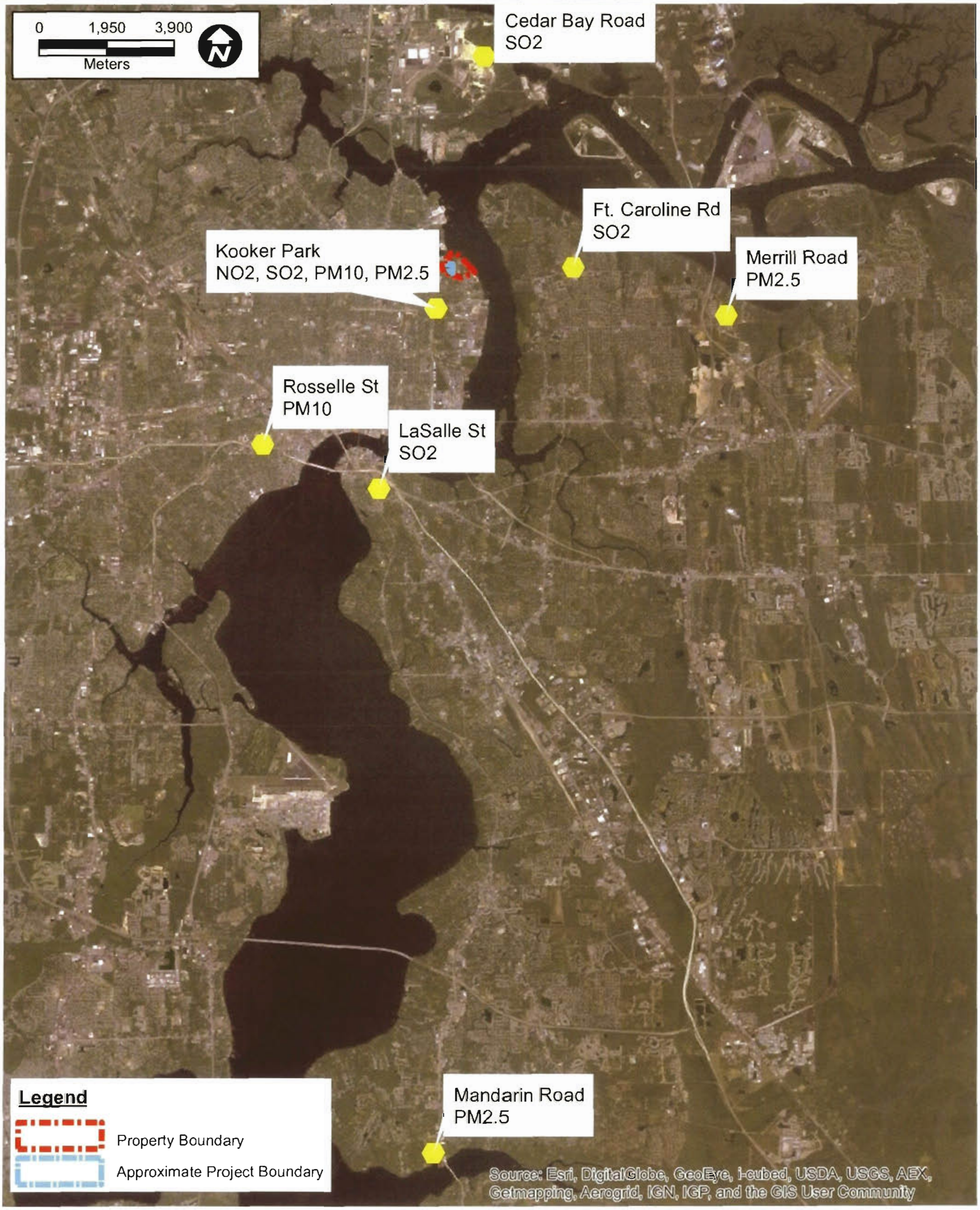


FIGURE 6-4.
LOCATION OF AIR QUALITY MONITORS

Sources: ESRI, 2011; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

Table 6-2. Monitored $PM_{2.5}$ Air Quality—Kooker Park, Duval County

Address	Site ID	Surrounding Land Use	Distance from Jacksonville Lime (km)	Direction from Jacksonville Lime (°)	24-Hour Average 98th Percentile Concentration $PM_{2.5}$ ($\mu g/m^3$)			3-Year Average ($\mu g/m^3$)	
					2010	2011	2012	24-Hour	Annual
2900 Bennett Street	120310032	Suburban	1.2	206	20	20	22	20.6	8.6
14932 Mandarin Road	120310098	Rural	25.5	181	17	29	16	20.7	8.1
9429 Merrill Road	120310099	Suburban	8.5	100	18	21	18	19.0	8.0
9429 Merrill Road	120310099	Suburban	8.5	100	19	37	12	22.7	8.4

Source: ECT, 2013.

The 3-year annual $PM_{2.5}$ averages at the three monitors were within 0.6 $\mu g/m^3$ of each other. The 3-year annual average value of 8.6 $\mu g/m^3$ measured at the Kooker Park monitor was the highest and is considered as representative of the air quality at the Jacksonville Lime site.

The PM_{10} 24-hour concentrations were fairly uniform between the Kooker Park and Rosselle Street monitor locations. Because of the proximity to the Jacksonville Lime site, the Kooker Park monitor is considered to be the most representative. Table 6-3 presents the PM_{10} monitor values. The measured second highs are all well below the NAAQS of 150 $\mu g/m^3$.

6.3.2 NO_2 MONITORING DATA

The Kooker Park monitor (see Figure 6-4) is the only NO_2 monitoring site in Duval County. Table 6-4 provides the NO_2 monitor values. For the 1-hour NO_2 NAAQS cumulative modeling, data from the Kooker Park monitoring station (AQS Site ID No. 120310032) is considered the most representative of the Jacksonville Lime site and will be used as the background NO_2 site. Specifically, 1-hour NO_2 background concentrations for each hour of the day were developed for use in the NO_2 modeling. The annual NO_2 background of 17 $\mu g/m^3$ was based on the highest of 3 prior years, i.e., 2008 through 2010.

6.3.3 SO_2 MONITORING DATA

As shown in Figure 6-4, several SO_2 monitor locations exist in the vicinity of the Jacksonville Lime site. Table 6-5 provides the SO_2 monitor values. The 1-hour background value of 42.7 $\mu g/m^3$ based on the 3-year average of the 99^{th} percentile concentrations from the Kooker Park monitor were incorporated into the modeling.

6.3.4 CO MONITORING DATA

Figure 6-4 illustrates the CO monitor locations. Over the past years (2009 through 2010), the CO levels have been low. The highest second-highest value over the 3-year period was 1.0 and 0.5 part per million (ppm) for the 1- and 8-hour averaging times, respectively (see Tables 6-6 and 6-7). The measured CO is approximately 3 and 6 percent of the 1- and 8-hour NAAQS, respectively.

Table 6-3. Monitored PM_{10} Air Quality—Kooker Park, Duval County

Address	Site ID	Surrounding Land Use	Distance from Jacksonville Lime (km)	Direction from Jacksonville Lime (°)	24-hour Average 2nd High Concentration PM_{10} (μg/m³)		
					2010	2011	2012
2900 Bennett Street	120310032	Suburban	1.2	206	48	101	55
2189 Rosselle Street	120310084	Suburban	7.5	227	62	91	52

Source: ECT, 2013.

Table 6-4. Monitored NO_2 Air Quality—Kooker Park, Duval County

Address	Site ID	Surrounding Land Use	Distance from Jacksonville Lime (km)	Direction from Jacksonville Lime (°)	1-hour Average 98th Percentile Concentration NO_2 (ppb)			3-Year Average	
					2010	2011	2012	ppb	µg/m³
2900 Bennett Street	120310032	Suburban	1.2	206	44	39	37	40.0	75.2

Note: NO_2 concentration in ppb was converted to µg/m³ by multiplying by 1.881.

Source: ECT, 2013.

Table 6-5. Monitored SO_2 Air Quality—Kooker Park, Duval County

Address	Site ID	Surrounding Land Use	Distance from Jacksonville Lime (km)	Direction from Jacksonville Lime (°)	1-hour Average 99th Percentile Concentration SO_2 (ppb)			3-Year Average	
					2010	2011	2012	ppb	µg/m³
2900 Bennett Street	120310032	Suburban	1.2	206	16	20	13	16.3	42.7
LaSalle Street	120310080	Suburban	6.9	203	17	12	9	12.7	33.2
1840 Cedar Bay	120310081	Rural	6.4	10	22	39	26	29.0	75.9
6241 Fort Caroline Road	120310097	Suburban	3.4	90	17	22	16	27.3	71.6

Note: SO_2 concentration in ppb was converted to $\mu g/m^3$ by multiplying by 2.618.

Source: ECT, 2013.

Table 6-6. Monitored 1-Hour CO Air Quality Data—Kooker Park, Duval County

Address	Site ID	Surrounding Land Use	Distance from Jacksonville Lime (km)	Direction from Jacksonville Lime (°)	1st High 1-Hour Concentration (ppm)		
					2010	2011	2012
LaSalle Street	120310080	Suburban	6.9	203	2.5	5.9	3.3
1200 S McDuff Avenue	120310083	Suburban	9.7	227	1.9	5.8	3.8
2189 Rosselle Street	120310084	Suburban	7.5	227	1.3	5.0	3.3
1216 Day Avenue	120310107	Suburban	9.7	228	-	-	1.8

Note: km = kilometer.
° = degree.
CO concentration in ppm is converted to µg/m^3 by multiplying by 1,150.

Source: ECT, 2013.

Table 6-7. Monitored 8-Hour CO Air Quality Data—Kooker Park, Duval County

Address	Site ID	Surrounding Land Use	Distance from Jacksonville Lime (km)	Direction from Jacksonville Lime (°)	1st High 8-Hour Concentration (ppm) 2010	2011	2012
LaSalle Street	120310080	Suburban	6.9	203	2.1	3.9	1.8
1200 S McDuff Avenue	120310083	Suburban	9.7	227	1.7	3.5	1.8
2189 Rosselle Street	120310084	Suburban	7.5	227	1.0	1.6	1.9
1216 Day Avenue	120310107	Suburban	9.7	228	—	—	1.1

Note: km = kilometer.
° = degree.
CO concentration in ppm is converted to $\mu g/m^3$ by multiplying by 1,150.

Source: ECT, 2013.

7.0 MODELING METHODOLOGY

The proposed Jacksonville Lime facility will be located in an area designated as attainment or unclassifiable for criteria pollutants. The approach for assessing air quality impacts of proposed projects generally begins by determining the impacts of only the proposed project. If the impacts are below the PSD Class II significant impact levels (SILs), then no further analysis is required since it is presumed that the project cannot contribute significantly to any NAAQS violation or exceedance of any PSD increment. If the impacts of the proposed modification are found to exceed a SIL, then further analysis considering other existing sources and background air quality levels for that pollutant and averaging time are performed. One notable exception is for $PM_{2.5}$, whose SILs were remanded in a recent court case. In this case, states still have the option to use the SILs, and Florida is still relying on the $PM_{2.5}$ SILs.

The approach used to analyze the potential impacts from the facility, as described in detail in the following subsections, was developed in accordance with accepted practice. Guidance contained in EPA manuals, policy memos, and user's guides was sought and followed. In addition, revised air dispersion modeling protocols were submitted to FDEP in August 2012 and October 2013, based on previous comments from the FDEP and EPA (see Appendix G). The following subsections describe further details on the air quality analyses and the modeling approach.

7.1 POLLUTANTS EVALUATED

Table 7-1 presents the maximum potential annual emissions rates for the proposed Jacksonville Lime project. As shown in that table, potential emissions of CO, PM_{10}, $PM_{2.5}$, NO_x, and GHG are each projected to exceed the applicable PSD SER threshold. Potential emissions from the facility are below the applicable PSD SER levels for all other PSD regulated pollutants. Accordingly, the PSD NSR air quality impact analysis requirements apply to those pollutants exceeding the SERs. Although projected facility GHG emissions will exceed the PSD applicability threshold, an air quality impact analysis is not required, as EPA has not established an NAAQS for that pollutant.

Table 7-1. Jacksonville Lime Emissions Compared to PSD SERs

Pollutant	Projected Maximum Annual Emissions (tpy)	PSD SER (tpy)	PSD Applicability
NO_x	343	40	Yes
CO	412	100	Yes
PM	81	25	Yes
PM_{10}	81	15	Yes
$PM_{2.5}$ (direct)	10	10	Yes
SO_2	157	40	Yes
Ozone (VOC)	19	40	No
Lead	0.06	0.6	No
Mercury	0.004	0.1	No
Total fluorides	2.7	3	No
Sulfuric acid mist	1.6	7	No
GHG (as CO_2e)	357,014	75,000	Yes
Total reduced sulfur (including hydrogen sulfide)	Not present	10	No
Reduced sulfur compounds (including hydrogen sulfide)	Not present	10	No
Municipal waste combustor acid gases (measured as SO_2 and hydrogen chloride)	Not present	40	No
Municipal waste combustor metals (measured as PM)	Not present	15	No
Municipal waste combustor organics (measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans)	Not present	3.5×10^{-6}	No
For the pollutants listed in this table and for major stationary sources located within 10 km of a Class I area having an impact equal to or greater than 1 $\mu g/m^3$, 24-hour average	N/A	Any amount	No

Sources: Rule 62-210.200(282), Florida Administrative Code (F.A.C.).
Jacksonville Lime, 2013.
ECT, 2013.

7.2 MODEL SELECTION

A refined level of modeling consisting of techniques that provide advanced technical treatment of atmospheric processes were used in the air quality assessment. Refined modeling requires more detailed and precise input data than screening level modeling, but also provides improved estimates of source impacts. For the Class II air quality impact analysis, the current version of the American Meteorological Society/U.S. Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) model (AERMOD) modeling system, together with a set of 5 years of hour-by-hour National Weather Service (NWS) meteorological data, was used to obtain refined impact predictions for short-term periods (i.e., periods equal to or less than 24 hours), as well as annual average concentrations.

Recommended procedures for conducting air quality impact assessments are contained in EPA's Guideline for Air Quality Models (GAQM) (EPA, 2009). The GAQM is codified in Appendix W of 40 CFR 51. In the November 9, 2005, Federal Register (F.R.), EPA approved the use of AERMOD as a GAQM Appendix A-preferred model effective December 9, 2005. AERMOD is recommended for use in a wide range of regulatory applications, including both simple and complex terrain. The AERMOD modeling system consists of meteorological and terrain preprocessing programs (AERMET and AERMAP, respectively) and the AERMOD dispersion model. The current EPA-approved versions of AERMOD (Version 12345 dated December 10, 2012) and AERMAP (Version 11103 dated April 13, 2011) were used to assess project air quality impacts at receptors located within 50 kilometers (km) of the project site.

7.3 MODEL OPTIONS

Procedures applicable to the AERMOD modeling system specified in the latest version of the AERMOD User's Guide (September 2004), AERMOD Implementation Guide (revised March 19, 2009), February 2012 Addendum to the User's Guide, and the current GAQM were followed. In particular, the AERMOD control pathway MODELOPT keyword parameters DFAULT and CONC were selected. Selection of the parameter DFAULT, which specifies use of the regulatory default options, is recommended by the GAQM. The CONC option specifies the calculation of concentrations. The project will be located in an area of Duval County that is considered rural for purposes of Air dispersion modeling (i.e., over half of the surrounding land use is composed of water and low density residential). Therefore, AERMOD options regarding urban area increased surface heating (URBAN-OPT keyword), pollutant exponential decay (HALFLIFE and DCAYCOEF keywords), and flagpole receptors (FLAGPOLE keyword) were not employed. As previously mentioned, the AERMOD modeling system was used to determine annual average impacts, in addition to short-term averages, by using the PERIOD parameter for the AVERTIME keyword.

7.4 NO_2 AMBIENT IMPACT ANALYSIS

On January 22, 2010, EPA promulgated a new hourly NO_2 standard of 100 parts per billion (ppb) (188 $\mu g/m^3$) based on the 3-year average of the 98^{th} percentile (i.e., highest, eighth-highest [H8H]) of the annual distribution of daily maximum 1-hour concentrations. The final rule for the new hourly NAAQS was published in the Federal Register on February 9, 2010, and the standard became effective on April 12, 2010.

Emissions of NO_x from combustion sources consist of nitric oxide (NO) and NO_2. At stack exit conditions, the primary species is NO, which typically comprises 90 percent or more of total NO_x.

AERMOD includes three options for estimating NO_2 impacts:

- Tier 1—Assumes complete (i.e., 100-percent) conversion of NO to NO_2.
- Tier 2—Ambient ratio method, representing the average ambient NO_2/NO_x ratio. Current EPA guidance recommends using a ratio of 0.80.
- Tier 3—Consists of the ozone-limiting and plume molar volume ratio method.

The Tier 1 option is an AERMOD regulatory default option that may be used without additional regulatory agency approval. The Tier 2 option has been historically accepted for regulatory modeling applications using an average ambient NO_2/NO_x ratio of 0.75. In accordance with EPA's March 1, 2011, guidance, Tier 2 will be accepted for regulatory modeling applications if the EPA recommended average ambient $NO_2:NO_x$ ratio of 0.80

is used. The two Tier 3 options are nonregulatory options within AERMOD and, therefore, require justification and regulatory agency approval.

The 1-hour NO_2 modeling analysis was conducted in accordance with current EPA modeling guidance, including the March 1, 2011, memorandum entitled Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS. Specifically, the following guidance and options were incorporated into the modeling:

- The NO_2 annual concentrations were determined using the Tier 2 ambient ratio method and an NO_2:NO_x ratio of 0.75.
- The NO_2 1-hour concentrations were determined using the Tier 3 ozone limiting method.
- The interim 1-hour SIL was compared to the multiyear (i.e., 5-year) average of the highest 1-hour values at all receptors to identify receptors where the new project could have a significant contribution.
- Upper bound ambient air NO_2:NO_x ratio set to default of 0.9.
- In stack NO_2:NO_x ratio set to default of 0.5 for most sources. A ratio of 0.05 was used for the Jacksonville Lime kiln stack based on stack test results from similar kilns. A ratio of 0.1 was used for JEA coal boilers located at the Northside/St. Johns River Power Park, based on continuous emissions monitoring system measurements.
- Hourly ozone data for the model years from the Duval County Sheffield Elementary monitor site (ID 031-0077) was used in the modeling.
- Background NO_2 data was based on hour-of-day averages for the most recent 3 years of data from the Kooker Park site.

7.5 BACKGROUND AIR QUALITY LEVELS

When predicted concentrations exceed the SIL, cumulative modeling including offsite sources must be performed. The resulting impacts must be added to a representative background concentration to account for nonmodeled sources of the pollutant. Cumulative modeling was required to show compliance with the NO_2 1-hour, NO_2 annual, SO_2

1-hour, and $PM_{10}/PM_{2.5}$ annual and 24-hour NAAQS. Also, cumulative modeling, including existing PSD sources, was required to assess the consumption of PSD increments. Conservative background levels were developed from existing monitored data as discussed previously (see Section 6.3).

7.6 TERRAIN CONSIDERATION

The GAQM defines *flat* terrain as terrain equal to the elevation of the stack base, *simple* terrain as terrain lower than the height of the stack top, and *complex* terrain as terrain exceeding the height of the stack being modeled. AERMOD is capable of developing estimates of air quality impacts for all three types of terrain.

The elevation of the project site is approximately 13 feet above mean sea level (ft-msl). The project kiln stacks will have a minimum height of 213 feet above ground level (ft-agl). Other stacks range from 35 to 120 ft-agl. Accordingly, terrain elevations above 48 to 226 ft-msl are classified as complex terrain depending on the stack being modeled. U.S. Geological Survey (USGS) National Elevation Dataset (NED) terrain data in georeferenced tagged image file format (GeoTIFF) were examined for terrain features within the expected project impact area. Based on this examination, most of the terrain in the vicinity of the project site is classified as flat terrain.

In accordance with the GAQM recommendations for AERMOD, each modeled receptor was assigned a terrain elevation based on USGS NED data and use of the AERMOD terrain preprocessor (AERMAP) (Version 11103 dated April 13, 2011) program. AERMAP was used in accordance with the latest version (October) (EPA, 2004b) of the User's Guide for AERMAP, addenda to the User's Guide (EPA, 2006b), and EPA's GAQM.

7.7 BUILDING WAKE EFFECTS

The Clean Air Act (CAA) Amendments of 1990 require the degree of emissions limitation required for control of any pollutant not be affected by a stack height that exceeds good engineering practice (GEP) or any other dispersion technique. On July 8, 1985, EPA promulgated final stack height regulations (40 CFR 51). The stack heights for the project emissions sources will comply with EPA stack height regulations.

While the GEP stack height rules address the maximum stack height that can be employed in a dispersion modeling analysis, stacks having heights lower than GEP stack height can potentially result in higher downwind concentrations due to building downwash effects. AERMOD evaluates the effects of building downwash based on the plume rise model enhancements (PRIME) building downwash algorithms. For the project ambient impact analysis, the complex downwash analysis implemented by AERMOD was performed using the current version of EPA's Building Profile Input Program (BPIP) for PRIME (BPIPPRM) (Version 04274 dated September 30, 2004). The EPA BPIPPRM program was used to determine the area of influence for each building/structure, whether a particular stack is subject to building downwash, the area of influence for directionally dependent building downwash, and to generate the specific building dimension data required by the model. BPIPPRM output consists of an array of 36 direction-specific (10 to 360 degree [°]) building heights (BUILDHGT keyword), lengths (BUILDLEN keyword), widths (BUILDWID keyword), and along-flow (XBADJ keyword) and across-flow (YBADJ keyword) distances for each stack suitable for use as input to AERMOD. Table 7-2 contains the dimensions of the buildings and structures used as input to the BPIPPRM program. Figure 7-1 provides a depiction of the Jacksonville Lime facility's structures and stacks.

7.8 RECEPTOR LOCATIONS

Receptors were placed at locations considered to be ambient air, which is defined as "that portion of the atmosphere, external to buildings, to which the general public has access." The entire perimeter of the project site will be fenced. Therefore, the nearest locations of general public access will be at the project fence line.

Consistent with GAQM and FDEP guidance, the project ambient impact analysis used the following receptor grids:

- Fence Line Receptors—Receptors placed on the project fence line spaced 50 meters apart.

Table 7-2. Building and Structure Dimensions

Structure Number*	Modeling ID	Measurements (meters) Elevation	X Length	Y Length	Diameter	Height
1	BLOWERROOM	4.572				
	Tier 1		32.92	11.83		9.78
	Tier 2		18.58	11.79		13.69
	Tier 3		4.27	7.92		30.63
	Tier 4		4.27	7.92		30.63
2	KILN1	4.572	11.48	10.7		52.34
3	KILN2	4.572	11.48	10.52		52.34
4	FEEDBIN	4.572	6.56	3.14		30.58
5	LIME SILOS	3.9624				
	Tier 1		8.17	50.52		29.57
	Tier 2		5.34	10.67		42.67
6,7,8	PILE1, PILE2, PILE3†	4.572				
	Tier 1				76.2	6.1
	Tier 2				38.1	18.29
	Tier 3				18.9	36.58
9	WOODGRINDING	4.2672	12.88	20.46		12.19
10	COKEGRINDING	4.2672	12.77	20.39		12.19
11	COKEBIN	4.1148			9.18	24.84
12	WOODBIN	3.9624			9	24.38
13	ROLLAWAYCHUTE-FEEDBIN	4.471416	14.33	7.32		39.32
14	CRUSHINGTOWER	3.9624	8.63	9.03		27.43
15	TRANSFERTOWER	5.0292	7.36	4.27		12.5
16	DOSINGSYSTEMS	4.572	10.79	7.27		24.69
17	ENDOFDRG415‡	4.572	5.1	10.67		10.26
18	MAINTENANCE	4.7244	27.43	15.24		6.1
19	OFFICE	4.7244	12.19	15.24		4.47
20	BLD_21	4.2672			8.14	23.47

*Corresponds to numbers on Figure 7-1. †Limestone storage piles. ‡Enclosure at western end of dragline #415.

Source: ECT, 2013.

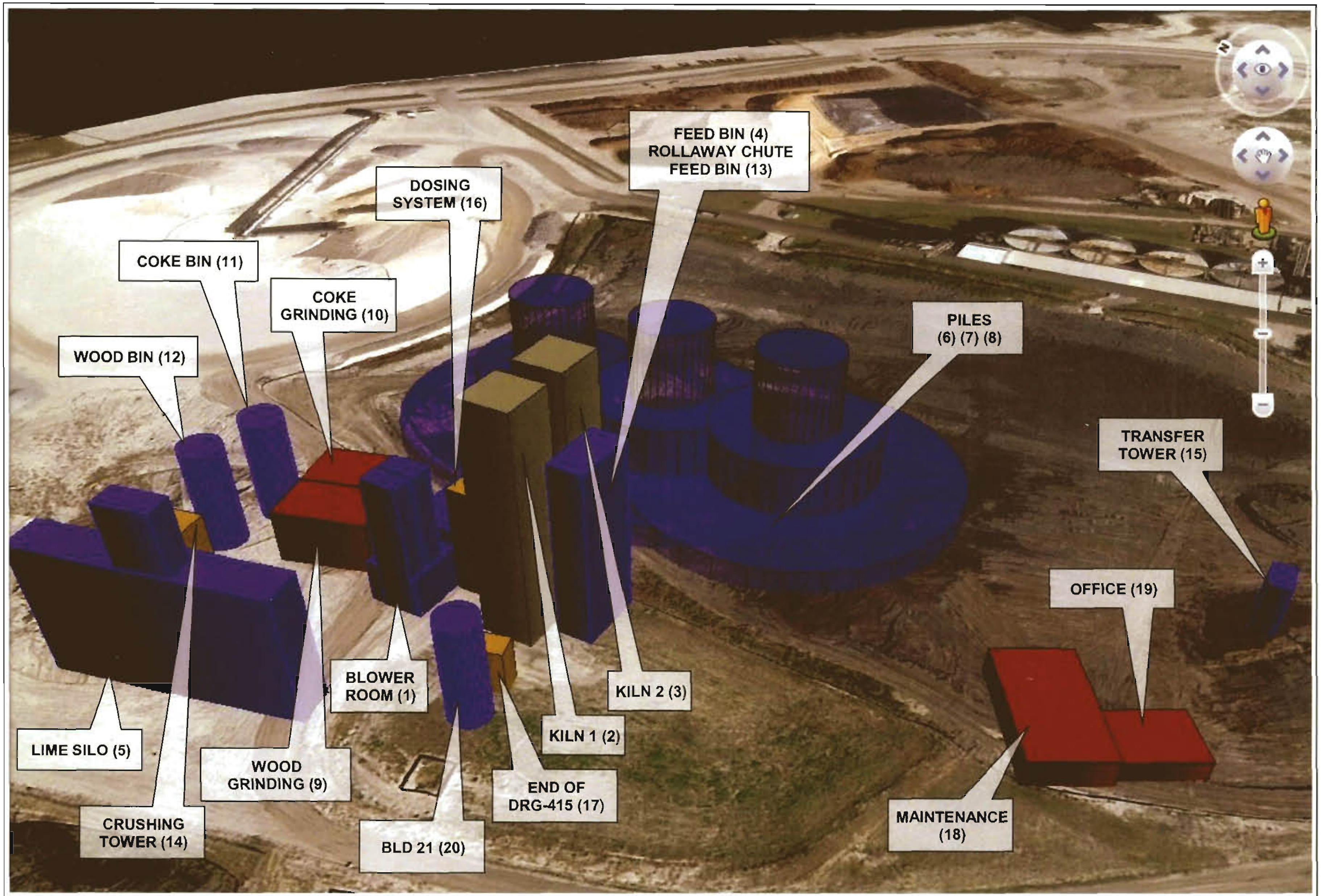


FIGURE 7-1.

THREE-DIMENSIONAL VIEW OF MAJOR BUILDLINGS/STRUCTURES

Source: ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

- Near-Field Cartesian Receptors—Receptors at 100-meter spacings starting 100 meters from the project fence line receptors and extending to approximately 2,000 meters.
- Mid-Field Cartesian Receptors—Receptors at 500-meter spacings starting at 2,500 meters and extending to approximately 5,000 meters.
- Far-Field Cartesian Receptors—Receptors at 1,000-meter spacings starting at 5,000 meters and extending to approximately 15,000 meters, with 2,500-meter spacing beyond that.

The receptor locations were such that the highest ambient impacts for each pollutant and averaging period have been identified using a receptor spacing of no more than 100 meters. Figures 7-2 through 7-4 depict the near, mid-, and far field receptors.

For cumulative modeling analyses, only those receptors that exceeded a PSD Class II SIL for a specific pollutant and averaging period were included. This included any receptor for which a SIL was exceeded for any averaging period and any year of meteorological data.

7.9 METEOROLOGICAL DATA

The AERMET meteorological preprocessing program creates two files used by AERMOD: surface and profile files. The surface file contains boundary layer parameters including friction velocity, Monin-Obukhov length, convective velocity scale, temperature scale, convectively generated boundary layer height, stable boundary layer height, and surface heat flux. The profile file contains multilevel data of windspeed, wind direction, and temperature. AERMET passes all observed meteorological parameters to AERMOD, including wind direction and speed (at multiple heights, if available), temperature, and, if available, measured turbulence. AERMOD uses this information to calculate concentrations in a manner that accounts for a dispersion rate that is a continuous function of meteorology.

The AERMET meteorological processor requires the determination of three surface characteristics: surface roughness length (zo), albedo (r), and Bowen ratio (Bo). Surface

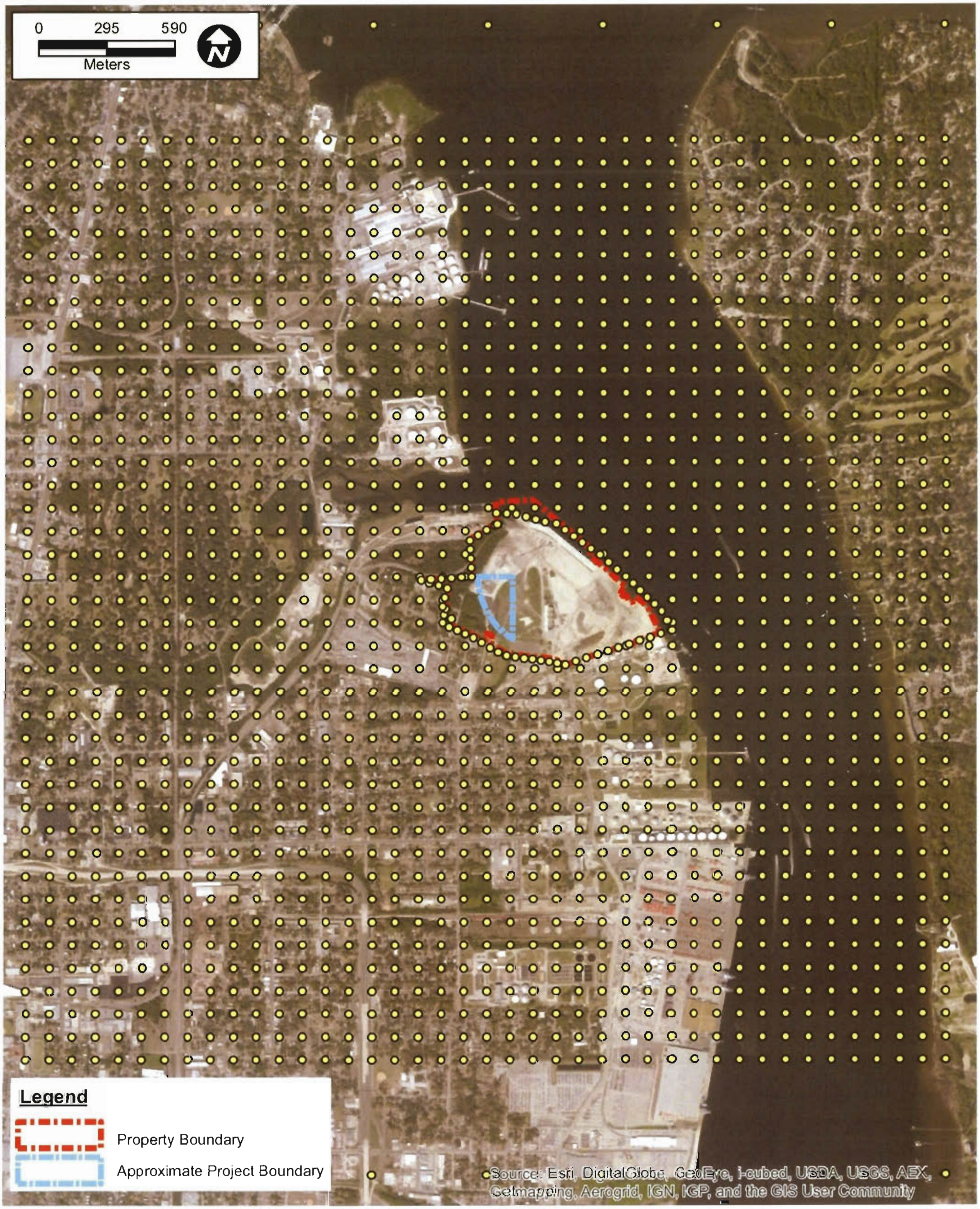


FIGURE 7-2.
NEAR FIELD RECEPTORS

Sources: ESRI, 2011; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

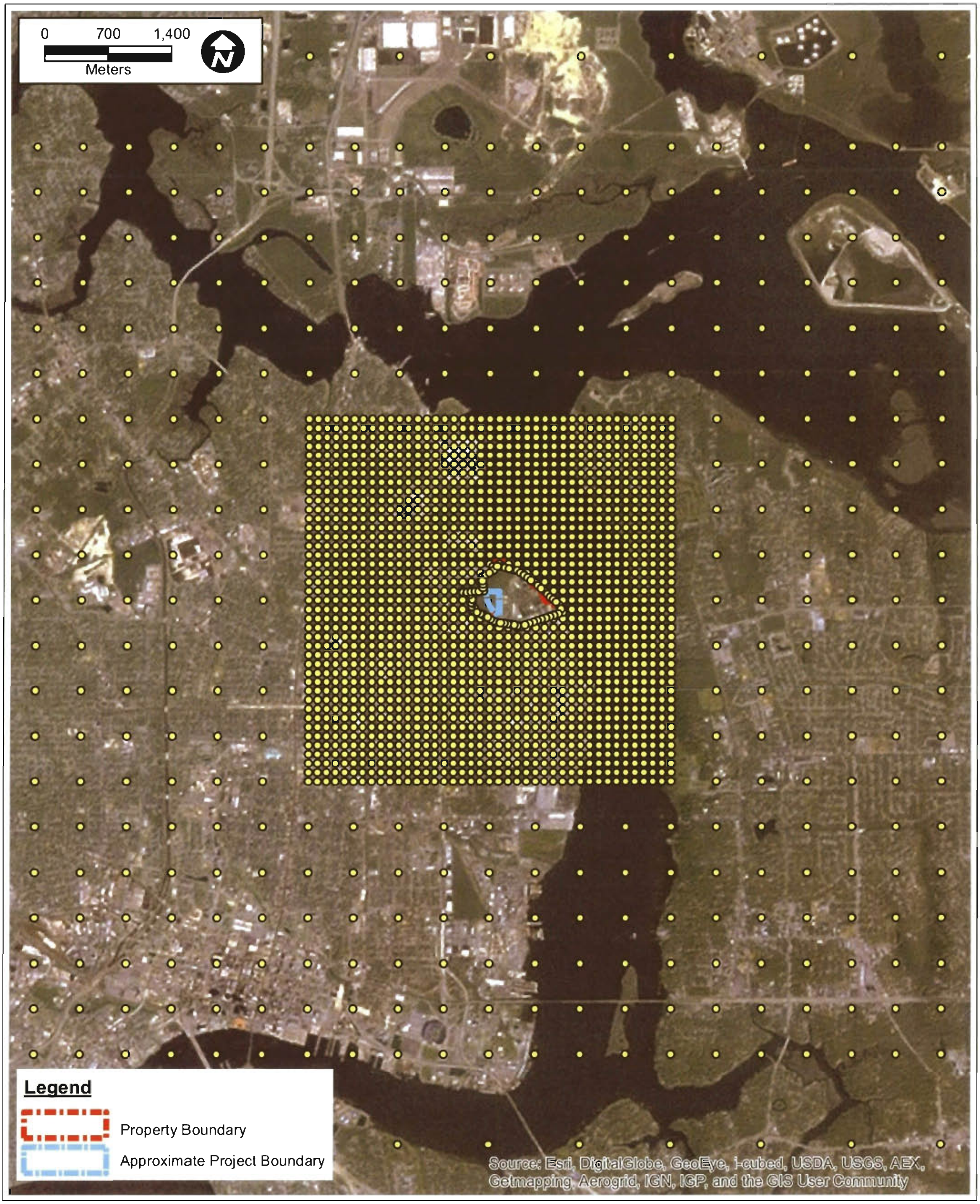


FIGURE 7-3.
MID-FIELD RECEPTORS

Sources ESRI, 2011; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

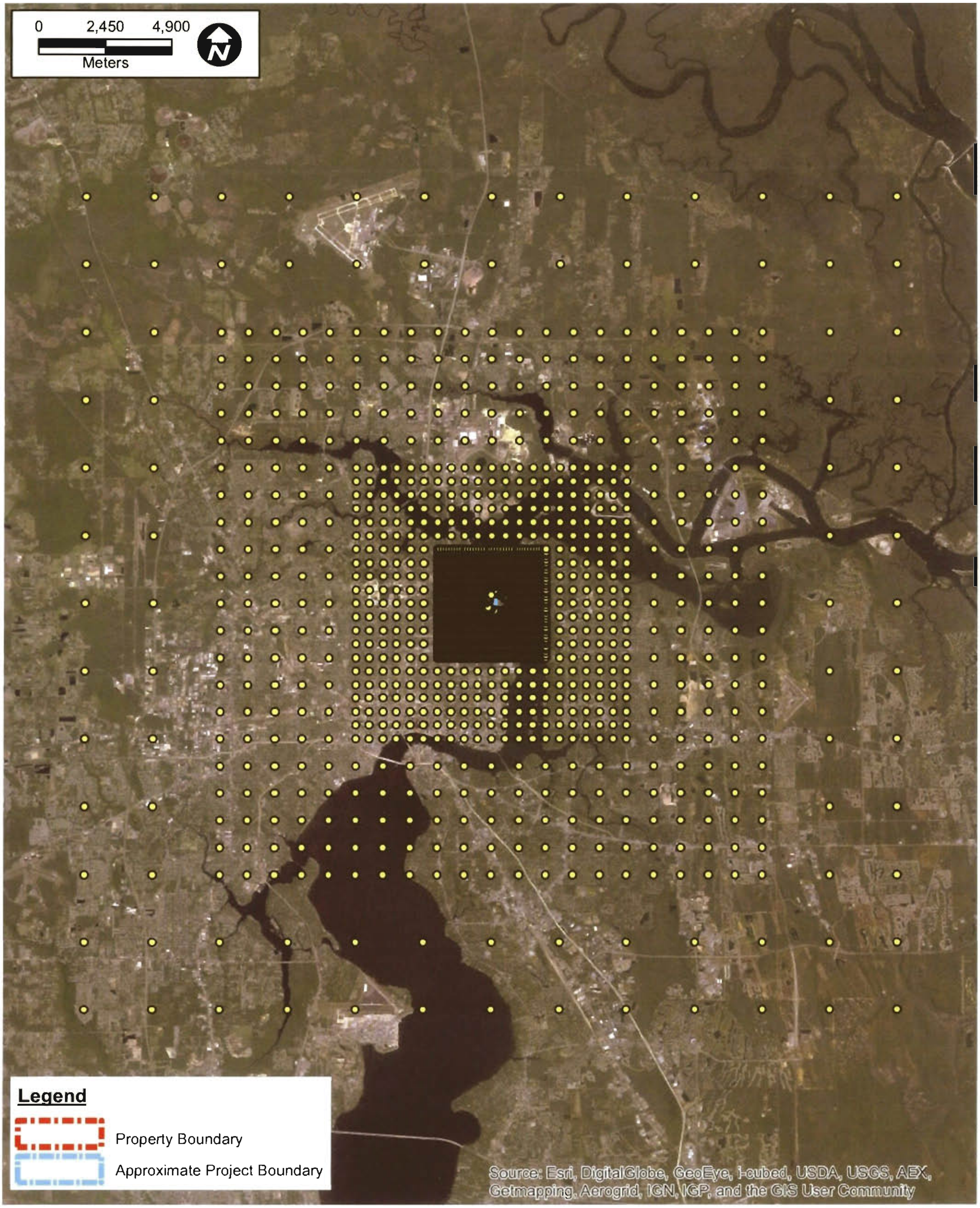


FIGURE 7-4.
FAR FIELD RECEPTORS

Sources: ESRI, 2011; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.

roughness length is related to the height of obstacles to the wind flow and is the height at which the mean horizontal wind speed is zero based on a logarithmic profile. Surface roughness length influences the surface shear stress and is an important factor in determining the magnitude of mechanical turbulence and the stability of the boundary layer. Albedo is the fraction of total incident solar radiation reflected by the surface back to space without absorption. The daytime Bowen ratio, an indicator of surface moisture, is the ratio of sensible heat flux to latent heat flux and, together with albedo and other meteorological observations, is used for determining planetary boundary layer parameters for convective conditions driven by the surface sensible heat flux. The EPA AERSURFACE program was developed to aid users in obtaining realistic and reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input to AERMET. The program uses publicly available national land cover datasets and look-up tables of surface characteristics that vary by land cover type and season.

FDEP supplied the preprocessed data appropriate for performing modeling demonstrations using AERMOD. The surface and upper air meteorological data is from the NWS site (Weather-Bureau-Army-Navy [WBAN] Station No. 13889) located at the Jacksonville International Airport (JAX) approximately 15 km northwest of the project site. The meteorological data consists of 5 years (i.e., 2006 through 2010) of NWS data from the JAX surface and upper air stations. These data were processed with Version 12345 of AERMET.

7.10 MODELING EMISSIONS INVENTORY

7.10.1 ON-PROPERTY SOURCES

The primary emissions sources at the proposed Jacksonville Lime facility will be the two kilns, which will exhaust through a common stack. The other combustion source is a small 3.5-million-British-thermal-units-per-hour (MMBtu/hr) heat input fuel dryer, which will be fired exclusively with natural gas. Several sources of $PM_{10}/PM_{2.5}$ emissions associated with limestone, fuel, and lime handling and processing operations were also included in the modeling. The kilns, and several of the other sources, will normally operate at full capacity. Some sources may be idle, depending on the type of fuel being fired in the kilns. Plant roadways will be paved. Accordingly, fugitive $PM_{10}/PM_{2.5}$ emissions due to vehicle travel on the plant roadways will be negligible, and, therefore, not included in the modeling analyses. Per FDEP recommendations, fugitive sources of $PM_{10}/PM_{2.5}$ were not included in the modeling. Tables 7-3 and 7-4 show the maximum short-term emissions rates and stack parameters.

$PM_{2.5}$ emissions rates were adjusted based on EPA data contained in AP-42 on particle size distributions for similar sources. The background document for revised AP-42 Section 11.19.2, Crushed Stone Processing and Pulverized Mineral Processing dated May 12, 2003, contains information on particle sizes for various processes. Figure 5 of that document illustrates that the cumulative percent of $PM_{2.5}$ from crushing, screening, and conveyor transfer points ranges from approximately 2 to 10 percent. The $PM_{2.5}$ emissions rates associated with the limestone handling and processing were conservatively adjusted by assuming that $PM_{2.5}$ is 15 percent of total PM. The limestone delivered to Jacksonville Lime will be approximately 2 to 4 inches in size. Most of the smaller limestone, e.g., less than 1 inch, will be rejected.

The proportion of particulate matter (PM) associated with the coke and coal operations were adjusted based on information contained in emissions factor documentation for AP-42, Section 11.10, Coal Cleaning, dated September 1995. The average mass below 2.5-micron particle size was reported to be 16 percent for coal drying after a fabric filter. The $PM_{2.5}$ emissions rates associated with the coke/coal handling and processing were conservatively adjusted by assuming that $PM_{2.5}$ is 16 percent of total PM. The coal and coke fed to the kilns will typically be less than 1 inch in size.

AP-42 Appendix B.1 contains particle size distribution data and sized emissions factors for selected sources. Table 10.5 of that report contains particle size distribution data for woodworking waste collection operations from belt sander hood exhaust. A mean of 14.3 percent for $PM_{2.5}$-micron particles was reported after a cyclone and particulate filter. Use of a 0.15-factor for adjusting the emissions rates is considered to be conservative, since the particle sized from sanding would be much smaller than the average size of the

Table 7-3. Maximum Hourly Emissions Rates of Jacksonville Lime Sources

Emissions Unit ID	Description	UTM Coordinates (meters) East	North	NO_x lb/hr	NO_x g/s	SO_2 lb/hr	SO_2 g/s	PM_{10} lb/hr	PM_{10} g/s	$PM_{2.5}$ lb/hr	$PM_{2.5}$ g/s	CO lb/hr	CO g/s
BM-3	Wood Chip Raw Storage Collector	439,320.67	3,359,679.40	N/A	N/A	N/A	N/A	0.086	0.007	0.008	0.0010	N/A	N/A
BM-4	Wood Chip Process Dust Collector Stack	439,335.69	3,359,645.21	N/A	N/A	N/A	N/A	0.489	0.038	0.045	0.0057	N/A	N/A
BM-6	Dosing Bin #1	439,334.43	3,359,621.34	N/A	N/A	N/A	N/A	0.127	0.015	0.019	0.0024	N/A	N/A
BM-7	Dosing Bin #2	439,339.43	3,359,621.34	N/A	N/A	N/A	N/A	0.127	0.011	0.013	0.0017	N/A	N/A
BM-9	Lime Handling Under Kilns	439,321.61	3,359,609.08	N/A	N/A	N/A	N/A	0.206	0.026	0.103	0.0130	N/A	N/A
BM-11	Lime Crusher Bldg	439,398.32	3,359,657.04	N/A	N/A	N/A	N/A	0.278	0.035	0.139	0.0175	N/A	N/A
BM-12	Top of Lime Silos / Screening	439,389.96	3,359,654.42	N/A	N/A	N/A	N/A	0.329	0.042	0.049	0.0062	N/A	N/A
BM-13	Lime Silo Truck Loadout Spouts	439,391.37	3,359,635.82	N/A	N/A	N/A	N/A	0.026	0.001	0.002	0.0002	N/A	N/A
BM-14	Lime Silo Truck Loadout Spouts	439,389.41	3,359,644.80	N/A	N/A	N/A	N/A	0.026	0.001	0.002	0.0002	N/A	N/A
BM-15	Lime Silo Truck Loadout Spouts	439,387.44	3,359,653.78	N/A	N/A	N/A	N/A	0.026	0.001	0.002	0.0002	N/A	N/A
BM-16	Lime Silo Truck Loadout Spouts	439,385.48	3,359,662.76	N/A	N/A	N/A	N/A	0.026	0.001	0.002	0.0002	N/A	N/A
BM-17	Reject Bin Top	439,303.09	3,359,603.04	N/A	N/A	N/A	N/A	0.093	0.003	0.012	0.0015	N/A	N/A
BM-19	Kiln Stack	439,339.19	3,359,613.08	82.50	10.40	35.79	4.51	9.999	1.261	1.697	0.2138	99.00	12.49
BM-21	Lime Reject Bin Loadout	439,305.66	3,359,603.63	N/A	N/A	N/A	N/A	0.051	0.002	0.006	0.0008	N/A	N/A
BM-23	Stone Feed Reject Bin Loadout	439,336.93	3,359,591.23	N/A	N/A	N/A	N/A	0.051	0.002	0.002	0.0002	N/A	N/A
BM-27	Coke Conveyor Belt Transfer	439,343.23	3,359,679.73	N/A	N/A	N/A	N/A	0.120	0.003	0.003	0.0004	N/A	N/A
BM-28	Coke Raw Storage Bin	439,334.93	3,359,677.17	N/A	N/A	N/A	N/A	0.099	0.002	0.002	0.0003	N/A	N/A
BM-30	Coke Process Dust Collector Stack	439,348.26	3,359,648.84	0.32	0.04	0.01	0.00	0.377	0.029	0.037	0.0047	0.14	0.02
BM-31	Lime Railcar Loadout	439,377.14	3,359,627.39	N/A	N/A	N/A	N/A	0.051	0.006	0.026	0.0033	N/A	N/A
BM-32	Stone Feed Reject Bin	439,339.20	3,359,593.31	N/A	N/A	N/A	N/A	0.172	0.022	0.026	0.0033	N/A	N/A

Note: lb/hr = pound per hour.
g/s = gram per second.
N/A = not applicable.

Sources: Jacksonville Lime, 2012.
ECT, 2013.

Table 7-4. Stack Parameters of Jacksonville Lime Sources

Emissions Unit ID	Description	Stack Height		Exit Temperature		Exit Velocity		Exit Diameter	
		ft	meters	°F	K	ft/s	m/s	ft	meters
BM-3	Wood Chip Raw Storage Collector	60.0	18.3	70.0	294.1	83.3	25.4	0.8	0.24
BM-4	Wood Chip Process Dust Collector Stack	60.0	18.3	70.0	294.1	85.4	26.0	1.9	0.57
BM-6	Dosing Bin #1	90.0	27.4	70.0	294.1	89.4	27.2	0.9	0.29
BM-7	Dosing Bin #2	90.0	27.4	70.0	294.1	89.4	27.2	0.9	0.29
BM-9	Lime Handling Under Kilns	60.0	18.3	150.0	338.6	84.6	25.8	1.3	0.4
BM-11	Lime Crusher Bldg	145.0	44.2	150.0	338.6	69.1	21.1	1.7	0.52
BM-12	Top of Lime Silos / Screening	145.0	44.2	70.0	294.1	71.1	21.7	1.7	0.52
BM-13	Lime Silo Truck Loadout Spouts	35.0	10.7	70.0	294.1	65.8	20.1	0.7	0.2
BM-14	Lime Silo Truck Loadout Spouts	35.0	10.7	70.0	294.1	65.8	20.1	0.7	0.2
BM-15	Lime Silo Truck Loadout Spouts	35.0	10.7	70.0	294.1	65.8	20.1	0.7	0.2
BM-16	Lime Silo Truck Loadout Spouts	35.0	10.7	70.0	294.1	65.8	20.1	0.7	0.2
BM-17	Reject Bin Top	98.0	29.9	150.0	338.6	68.2	20.8	1.0	0.30
BM-19	Kiln Stack	213.3	65.0	294.0	418.6	65.6	20.0	4.8	1.46
BM-21	Lime Reject Bin Loadout	35.0	10.7	70.0	294.1	65.8	20.1	0.7	0.21
BM-23	Stone Feed Reject Bin Loadout	35.0	10.7	70.0	294.1	65.8	20.1	0.7	0.21
BM-27	Coke Conveyor Belt Transfer	35.0	10.7	70.0	294.1	70.3	21.4	1.0	0.31
BM-28	Coke Raw Storage Bin	76.0	23.2	70.0	294.1	70.0	21.4	0.9	0.29
BM-30	Coke Process Dust Collector Stack	120.0	36.6	70.0	294.1	91.7	27.9	1.6	0.49
BM-31	Lime Railcar Loadout	41.0	12.5	70.0	294.1	65.8	20.1	0.7	0.21
BM-32	Stone Feed Reject Bin	110.0	33.5	70.0	294.1	87.9	26.8	1.4	0.44

Note: ft = foot. °F = Fahrenheit. K = Kelvin. ft/s = foot per second. m/s = meter per second.

Sources: Carmeuse, 2013.
ECT, 2013.

Y:\GDP-13\PRJ\JXLM-PSD2-TBLS7.XLSX\74—10/22/2013

wood fuel, even after grinding, i.e., the wood chips will be ground to 2 millimeters for input to the kilns.

The emissions rates for lime handling and processing operations were also adjusted based on information from AP-42 Appendix B.1. Table 11.21 of that document contains information for phosphate rock processing: roller mill and bowl mill grinding. A mean of 25 percent for $PM_{2.5}$-micron particles was reported after the fabric filter. Use of a 0.5-factor for adjusting the emissions rates is considered to be conservative, since it is supported by the results of testing for other nonmetallic minerals, e.g., 11.5-percent $PM_{2.5}$ for feldspar ball mill.

7.10.2 OFF-PROPERTY SOURCES

The project's air quality impacts exceeded the SILs for several pollutants and averaging periods. Accordingly, a cumulative multisource assessment of attainment with the NAAQS and PSD increments were required for those pollutants exceeding the SILs. An offsite emissions source inventory was developed from FDEP-supplied information for sources emitting NO_x, SO_x, and $PM_{10}/PM_{2.5}$ within 50 km of the Jacksonville Lime site. This data consisted of facility registration and customer numbers, facility name and address, emissions unit description, source identification, location, actual and potential emissions rates, and stack parameters (e.g., height, diameter, temperature, and flow rate). Tables 7-5 through 7-7 provide the offsite sources included in the NAAQS cumulative modeling for NO_2, SO_2, and $PM_{10}/PM_{2.5}$. In addition to the NAAQS, the PSD increment consumption was assessed. Existing increment consuming source of NO_2, SO_2, and $PM_{10}/PM_{2.5}$ modeled along with the Jacksonville Lime sources. Tables 7-8 through 7-10 contain the emissions rates and stack parameters of the existing increment-consuming sources.

Table 7-5. Offsite Sources of NO_x For Inclusion in NAAQS Modeling

Facility Name / Model ID	UTM Coordinates (meters) X	UTM Coordinates (meters) Y	Elevation (meters)	NO_x Emissions Rate lb/hr	NO_x Emissions Rate g/s	Stack Height ft	Stack Height meters	Exhaust Temperature °F	Exhaust Temperature K	Exhaust Velocity ft/s	Exhaust Velocity m/s	Exhaust Diameter ft	Exhaust Diameter meters
JEA Northside/SJRPP (ID 0310045)													
JEANOR16	447,050.00	3,366,790.00	3.95	3,689.29	464.85	640.16	195.12	155.73	341.89	76.80	23.41	22.31	6.80
JEANOR17	446,900.00	3,366,300.00	3.33	3,689.29	464.85	640.16	195.12	155.73	341.89	72.51	22.10	22.31	6.80
JEANOR3	446,820.00	3,365,150.00	2.72	1,511.35	190.43	300.08	91.46	329.74	438.56	62.01	18.90	23.01	7.01
JEANOR2	446,900.00	3,364,960.00	2.72	1,039.44	130.97	300.08	91.46	274.73	408.00	53.02	16.16	16.50	5.03
JEANOR6	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR7	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR8	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR9	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR27	446,960.00	3,365,210.00	2.72	249.05	31.38	495.13	150.92	143.73	335.22	66.01	20.12	15.00	4.57
JEANOR26	446,870.00	3,365,180.00	2.75	249.05	31.38	495.13	150.92	143.73	335.22	66.01	20.12	15.00	4.57
JEANOR14	446,940.00	3,364,995.00	2.72	65.48	8.25	168.04	51.22	285.73	414.11	136.48	41.60	11.10	3.38
Cedar Bay Generating Co (ID 0310337)													
CEDBAY01	441,690.00	3,365,790.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
CEDBAY02	441,670.00	3,365,770.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
CEDBAY03	441,650.00	3,365,750.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
Anheuser Busch Jacksonville Brewery (ID 0310006)													
ABUSCH27	437,910.00	3,366,860.00	5.34	75.08	9.46	100.03	30.49	284.74	413.56	64.01	19.51	5.81	1.77
ABUSCH2	437,960.00	3,367,060.00	5.58	36.83	4.64	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
ABUSCH1	437,940.00	3,367,040.00	5.03	36.83	4.64	100.03	30.49	419.74	488.56	53.02	16.16	3.60	1.10
ABUSCH4	437,910.00	3,366,980.00	4.14	36.83	4.64	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
ABUSCH3	437,960.00	3,366,060.00	6.07	36.83	4.64	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
Anchor Glass Container Corp (ID 0310005)													
ANCHOR3	431,480.00	3,357,720.00	7.30	106.35	13.40	113.02	34.45	599.74	588.56	44.62	13.60	5.00	1.52
ANCHOR4	431,500.00	3,357,500.00	7.30	54.29	6.84	122.05	37.20	418.73	488.00	38.02	11.59	5.00	1.52
ANCHOR1	431,420.00	3,357,710.00	7.30	34.52	4.35	48.00	14.63	749.75	671.90	105.41	32.13	2.95	0.90

Note: lb/hr = pound per hour. g/s = gram per second. ft = foot. °F = degree Fahrenheit. K = Kelvin. ft/s = foot per second. m/s = meter per second.

Source: ECT, 2013.

Table 7-6. Offsite Sources of SO_x for Inclusion in NAAQS Modeling

Facility Name	UTM Coordinates (meters)		Elevation	SO_x Emissions Rate		Stack Height		Exhaust Temperature		Exhaust Velocity		Exhaust Diameter	
Model ID	X	Y	(meters)	lb/hr	g/s	ft	meters	°F	K	ft/s	m/s	ft	meters
JEA Northside/SJRPP (ID 0310045)													
JEANOR3	446,820.00	3,365,150.00	2.72	9,974.13	1,256.74	300.07	91.46	329.74	438.56	62.01	18.90	23.01	7.01
JEANOR16	447,050.00	3,366,790.00	3.95	4,669.44	588.35	640.16	195.12	155.73	341.89	76.80	23.41	22.31	6.80
JEANOR17	446,900.00	3,366,300.00	3.33	4,669.44	588.35	640.16	195.12	155.73	341.89	72.51	22.10	22.31	6.80
JEANOR7	446,750.00	3,365,500.00	3.10	455.40	57.38	30.02	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR6	446,750.00	3,365,500.00	3.10	455.40	57.38	30.02	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR8	446,750.00	3,365,500.00	3.10	455.40	57.38	30.02	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR9	446,750.00	3,365,500.00	3.10	455.40	57.38	30.02	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR27	446,960.00	3,365,210.00	2.72	553.25	69.71	495.14	150.92	143.73	335.22	66.01	20.12	15.00	4.57
JEANOR26	446,870.00	3,365,180.00	2.75	553.25	69.71	495.14	150.92	143.73	335.22	66.01	20.12	15.00	4.57
JEANOR14	446,940.00	3,364,995.00	2.72	233.81	29.46	168.04	51.22	285.73	414.11	136.48	41.60	11.10	3.38
IFF Chemical Holdings, Inc (ID 0310071)													
IFFCHE37	428,050.00	3,357,540.00	7.00	7.54	0.95	75.03	22.87	148.73	338.00	46.72	14.24	2.50	0.76
IFFCHE3	427,890.00	3,357,470.00	7.46	63.65	8.02	51.02	15.55	594.73	585.78	2.99	0.91	4.00	1.22
IFFCHE14	427,930.00	3,357,510.00	7.34	56.90	7.17	66.01	20.12	594.73	585.78	38.02	11.59	4.00	1.22
Rennessenz, LLC (ID 0310039)													
RENESS6	436,150.00	3,361,220.00	3.32	48.02	6.05	125.03	38.11	349.74	449.67	74.51	22.71	5.10	1.56
RENESS4	436,140.00	3,361,190.00	3.50	200.24	25.23	40.01	12.20	269.73	405.22	46.00	14.02	3.60	1.10
RENESS5	436,060.00	3,361,100.00	3.36	193.17	24.34	125.03	38.11	349.74	449.67	76.41	23.29	3.80	1.16
RENESS32	436,250.00	3,361,100.00	3.14	188.10	23.70	125.00	38.10	350.01	449.82	76.41	23.29	3.80	1.16
RENESS11	436,150.00	3,361,220.00	3.32	82.14	10.35	125.03	38.11	349.74	449.67	74.51	22.71	5.10	1.56
Cedar Bay Generating Co (ID 0310337)													
CEDBAY01	441,690.00	3,365,790.00	2.72	319.21	40.22	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
CEDBAY02	441,670.00	3,365,770.00	2.72	319.21	40.22	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
CEDBAY03	441,650.00	3,365,750.00	2.72	319.21	40.22	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
Anheuser Busch Jacksonville Brewery (ID 0310006)													
ABUSCH2	437,960.00	3,367,060.00	5.58	46.35	5.84	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
ABUSCH1	437,940.00	3,367,040.00	5.03	46.35	5.84	100.03	30.49	419.74	488.56	53.02	16.16	3.60	1.10
ABUSCH4	437,910.00	3,366,980.00	4.14	46.35	5.84	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
ABUSCH3	437,960.00	3,366,060.00	6.07	46.35	5.84	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
Anchor Glass Container Corp (ID 0310005)													
ANCHOR3	431,480.00	3,357,720.00	7.30	44.29	5.58	113.02	34.45	599.74	588.56	44.62	13.60	5.00	1.52
ANCHOR4	431,500.00	3,357,500.00	7.30	29.76	3.75	122.05	37.20	418.73	488.00	38.02	11.59	5.00	1.52
JEA Buckman St WWTP (ID 0310166)													
JEABUC7	439,320.00	3,358,000.00	4.36	43.25	5.45	90.03	27.44	239.74	388.56	14.80	4.51	3.80	1.16
JEABUC16	439,340.00	3,357,930.00	4.31	85.40	10.76	80.02	24.39	-0.27	255.22	0.03	0.01	1.00	0.31
Owens - Corning, Jacksonville Plant (ID 0310050)													
OWENS12	439,470.00	3,356,170.00	2.84	52.22	6.58	22.01	6.71	619.74	599.67	51.12	15.58	2.50	0.76
JEA Kennedy (ID 0310047)													
JEAKEN15	439,950.00	3,359,390.00	2.20	98.10	12.36	90.03	27.44	1,115.73	875.22	87.34	26.62	24.01	7.32
JEAKEN13	440,000.00	3,359,200.00	2.24	10.63	1.34	33.01	10.06	428.74	493.56	58.01	17.68	1.60	0.49
JEAKEN16	439,890.00	3,359,380.00	2.64	10.63	1.34	90.03	27.44	1,109.73	871.89	157.15	47.90	18.01	5.49
Transmontaign Terminals, LLC (ID 0310188)													
TRANMO12	439,950.00	3,358,900.00	2.82	6.11	0.77	20.01	6.10	549.73	560.78	71.52	21.80	0.89	0.27
TRANMO11	439,950.00	3,358,890.00	2.84	0.40	0.05	20.01	6.10	349.74	449.67	31.30	9.54	1.33	0.41
TRANMO23	440,020.00	3,358,930.00	2.72	0.08	0.01	29.99	9.14	645.01	613.71	30.61	9.33	2.50	0.76
TRANMO18	440,030.00	3,358,890.00	2.72	0.01	0.00	28.02	8.54	349.74	449.67	31.30	9.54	1.33	0.41

Note: lb/hr = pound per hour. ft = foot. °F = degree Fahrenheit. ft/s = foot per second.
g/s = gram per second. K = Kelvin. m/s = meter per second.

Source: ECT, 2013.

Table 7-7. Offsite Sources of PM for Inclusion in NAAQS Modeling

Facility Name	UTM Coordinates (meters)		Elevation	PM Emissions Rate		Stack Height		Exhaust Temperature		Exhaust Velocity		Exhaust Diameter	
Model ID	X	Y	(meters)	lb/hr	g/s	ft	meters	°F	K	ft/s	m/s	ft	meters
Kraft Foods Global Maxwell House Coffee (ID 0310004)													
MHC501	437,690.00	3,354,960.00	1.00	0.16	0.02	150.00	45.72	374.99	463.70	41.31	12.59	2.00	0.61
MHC503	437,540.00	3,354,710.00	1.00	0.48	0.06	89.01	27.13	848.03	726.50	6.20	1.89	2.49	0.76
MHC504	437,540.00	3,354,710.00	1.00	0.71	0.09	89.01	27.13	979.97	799.80	9.09	2.77	2.99	0.91
MHC505	437,540.00	3,354,710.00	1.00	0.71	0.09	96.00	29.26	799.97	699.80	3.81	1.16	7.48	2.28
MHC506	437,540.00	3,354,710.00	1.00	0.40	0.05	114.01	34.75	770.09	683.20	0.00	0.00	2.33	0.71
MHC509	437,540.00	3,354,710.00	1.00	0.71	0.09	174.02	53.04	877.01	742.60	0.00	0.00	2.76	0.84
MHC510	437,540.00	3,354,710.00	1.00	0.71	0.09	89.99	27.43	77.09	298.20	0.00	0.00	2.49	0.76
MHC513	437,540.00	3,354,710.00	1.00	0.08	0.01	85.99	26.21	99.95	310.90	0.00	0.00	1.74	0.53
MHC514	437,540.00	3,354,710.00	1.00	0.71	0.09	85.99	26.21	99.95	310.90	0.00	0.00	1.74	0.53
MHC515	437,540.00	3,354,710.00	1.00	0.32	0.04	104.99	32.00	99.95	310.90	0.00	0.00	1.51	0.46
MHC517	437,540.00	3,354,710.00	1.00	0.71	0.09	85.99	26.21	95.09	308.20	0.00	0.00	2.30	0.70
MHC518	437,540.00	3,354,710.00	1.00	0.08	0.01	83.99	25.60	77.09	298.20	0.00	0.00	1.25	0.38
MHC519	437,540.00	3,354,710.00	1.00	0.48	0.06	79.00	24.08	104.99	313.70	0.00	0.00	0.95	0.29
MHC530	437,540.00	3,354,710.00	1.00	0.48	0.06	49.02	14.94	77.09	298.20	0.00	0.00	0.98	0.30
MHC534	437,540.00	3,354,710.00	1.00	0.71	0.09	29.99	9.14	130.01	327.60	0.00	0.00	0.49	0.15
MHC536	437,540.00	3,354,710.00	1.00	0.24	0.03	79.99	24.38	77.09	298.20	0.00	0.00	0.49	0.15
MHC537	437,540.00	3,354,710.00	1.00	0.48	0.06	100.00	30.48	77.09	298.20	0.00	0.00	0.75	0.23
MHC538	437,540.00	3,354,710.00	1.00	1.35	0.17	110.01	33.53	104.09	313.20	0.00	0.00	2.99	0.91
MHC539	437,540.00	3,354,710.00	1.00	0.71	0.09	95.01	28.96	77.09	298.20	0.00	0.00	0.98	0.30
MHC540	437,540.00	3,354,710.00	1.00	0.48	0.06	95.01	28.96	77.09	298.20	0.00	0.00	0.98	0.30
MHC543	437,540.00	3,354,710.00	1.00	0.48	0.06	89.99	27.43	77.09	298.20	0.00	0.00	0.49	0.15
MHC550	437,670.00	3,354,960.00	1.00	4.44	0.56	119.00	36.27	400.01	477.60	63.29	19.29	4.20	1.28
MHC551	437,700.00	3,354,950.00	1.00	0.87	0.11	119.00	36.27	400.01	477.60	63.29	19.29	4.20	1.28
MHC552	437,700.00	3,354,950.00	1.00	3.33	0.42	119.00	36.27	400.01	477.60	63.29	19.29	4.20	1.28
Anchor Glass Container Corp (ID 0310005)													
ANCHOR3	431,480.00	3,357,720.00	7.30	14.29	1.80	112.99	34.44	599.99	588.70	44.59	13.59	4.99	1.52
JEA Northside/SJRPP (ID 0310045)													
JEANOR6	446,750.00	3,365,500.00	2.72	26.43	3.33	29.99	9.14	799.97	699.80	0.00	0.00	12.89	3.93
JEANOR7	446,750.00	3,365,500.00	2.72	26.43	3.33	29.99	9.14	799.97	699.80	0.00	0.00	12.89	3.93
JEANOR8	446,750.00	3,365,500.00	2.72	26.19	3.30	29.99	9.14	799.97	699.80	0.00	0.00	12.89	3.93
JEANOR9	446,750.00	3,365,500.00	2.72	26.43	3.33	29.99	9.14	799.97	699.80	0.00	0.00	12.89	3.93
JEANOR16	447,050.00	3,366,790.00	2.72	183.97	23.18	639.99	195.07	155.93	342.00	76.80	23.41	22.31	6.80
JEANOR17	446,900.00	3,366,300.00	2.72	183.97	23.18	639.99	195.07	155.93	342.00	72.51	22.10	22.31	6.80
JEANOR26	446,870.00	3,365,180.00	2.72	30.40	3.83	495.01	150.88	144.05	335.40	66.01	20.12	14.99	4.57
JEANOR27	446,960.00	3,365,210.00	2.72	30.40	3.83	495.01	150.88	144.05	335.40	66.01	20.12	14.99	4.57
JEANOR33	446,820.00	3,365,150.00	2.72	0.95	0.12	75.00	22.86	164.93	347.00	75.30	22.95	3.41	1.04
JEANOR34	446,820.00	3,365,150.00	2.72	0.08	0.01	29.99	9.14	77.99	298.70	131.79	40.17	1.31	0.40
JEANOR39	446,930.00	3,367,070.00	2.72	0.24	0.03	129.99	39.62	149.99	338.70	0.00	0.00	1.51	0.46
JEANOR43	446,930.00	3,367,060.00	2.72	0.08	0.01	37.99	11.58	68.09	293.20	0.00	0.00	2.49	0.76
JEANOR50	446,820.00	3,365,150.00	2.72	1.59	0.20	87.99	26.82	220.01	377.60	0.00	0.00	2.99	0.91
JEA Kennedy (ID 0310047)													
JEAKEN15	439,950.00	3,359,390.00	2.40	16.98	2.14	89.99	27.43	1,116.05	875.40	87.30	26.61	24.02	7.32
Owens - Corning, Jacksonville Plant (ID 0310050)													
OWENS1	439,570.00	3,356,160.00	3.00	0.08	0.01	58.99	17.98	99.95	310.90	117.91	35.94	0.30	0.09
OWENS2	439,480.00	3,356,270.00	3.00	0.16	0.02	77.99	23.77	99.95	310.90	176.80	53.89	0.30	0.09
United States Gypsum Co (ID 0310072)													
USGYP101	438,910.00	3,361,310.00	2.70	0.24	0.03	75.00	22.86	68.09	293.20	16.99	5.18	0.98	0.30
USGYP102	438,910.00	3,361,310.00	2.70	0.24	0.03	75.00	22.86	68.09	293.20	16.99	5.18	0.98	0.30
USGYP103	438,910.00	3,361,310.00	2.70	0.08	0.01	75.00	22.86	68.09	293.20	0.00	0.00	0.98	0.30
USGYP104	438,910.00	3,361,310.00	2.70	0.08	0.01	75.00	22.86	68.09	293.20	16.99	5.18	0.98	0.30
USGYP105	438,910.00	3,361,310.00	2.70	0.63	0.08	75.00	22.86	68.09	293.20	16.99	5.18	0.98	0.30
USGYP106	438,910.00	3,361,310.00	2.70	0.24	0.03	29.99	9.14	68.09	293.20	0.00	0.00	0.66	0.20
USGYP107	438,910.00	3,361,310.00	2.70	0.16	0.02	29.99	9.14	68.09	293.20	0.00	0.00	0.66	0.20
Naval Air Station Jacksonville (ID 0310213)													
NASJAX105	435,680.00	3,344,110.00	3.00	3.02	0.38	64.01	19.51	77.09	298.20	0.003	0.001	6.27	1.91
NASJAX113	434,180.00	3,343,240.00	3.00	5.63	0.71	56.99	17.37	77.09	298.20	0.003	0.001	2.99	0.91
Cedar Bay Generating Co (ID 0310337)													
CEDBAY1	441,690.00	3,365,790.00	2.72	19.13	2.41	402.99	122.83	265.01	402.60	120.01	36.58	13.29	4.05
CEDBAY2	441,670.00	3,365,770.00	2.72	19.13	2.41	402.99	122.83	265.01	402.60	120.01	36.58	13.29	4.05
CEDBAY3	441,650.00	3,365,750.00	2.72	19.13	2.41	402.99	122.83	265.01	402.60	120.01	36.58	13.29	4.05
CEDBAY4	441,710.00	3,365,670.00	2.72	1.11	0.14	62.99	19.20	194.99	363.70	59.81	18.23	4.17	1.27
CEDBAY5	441,830.00	3,365,740.00	2.72	1.11	0.14	62.99	19.20	194.99	363.70	59.81	18.23	4.17	1.27
CEDBAY6	441,700.00	3,365,810.00	2.72	0.08	0.01	20.01	6.10	77.09	298.20	24.80	7.56	1.90	0.58
CEDBAY7	441,680.00	3,365,810.00	2.72	0.56	0.07	141.99	43.28	77.09	298.20	54.59	16.64	2.99	0.91
CEDBAY9	441,670.00	3,365,760.00	2.72	0.16	0.02	89.99	27.43	101.93	312.00	113.71	34.66	1.12	0.34
CEDBAY25	441,620.00	3,365,830.00	2.72	0.16	0.02	89.01	27.13	101.93	312.00	116.21	35.42	1.12	0.34
CEDBAY32	441,640.00	3,365,820.00	2.72	0.08	0.01	104.00	31.70	79.97	299.80	131.00	39.93	0.52	0.16
CEDBAY33	441,760.00	3,365,740.00	2.72	0.08	0.01	137.99	42.06	126.95	325.90	164.90	50.26	0.69	0.21
Atlantic Coast Asphalt (ID 0310026)													
ATLASPH1	429,130.00	3,361,240.00	5.80	11.59	1.46	41.01	12.50	299.93	422.00	50.59	15.42	0.00	0.00

Note: lb/hr = pound per hour. ft = foot. °F = degree Fahrenheit. ft/s = foot per second.
g/s = gram per second. K = Kelvin. m/s = meter per second.

Source: ECT, 2013.

Table 7-8. Existing NO_2 Increment-Consuming Sources

Facility Name / Model ID	UTM Coordinates (meters) X	UTM Coordinates (meters) Y	Elevation (meters)	NO_2 Emissions Rate lb/hr	NO_2 Emissions Rate g/s	Stack Height ft	Stack Height meters	Exhaust Temperature °F	Exhaust Temperature K	Exhaust Velocity ft/s	Exhaust Velocity m/s	Exhaust Diameter ft	Exhaust Diameter meters
JEA Northside/SJRPP (ID 0310045)													
JEANOR17	446,900.00	3,366,300.00	2.72	3,689.29	464.85	640.16	195.12	155.73	341.89	72.51	22.10	22.31	6.80
JEANOR27	446,960.00	3,365,210.00	2.72	249.05	31.38	495.11	150.91	143.73	335.22	66.01	20.12	14.99	4.57
JEANOR26	446,870.00	3,365,180.00	2.72	249.05	31.38	495.11	150.91	143.73	335.22	66.01	20.12	14.99	4.57
JEANOR33	446,820.00	3,365,150.00	2.72	11.59	1.46	75.03	22.87	164.73	346.89	75.33	22.96	3.41	1.04
Cedar Bay Generating Co (ID 0310337)													
CEDBAY01	441,690.00	3,365,790.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.29	4.05
CEDBAY02	441,670.00	3,365,770.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.29	4.05
CEDBAY03	441,650.00	3,365,750.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.29	4.05
CEDBAY04	441,710.00	3,365,670.00	2.72	4.84	0.61	63.02	19.21	194.74	363.56	59.81	18.23	4.17	1.27
CEDBAY05	441,830.00	3,365,740.00	2.72	2.38	0.30	63.02	19.21	194.74	363.56	59.81	18.23	4.17	1.27
JEA Brandy Branch Facility (ID 0310485)													
JEABRBF1	408,820.00	3,354,650.00	24.38	318.25	40.10	90.03	27.44	1,080.73	855.78	106.33	32.41	18.01	5.49
JEABRBF2	408,870.00	3,354,660.00	24.38	318.25	40.10	90.03	27.44	1,080.73	855.78	106.33	32.41	18.01	5.49
Gerdau Ameristeel Jacksonville Mill Div (ID 0310157)													
GERDAU1	405,070.00	3,350,020.00	25.60	33.02	4.16	115.03	35.06	229.73	383.00	64.01	19.51	10.01	3.05
GERDAU4	405,850.00	3,350,370.00	25.60	330.32	41.62	0.00	0.00	76.73	298.00	0.00	0.00	0.00	0.00

Note: lb/hr = pound per hour. ft = foot. °F = degree Fahrenheit. ft/s = foot per second.
g/s = gram per second. K = Kelvin. m/s = meter per second.

Source: ECT, 2013.

Y:\GDP-13\PRJ\JXLM-PSD2-TBLS7.XLSX\78—10/18/2013

Table 7-9. Existing SO_2 Increment-Consuming Sources

Facility Name / Model ID	UTM Coordinates (meters) X	UTM Coordinates (meters) Y	Elevation (meters)	SO_2 Emissions Rate lb/hr	SO_2 Emissions Rate g/s	Stack Height ft	Stack Height meters	Exhaust Temperature °F	Exhaust Temperature K	Exhaust Velocity ft/s	Exhaust Velocity m/s	Exhaust Diameter ft	Exhaust Diameter meters
JEA Northside/SJRPP (ID 0310045)													
JEANOR16	447,050.00	3,366,790.00	2.72	7,379.52	929.82	640.16	195.12	155.73	341.89	76.80	23.41	22.31	6.80
JEANOR17	446,900.00	3,366,300.00	2.72	7,379.52	929.82	640.16	195.12	155.73	341.89	72.51	22.10	22.31	6.80
JEANOR27	446,960.00	3,365,210.00	2.72	553.25	69.71	495.11	150.91	143.73	335.22	66.01	20.12	14.99	4.57
JEANOR26	446,870.00	3,365,180.00	2.72	553.25	69.71	495.11	150.91	143.73	335.22	66.01	20.12	14.99	4.57
JEANOR33	446,820.00	3,365,150.00	2.72	0.32	0.04	75.03	22.87	164.73	346.89	75.33	22.96	3.41	1.04
Cedar Bay Generating Co (ID 0310337)													
CEDBAY01	441,690.00	3,365,790.00	2.72	319.21	40.22	403.12	122.87	264.72	402.44	120.05	36.59	13.29	4.05
CEDBAY02	441,670.00	3,365,770.00	2.72	319.21	40.22	403.12	122.87	264.72	402.44	120.05	36.59	13.29	4.05
CEDBAY03	441,650.00	3,365,750.00	2.72	319.21	40.22	403.12	122.87	264.72	402.44	120.05	36.59	13.29	4.05
CEDBAY05	441,830.00	3,365,740.00	2.72	0.79	0.10	63.02	19.21	194.74	363.56	59.81	18.23	4.17	1.27
CEDBAY04	441,710.00	3,365,670.00	2.72	0.79	0.10	63.02	19.21	194.74	363.56	59.81	18.23	4.17	1.27
JEA Brandy Branch Facility (ID 0310485)													
JEABRBF1	408,820.00	3,354,650.00	24.38	33.02	4.16	90.03	27.44	1,080.73	855.78	106.33	32.41	18.01	5.49
JEABRBF2	408,870.00	3,354,660.00	24.38	32.78	4.13	90.03	27.44	1,080.73	855.78	106.33	32.41	18.01	5.49

Note: lb/hr = pound per hour. ft = foot. °F = degree Fahrenheit. ft/s = foot per second.
g/s = gram per second. K = Kelvin. m/s = meter per second.

Source: ECT, 2013.

Table 7-10. Existing PM_{10}/$PM_{2.5}$ Increment-Consuming Sources

Facility Name	UTM Coordinates (meters)		Elevation	PM Emissions Rate		Stack Height		Exhaust Temperature		Exhaust Velocity		Exhaust Diameter	
Model ID	X	Y	(meters)	lb/hr	g/s	ft	meters	°F	K	ft/s	m/s	ft	meters
Cedar Bay Generating Co (ID 0310337)													
CEDBAY06	441,700.00	3,365,810.00	2.72	0.11	0.01	20.01	6.10	76.73	298.00	24.80	7.56	1.90	0.58
CEDBAY07	441,680.00	3,365,810.00	2.72	0.57	0.07	142.03	43.29	76.73	298.00	54.63	16.65	2.99	0.91
CEDBAY09	441,670.00	3,365,760.00	2.72	0.16	0.02	90.03	27.44	101.73	311.89	113.71	34.66	1.12	0.34
CEDBAY10	441,720.00	3,365,740.00	2.72	0.02	0.00	25.00	7.62	95.74	308.56	35.79	10.91	0.62	0.19
CEDBAY25	441,620.00	3,365,830.00	2.72	0.17	0.02	89.01	27.13	101.73	311.89	116.24	35.43	1.12	0.34
CEDBAY32	441,640.00	3,365,820.00	2.72	0.05	0.01	104.04	31.71	79.74	299.67	131.04	39.94	0.52	0.16
CEDBAY33	441,760.00	3,365,740.00	2.72	0.08	0.01	138.02	42.07	126.73	325.78	164.93	50.27	0.69	0.21
JEA Northside/SJRPP (ID 0310045)													
JEANOR29	446,820.00	3,365,150.00	2.72	0.02	0.00	8.01	2.44	76.73	298.00	127.33	38.81	2.00	0.61
JEANOR31	446,820.00	3,365,150.00	2.72	0.00	0.00	160.04	48.78	76.73	298.00	382.09	116.46	0.98	0.30
JEANOR32	446,930.00	3,367,070.00	2.72	0.00	0.00	90.03	27.44	67.73	293.00	0.00	0.00	1.71	0.52
JEANOR34	446,820.00	3,365,150.00	2.72	0.05	0.01	30.02	9.15	77.74	298.56	131.82	40.18	1.31	0.40
JEANOR35	447,040.00	3,365,150.00	2.72	0.03	0.00	130.02	39.63	67.73	293.00	67.91	20.70	0.98	0.30
JEANOR36	446,820.00	3,365,150.00	2.72	0.00	0.00	60.01	18.29	149.74	338.56	0.00	0.00	0.49	0.15
JEANOR37	446,820.00	3,365,150.00	2.72	0.02	0.00	120.05	36.59	149.74	338.56	53.12	16.19	0.98	0.30
JEANOR38	446,820.00	3,365,150.00	2.72	0.02	0.00	95.01	28.96	149.74	338.56	53.12	16.19	0.98	0.30
JEANOR39	446,930.00	3,367,070.00	2.72	0.22	0.03	130.02	39.63	149.74	338.56	0.00	0.00	1.51	0.46
JEANOR40	446,930.00	3,367,070.00	2.72	0.01	0.00	25.00	7.62	149.74	338.56	0.00	0.00	0.66	0.20
JEANOR41	446,930.00	3,367,070.00	2.72	0.01	0.00	25.00	7.62	149.74	338.56	0.00	0.00	0.66	0.20
JEANOR42	446,820.00	3,365,150.00	2.72	0.01	0.00	70.01	21.34	79.74	299.67	127.33	38.81	0.49	0.15
JEANOR43	446,930.00	3,367,060.00	2.72	0.08	0.01	38.02	11.59	67.73	293.00	0.00	0.00	2.49	0.76
Rock Tenn Jacksonville Mill (ID 031310067)													
ROCTEN06	456,310.00	3,394,440.00	2.72	137.22	17.29	257.05	78.35	449.73	505.22	41.21	12.56	10.99	3.35
ROCTEN21	456,520.00	3,394,550.00	3.65	38.54	4.86	101.02	30.79	349.74	449.67	159.45	48.60	3.12	0.95

Note: lb/hr = pound per hour.
g/s = gram per second.
ft = foot.
°F = degree Fahrenheit.
K = Kelvin.
ft/s = foot per second.
m/s = meter per second.

Source: ECT, 2013.

8.0 AIR QUALITY MODELING RESULTS

Comprehensive dispersion modeling was conducted to assess the air quality impacts resulting from the Jacksonville Lime project in accordance with the methodology described in Section 7.0 and the modeling protocols contained in Appendix G. This section provides the results of the project Class II air quality assessment for CO, SO_2, NO_2, PM_{10}, and $PM_{2.5}$. The AERMOD dispersion model was used to assess the impacts in the surrounding Class II areas for each modeled pollutant and averaging period (i.e., annual, 24-, 8-, 3-, and 1-hour) subject to PSD review for each year of the 5 years of meteorological data (2006 through 2010).

The primary objective of the air quality analysis is to demonstrate that emissions from the proposed project will not cause or significantly contribute to a violation of any NAAQS or PSD increment. Refined modeling results obtained from the AERMOD modeling system have been summarized in tabular format. For the PSD preconstruction ambient air quality monitoring *de minimis* and Class II SIL analyses, the model result tables indicate, for each pollutant, the year of meteorology, applicable averaging period, and magnitude and location of the maximum modeled impact.

A cumulative analysis was necessary to show compliance with the NAAQS for the following pollutants and averaging times:

- $\underline{NO_2}$: 1-hour and annual average.
- $\underline{SO_2}$: 1-hour average.
- $\underline{PM_{10}}$: 24-hour average and annual average.
- $\underline{PM_{2.5}}$: 24-hour and annual average.

The cumulative model results tables indicate the year of meteorology, applicable averaging period, magnitude and location of the maximum modeled impact, background concentration, and total impact. Since a 1-hour PSD Class II increment has not been established for SO_2 or NO_2, that analysis was not applicable for those pollutants and averaging times. The summary tables include the PSD SMCs, Class II SILs, and the NAAQS, as appropriate, for comparison purposes. The following subsections provide the model results specific to each pollutant. Table 8-1 summarizes the results of the PSD Class II analysis. More detailed results are provided in the following subsections.

8.1 AIR QUALITY IMPACT ANALYSIS FOR CO

Tables 8-2 and 8-3 provide the SIL modeling results for the CO 1- and 8-hour averaging times. Since all impacts are well below the SILs, no further analysis is required, i.e., the proposed project will not contribute significantly to any predicted violation of a NAAQS.

8.2 AIR QUALITY IMPACT ANALYSIS FOR SO_2

Table 8-4 presents the 1-hour averaging time SIL results for SO_2. As shown, the 1-hour impacts are higher than the SIL. As shown in Table 8-5, Jacksonville Lime does not contribute significantly to any of the more than 65,000 predicted violations of the 1-hour NAAQS. The violations are being caused by large sources in the area that have permitted limits far greater than what they actually emit. Several of the sources at these facilities are expected to reduce their allowable emissions in the future. The sulfur content of the fuel for the kilns was modeled at approximately 4.25 percent, for a combined SO_x emissions rate of 35.79 pounds per hour (lb/hr). This is less than the sulfur content of 5.2 percent that was originally proposed.

Table 8-6 presents the SIL modeling results for the 3-hour SO_2 averaging time. Since all impacts are below the SIL, no further analysis is required to show compliance with the NAAQS or PSD increment.

Table 8-7 presents the SIL modeling results for the 24-hour SO_2 averaging time. Since the maximum predicted concentration was above the SIL, it was necessary to evaluate the PSD increment. Table 8-8 provides the results of the PSD increment analysis.

Table 8-9 presents the SIL modeling results for the annual SO_2 averaging time. Since all impacts are below the SIL, no further analysis is required to show compliance with the PSD increment.

Table 8-1. Summary of Class II Analysis

		Emissions (µg/m^3)							
Pollutant	Averaging Time	Maximum Jacksonville Lime Impact	PSD SIL	Jacksonville Lime Impact >SIL	*De Minimis* Monitoring Level	Cumulative Impact (With Background)	NAAQS	Impact of Jacksonville Lime and Other Increment Sources	PSD Increment
NO_2	Annual	1.1	1	Yes	14	4.15	100	3.42	25
	1-Hour	41.3	7.5	Yes	—	189.3*	188	N/A	—
PM_{10}	Annual	1.5	1	Yes	—	N/A	—	1.52	17
	24-Hour	13.8	5	Yes	10	99.8	150	10.14	30
$PM_{2.5}$	Annual	0.25	0.3	No	—	<SIL	12	<SIL	4
	24-Hour	1.63	1.2	Yes	4	55.2	35	3.46	9
SO_2	Annual	0.63	1	No	—	N/A	—	<SIL	20
	24-Hour	9.18	5	Yes	13	N/A	—	62.6	91
	3-hour	20.7	25	No	—	< SIL	1,300	<SIL	512
	1-Hour	19.66	7.8	Yes	—	3,459*	196	N/A	—
CO	8-Hour	44.0	500	No	575	< SIL	10,000	N/A	—
	1-Hour	60.1	2,000	No	—	< SIL	40,000	N/A	—

*Jacksonville Lime's impact was less than the SIL at all predicted violations.

Source: ECT, 2013.

Y:\GDP-13\PRJ\JXLM-PSD2-TBLS8.XLSX\81—10/23/2013

Table 8-2. CO 1-Hour Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted CO impact (μg/m^3)*	55.0	60.1	59.4	56.3	53.5
Receptor UTM Easting (meter)	438,819.13	439,119.13	439,119.13	439,019.13	439,019.13
Receptor UTM Northing (meter)	3,359,318.50	3,359,118.50	3,359,118.50	3,359,118.50	3,359,118.50
Distance from grid origin (meter)†	598	541	541	589	589
Direction from grid origin (Vector degrees)†	240	204	204	213	213
Receptor elevation (meter, amsl)	4.74	4.82	4.82	5.16	5.16
PSD modeling SIL (μg/m^3)	2,000	2,000	2,000	2,000	2,000
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	2.8	3.0	3.0	2.8	2.7

*Based on the worst-case operating scenario.
†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-3. CO 8-Hour Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted CO impact ($\mu g/m^3$)*	35.7	44.0	37.9	40.6	36.8
Receptor UTM Easting (meter)	438,819.13	439,119.13	439,019.13	438,719.13	438,919.13
Receptor UTM Northing (meter)	3,359,318.50	3,359,118.50	3,359,218.50	3,359,518.50	3,359,218.50
Distance from grid origin (meter)†	598	541	508	627	576
Direction from grid origin (Vector degrees)†	240	204	219	261	227
Receptor elevation (meter, amsl)	4.74	4.82	5.20	4.08	5.39
PSD modeling SIL ($\mu g/m^3$)	500	500	500	500	500
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	7.1	8.8	7.6	8.1	7.4

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-4. SO_2 1-Hour Average SIL Analysis Results

	5-Year Average
Maximum predicted SO_2 impact ($\mu g/m^3$)	19.66
Receptor UTM Easting (meter)	439,119.13
Receptor UTM Northing (meter)	3,359,118.50
Distance from grid origin (meter)*	0.54
Direction from grid origin (Vector degrees)*	204
Receptor elevation (meter, amsl)	4.82
PSD modeling SIL ($\mu g/m^3$)	7.8
Exceed PSD modeling SIL? (Yes/No)	Yes
Percent of PSD modeling SIL (%)	252.1

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-5. Cumulative 1-Hour Average SO_2 NAAQS Analysis Results

Parameter	2006 through 2010 5-Year Average All Sources
Highest 99th percentile of 1-hour daily maximum SO_2 impact ($\mu g/m^3$)	3,416.05
Receptor UTM Easting (meter)	439,319.13
Receptor UTM Northing (meter)	3,357,818.50
Receptor Elevation (meter, amsl)	4.55
Distance from kiln stack (km)*	1.79
Direction from kiln stack (degrees)*	180.64
Background 1-hour SO_2 Concentration ($\mu g/m^3$)†	42.64
Total 1-hour SO_2 concentration ($\mu g/m^3$)	3,458.69
Jacksonville Lime contribution ($\mu g/m^3$)	0.01
Jacksonville Lime contribution (%)	0.0003
1-hour SO_2 NAAQS ($\mu g/m^3$)	197.0
Exceed 1-hour NAAQS (Yes/No)	Yes
Percent of 1-hour NAAQS (%)	1,755.68
Number of modeled exceedences of the 1-hour SO_2 NAAQS ($\mu g/m^3$)‡	65,171
Number of Jacksonville Lime significant impacts to modeled exceedances	0
EPA 1-hour NO_2 recommended interim SIL ($\mu g/m^3$)	7.80
Maximum contribution to an exceedance ($\mu g/m^3$)	7.51
Exceedance concentration, including background ($\mu g/m^3$)	363.35
Receptor UTM Easting (meter)	438,519.13
Receptor UTM Northing (meter)	3,358,818.50
Receptor Elevation (meter, amsl)	5.47
Distance from kiln stack (km)	1.14
Direction from kiln stack (degrees)	225.90

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting 439,339.19 m and UTM Northing 3,359,613.08 m.

†Three-year average of 1-hour 99th percentile SO2 values for 2010, 2011, and 2012 from the Kooker Park monitor (Station ID: 120310032).

‡Including all ranks and background concentration.

Source: ECT, 2013.

Table 8-6. SO_2 3-Hour Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted SO_2 impact ($\mu g/m^3$)	17.33	20.71	19.50	18.27	17.63
Receptor UTM Easting (meter)	439,219.13	439,119.13	439,119.13	439,219.13	439,019.13
Receptor UTM Northing (meter)	3,359,118.50	3,359,118.50	3,359,118.50	3,359,018.50	3,359,118.50
Distance from grid origin (meter)*	509	541	541	607	589
Direction from grid origin (Vector degrees)*	194	204	204	191	213
Receptor elevation (meter, amsl)	4.87	4.82	4.82	5.16	5.16
PSD modeling SIL ($\mu g/m^3$)	25	25	25	25	25
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	69.3	82.8	78.0	73.1	70.5

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-7. SO_2 24-Hour Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted SO_2 impact ($\mu g/m^3$)	5.52	7.29	9.18	7.22	5.40
Receptor UTM Easting (meter)	438,919.13	439,119.13	438,919.13	439,219.13	438,919.13
Receptor UTM Northing (meter)	3,359,118.50	3,359,118.50	3,359,018.50	3,358,918.50	3,359,118.50
Distance from grid origin (meter)*	649	541	728	705	649
Direction from grid origin (Vector degrees)*	220	204	215	190	220
Receptor elevation (meter, amsl)	5.47	4.82	5.72	5.17	5.47
PSD modeling SIL ($\mu g/m^3$)	5	5	5	5	5
Exceed PSD modeling SIL? (Yes/No)	Yes	Yes	Yes	Yes	Yes
Percent of PSD modeling SIL (%)	110.4	145.8	183.6	144.4	108.0

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-8. Cumulative 24-hour Average SO_2 Increment Analysis

	2006	2007	2008	2009	2010
Maximum predicted SO2 impact (μg/m^3)*	59.65	42.1	54.3	62.6	31.7
Receptor UTM Easting (meter)	438,619.13	439,819.13	439,819.13	438,819.13	438,919.13
Receptor UTM Northing (meter)	3,359,718.50	3,360,218.50	3,360,218.50	3,359,118.50	3,359,118.50
Distance from grid origin (meter)†	728	773	773	718	649
Direction from grid origin (Vector degrees)†	278	38	38	226	220
Receptor elevation (meter, amsl)	2.09	0	0	5.52	5.47
PSD modeling Increment (μg/m^3)	91	91	91	91	91
Exceed PSD modeling Increment? (Yes/No)	No	No	No	No	No
Percent of PSD modeling Increment (%)	65.5	46.3	59.7	68.8	34.8

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Y:\GDP-13\PRJ\JXLM-PSD2-TBLS8.XLSX\88—10/23/2013

Table 8-9. SO_2 Annual Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted SO_2 impact ($\mu g/m^3$)	0.55	0.63	0.48	0.47	0.53
Receptor UTM Easting (meter)	439,885.57	438,719.13	439,841.81	439,719.13	439,978.32
Receptor UTM Northing (meter)	3,359,410.07	3,359,518.50	3,359,781.31	3,360,018.50	3,359,440.02
Distance from grid origin (meter)†	583	627	530	556	662
Direction from grid origin (Vector degrees)†	110	261	71	43	105
Receptor elevation (meter, amsl)	2.72	4.08	0.13	0	1.88
PSD modeling SIL ($\mu g/m^3$)	1	1	1	1	1
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	55.0	63.0	48.0	47.0	53.0

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Y:\GDP-13\PRJ\JXLM-PSD2-TBLS8.XLSX\89—10/22/2013

8.3 AIR QUALITY IMPACT ANALYSIS FOR NO_2

Table 8-10 presents the 1-hour NO_2 SIL modeling results. Since the SIL was exceeded, a cumulative analysis was performed to show compliance with the NAAQS. As shown in Table 8-11, Jacksonville Lime did not contribute significantly to any of the predicted violations of the 1-hour NO_2 NAAQS.

Table 8-12 presents the annual averaging time results for NO_2. As can be seen, the annual SIL was slightly exceeded. Table 8-13 contains the results of the cumulative analysis, which shows that the project will not contribute to a violation of the annual NAAQS. Also the project will not contribute significantly to an exceedance of the annual PSD increment as shown in Table 8-14.

8.4 AIR QUALITY IMPACT ANALYSIS FOR PM_{10}

Table 8-15 provides the results of the 24-hour SIL analysis for PM_{10}. Since the PM_{10} SIL was exceeded, additional modeling was performed to show compliance with the 24-hour PM_{10} NAAQS and PSD increment. As shown in Table 8-16, the Jacksonville Lime project will not contribute significantly to any violation of the PM_{10} 24-hour NAAQS. In addition, the results of the modeling demonstrate that the project will not contribute significantly to any exceedance of the 24-hour PM_{10} PSD increment (see Table 8-17).

Table 8-18 presents the results of the annual SIL analysis for PM_{10}. Since the PM_{10} SIL was exceeded, additional modeling was performed to show compliance with the annual PM_{10} PSD increment. As shown in Table 8-19, the Jacksonville Lime project will not contribute significantly to any exceedance of the annual PM_{10} PSD increment.

Table 8-10. NO_2 1-Hour Average SIL Analysis Results

	5-Year Average
Tier 3 maximum predicted NO_2 impact ($\mu g/m^3$)*	41.28
Receptor UTM Easting (meter)	439,119
Receptor UTM Northing (meter)	3,359,119
Distance from grid origin (meter)†	541
Direction from grid origin (Vector degrees)†	204
Receptor elevation (meter, amsl)	4.82
PSD modeling SIL ($\mu g/m^3$)	7.5
Exceed PSD modeling SIL? (Yes/No)	Yes
Percent of PSD modeling SIL (%)	550.4

*Based on the worst-case operating scenario, assuming complete conversion of NO_x to NO_2.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-11. Cumulative 1-Hour Average NO_2 NAAQS Analysis Results

Parameter	2006 through 2010 5-Year Average All Sources
Highest Tier 3 98th percentile of 1-hour daily maximum NO_2 impact ($\mu g/m^3$)*	144.90
Receptor UTM Easting (meter)	447,219.13
Receptor UTM Northing (meter)	3,363,418.50
Receptor Elevation (meter, amsl)	0.00
Distance from kiln stack (km)**	8.75
Direction from kiln stack (degrees)**	64
Background 1-hour NO_2 Concentration ($\mu g/m^3$)†	44.37
Total 1-hour NO_2 concentration ($\mu g/m^3$)	189.27
JL contribution ($\mu g/m^3$)	0.03
JL contribution (%)	0.02
1-hour NO_2 NAAQS ($\mu g/m^3$)	188
Exceed 1-hour NAAQS (Yes/No)	Yes
Percent of 1-hour NAAQS (%)	100.7
Number of modeled exceedences of the 1-hour NO_2 NAAQS ($\mu g/m^3$)‡	3
Number of JL significant impacts to modeled exceedances	0
EPA 1-hour NO_2 recommended interim SIL ($\mu g/m^3$)	7.5
Maximum JL contribution to an exceedance ($\mu g/m^3$)	0.04
Exceedance concentration, including background ($\mu g/m^3$)	189.13
Receptor UTM Easting (meter)	447,219.13
Receptor UTM Northing (meter)	3,363,418.50
Receptor Elevation (meter, amsl)	0.00
Distance from kiln stack (meter)	8.75
Direction from kiln stack (degrees)	64

*Tier 3 impact based on ozone limiting method.

**Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting 439,339.19 m, and UTM Northing 3,359,613.08 m.

†Three-year hour-of-day average of 1-hour NO2 values for 2010, 2011, and 2012 from Station ID: 120310032 (Kooker Park, Duval County).

‡Including all ranks and background concentration.

Source: ECT, 2013.

Table 8-12. NO_2 Annual Average SIL Analysis Results

	2006	2007	2008	2009	2010
Tier 1 maximum predicted NO_2 impact ($\mu g/m^3$)	1.30	1.51	1.16	1.13	1.27
Tier 2 maximum predicted NO_2 impact ($\mu g/m^3$)	0.97	1.13	0.87	0.85	0.95
Receptor UTM Easting (meter)	439,885.57	438,719	439,842	439,719.13	439,932
Receptor UTM Northing (meter)	3,359,410.07	3,359,518.50	3,359,781.31	3,360,018.50	3,359,425.05
Distance from grid origin (meter)	583	627	530	556	622
Direction from grid origin (Vector degrees)*	110	261	71	43	108
Receptor elevation (meter, amsl)*	2.72	4.08	0.13	0	2.13
PSD modeling SIL ($\mu g/m^3$)	1	1	1	1	1
Exceed PSD modeling SIL? (Yes/No)	No	Yes	No	No	No
Percent of PSD modeling SIL (%)	97.3	113.3	87.0	84.7	95.3
PSD monitoring *de minimis* impact level ($\mu g/m^3$)	14.0	14.0	14.0	14.0	14.0
Exceed PSD monitoring *de minimis* impact level? (Yes/No)	No	No	No	No	No
Percent of PSD monitoring *de minimis* impact level (%)	9.3	10.8	8.3	8.1	9.1

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-13. Cumulative Annual Average NO_2 NAAQS Analysis Results

Parameter	2007
Highest Tier 1 maximum annual NO_2 impact ($\mu g/m^3$)	5.53
Highest Tier 2 maximum annual NO_2 impact ($\mu g/m^3$)*	4.15
Receptor UTM Easting (meter)	438,719.13
Receptor UTM Northing (meter)	3,359,518.50
Receptor Elevation (meter, amsl)	4.08
Distance from kiln stack (km)†	0.63
Direction from kiln stack (degrees)†	261
Background Annual NO_2 Concentration ($\mu g/m^3$)‡	17
Total annual NO_2 concentration ($\mu g/m^3$)	21.15
JL contribution ($\mu g/m^3$)	1.49
JL contribution (%)	7.07
Annual NO_2 NAAQS ($\mu g/m^3$)	100
Exceed 1-hour NAAQS (Yes/No)	No
Percent of 1-hour NAAQS (%)	21.1

*Tier 1 impact times EPA default NO_2/NO_x ration of 0.75.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

‡Based on highest annual average of years 2008 through 2010 from Station ID 120310032 (Kooker Park, Duval County).

Source: ECT, 2013.

Table 8-14. Cumulative Annual Average NO_2 PSD Increment Analysis

	2007
Tier 1 maximum predicted NO_2 impact ($\mu g/m^3$)	3.42
Tier 2 maximum predicted NO_2 impact ($\mu g/m^3$)	2.57
Receptor UTM Easting (meter)	438,719.13
Receptor UTM Northing (meter)	3,359,518.50
Distance from grid origin (meter)	627
Direction from grid origin (Vector degrees)*	261
Receptor elevation (meter, amsl)	4.08
PSD modeling Increment ($\mu g/m^3$)	25
Exceed PSD modeling Increment? (Yes/No)	No
Percent of PSD modeling Increment (%)	10.3

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-15. PM_{10} 24-Hour Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted impact (µg/m^3)*	6.26	12.26	8.77	13.78	9.84
Receptor UTM Easting (meter)	439,220.51	439,256.84	439,220.51	439,327.99	439,220.51
Receptor UTM Northing (meter)	3,359,470.19	3,359,454.86	3,359,470.19	3,359,411.05	3,359,470.19
Distance from grid origin (meter)†	186	178	186	202	186
Direction from grid origin (Vector degrees)†	220	207	220	183	220
Receptor elevation (meter, amsl)	4.86	5	4.86	5	5
PM_{10} modeling SIL (µg/m^3)	5	5	5	5	5
Exceed PSD modeling SIL? (Yes/No)	Yes	Yes	Yes	Yes	Yes
Percent of PSD modeling SIL (%)	125.2	245.2	175.4	275.6	196.8
PSD monitoring *de minimis* impact level (µg/m^3)	10.0	10.0	10.0	10.0	10.0
Exceed PSD monitoring *de minimis* impact level? (Yes/No)	No	Yes	No	Yes	No
Percent of PSD monitoring *de minimis* impact level (%)	62.6	122.6	87.7	137.8	98.4

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-16. Cumulative 24-Hour Average PM_{10} NAAQS Analysis Results

Parameter	2006-2010 All Sources
Sixth highest 24-hour 5-year average daily maximum PM_{10} impact (μg/m^3)	31.77
Receptor UTM Easting (meter)	439,327.99
Receptor UTM Northing (meter)	3,359,411.05
Receptor elevation (meter, amsl)	4.54
Distance from kiln stack (km)*	0.20
Direction from kiln stack (degrees)*	183
Background 24-hour PM_{10} Concentration (μg/m^3)†	68
Total 24-hour PM10 concentration (μg/m^3)	99.77
Jacksonville Lime contribution (μg/m^3)	0.76
Jacksonville Lime contribution (%)	0.76
24-hour PM_{10} NAAQS (μg/m^3)	150
Exceed 1-hour NAAQS (Yes/No)	No
Percent of 1-hour NAAQS (%)	66.5
Number of modeled exceedences of the 24-hour PM_{10} NAAQS (μg/m^3)‡	0
Number of Jacksonville Lime significant impacts to modeled exceedances	N/A
EPA 24-hour PM_{10} recommended interim SIL (μg/m^3)	5
Maximum contribution to an exceedance (μg/m^3)	N/A
Exceedance concentration, including background (μg/m^3)	N/A
Receptor UTM Easting (meter)	N/A
Receptor UTM Northing (meter)	N/A
Receptor Elevation (meter, amsl)	N/A
Distance from kiln stack (meter)	N/A
Direction from kiln stack (degrees)	N/A

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

†Three-year average of second-high PM_{10} values for 2010, 2011, and 2012 from Station ID 120310032 (Kooker Park, Duval County).

‡Including all ranks and background concentration.

Source: ECT, 2013.

Table 8-17. Cumulative 24-hour PM_{10} PSD Increment Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted PM impact ($\mu g/m^3$)*	6.40	10.12	8.6	10.14	8.60
Receptor UTM Easting (meter)	439,256.84	439,256.84	439,292.42	439,363.57	439,220.50
Receptor UTM Northing (meter)	3,359,454.86	3,359,454.86	3,359,432.96	3,359,389.15	3,359,470.10
Distance from grid origin (meter)†	178	178	186	225	186
Direction from grid origin (Vector degrees)†	207	207	195	174	220
Receptor elevation (meter, amsl)	4.87	4.87	4.71	4.28	4.86
PSD modeling Increment ($\mu g/m^3$)	30	30	30	30	30
Exceed PSD modeling Increment? (Yes/No)	No	No	No	No	No
Percent of PSD modeling Increment (%)	21.3	33.7	28.7	33.8	28.7

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-18. PM_{10} Annual Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted impact ($\mu g/m^3$)*	0.81	1.48	1.05	1.18	1.03
Receptor UTM Easting (meter)	439,157.28	439,292.42	439,256.84	439,327.99	439,292.42
Receptor UTM Northing (meter)	3,359,535.28	3,359,432.96	3,359,454.86	3,359,411.05	3,359,432.96
Distance from grid origin (meter)†	198	186	178	202	186
Direction from grid origin (Vector degrees)†	247	195	207	183	195
Receptor elevation (meter, amsl)	4.14	5	5	4.54	4.71
PM_{10} modeling SIL ($\mu g/m^3$)	1	1	1	1	1
Exceed PSD modeling SIL? (Yes/No)	No	Yes	Yes	Yes	Yes
Percent of PSD modeling SIL (%)	81.0	148.0	105.0	118.0	103.0

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-19. Cumulative Annual Average PM_{10} PSD Increment Analysis Results

	2007	2008	2009	2010
Maximum predicted PM impact ($\mu g/m^3$)*	1.52	1.10	1.22	1.06
Receptor UTM Easting (meter)	439,292.42	439,256.84	439,327.99	439,292.42
Receptor UTM Northing (meter)	3,359,432.96	3,359,454.86	3,359,411.05	3,359,432.96
Distance from grid origin (meter)†	186	178	202	186
Direction from grid origin (Vector degrees)†	195	207	183	195
Receptor elevation (meter, amsl)	4.71	4.87	4.54	4.71
PSD modeling Increment ($\mu g/m^3$)	17	17	17	17
Exceed PSD modeling Increment? (Yes/No)	No	No	No	No
Percent of PSD modeling Increment (%)	8.9	6.5	7.2	6.2

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

8.5 AIR QUALITY IMPACT ANALYSIS FOR $PM_{2.5}$

Table 8-20 presents the 24-hour $PM_{2.5}$ SIL modeling results. In addition to the 5-year average value exceeding the SIL, modeling also showed that the 24-hour PM_{10} SIL would be exceeded in each individual year. As shown in Table 8-21, the Jacksonville Lime project will not contribute significantly to any violation of the $PM_{2.5}$ 24-hour NAAQS. In addition, the results of the modeling demonstrate that the project will not contribute significantly to any exceedance of the 24-hour $PM_{2.5}$ PSD increment (see Table 8-22).

Table 8-23 provides the results of the annual SIL analysis for $PM_{2.5}$. Since the $PM_{2.5}$ SILs were not exceeded, additional modeling was not required to show compliance with the annual $PM_{2.5}$ NAAQS and PSD increment.

Table 8-20. $PM_{2.5}$ 24-Hour Average Analysis Results

	5-year Average
Maximum predicted impact (µg/m^3)	1.63
Receptor UTM Easting (meter)	439220.51
Receptor UTM Northing (meter)	3359470.19
Distance from grid origin (meter)*	186
Direction from grid origin (Vector degrees)*	220
Receptor elevation (meter, amsl)	4.86
$PM_{2.5}$ modeling SIL (µg/m^3)	1.2
Exceed PSD modeling SIL? (Yes/No)	Yes
Percent of PSD modeling SIL (%)	135.8
PSD monitoring *de minimis* impact level (µg/m^3)	4.0
Exceed PSD monitoring *de minimis* impact level? (Yes/No)	No
Percent of PSD monitoring *de minimis* impact level (%)	40.8

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-21. Cumulative 24-Hour Average $PM_{2.5}$ NAAQS Analysis Results

Parameter	2006 through 2010 5-Year Average All Sources
Highest 98th percentile of 24-hour daily maximum $PM_{2.5}$ impact (μg/m³)	34.58
Receptor UTM Easting (meter)	439,327.99
Receptor UTM Northing (meter)	3,359,411.05
Receptor Elevation (meter, amsl)	4.86
Distance from kiln stack (km)*	0.20
Direction from kiln stack (degrees)*	183
Background 24-hour $PM_{2.5}$ Concentration (μg/m³)†	20.6
Total 24-hour $PM_{2.5}$ concentration (μg/m³)	55.18
Jacksonville Lime contribution (μg/m³)	0.19
Jacksonville Lime contribution (%)	0.34
24-hour $PM_{2.5}$ NAAQS (μg/m³)	35
Exceed 1-hour NAAQS (Yes/No)	Yes
Percent of 1-hour NAAQS (%)	157.7
Number of modeled exceedences of the 24-hour $PM_{2.5}$ NAAQS (μg/m³)‡	197
Number of Jacksonville Lime significant impacts to modeled exceedances	0
EPA 24-hour $PM_{2.5}$ recommended interim SIL (μg/m³)	1.2
Maximum contribution to an exceedance (μg/m³)	0.6
Exceedance concentration, including background (μg/m³)	43.25
Receptor UTM Easting (meter)	439,256.84
Receptor UTM Northing (meter)	3,359,454.86
Receptor Elevation (meter, amsl)	4.87
Distance from kiln stack (meter)	0.18
Direction from kiln stack (degrees)	207

*Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439339.19, and UTM Northing 3,359,613.08.

†Three-year average of 1-hour 98th percentile PM2.5 values for 2010, 2011, and 2012 from Station ID: 120310032 (Kooker Park, Duval County).

‡Including all ranks and background concentration.

Source: ECT, 2013.

Table 8-22. Cumulative 24-hour Average $PM_{2.5}$ PSD Increment Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted PM2.5 impact ($\mu g/m^3$)*	1.98	3.41	2.55	3.46	2.61
Receptor UTM Easting (meter)	439,220.51	439,256.84	439,292.42	439,327.99	439,220.51
Receptor UTM Northing (meter)	3,359,470.19	3,359,454.86	3,359,432.96	3,359,411.05	3,359,470.19
Distance from grid origin (meter)†	186	178	186	202	186
Direction from grid origin (Vector degrees)†	220	207	195	183	220
Receptor elevation (meter, amsl)	4.86	4.87	4.71	4.54	4.86
PSD modeling Increment ($\mu g/m^3$)	9	9	9	9	9
Exceed PSD modeling Increment? (Yes/No)	No	No	No	No	No
Percent of PSD modeling Increment (%)	22.0	37.9	28.3	38.4	25.7

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Table 8-23. $PM_{2.5}$ Annual Average SIL Analysis Results

	2006	2007	2008	2009	2010
Maximum predicted impact ($\mu g/m^3$)*	0.15	0.25	0.18	0.20	0.15
Receptor UTM Easting (meter)	439,157.28	439,256.84	439,256.84	439,256.84	439,157.28
Receptor UTM Northing (meter)	3,359,535.28	3,359,454.86	3,359,454.86	3,359,454.86	3,359,535.28
Distance from grid origin (meter)†	198	178	178	178	198
Direction from grid origin (Vector degrees)†	247	207	207	207	247
Receptor elevation (meter, amsl)	4.14	5	4.87	5	4.14
$PM_{2.5}$ PSD modeling SIL ($\mu g/m^3$)	0.3	0.3	0.3	0.3	0.3
Exceed PSD modeling SIL? (Yes/No)	No	No	No	No	No
Percent of PSD modeling SIL (%)	49.9	83.3	60.0	66.7	50.0
$PM_{2.5}$ PSD modeling SIL ($\mu g/m^3$)	0.06	0.06	0.06	0.06	0.06
Exceed PSD modeling SIL? (Yes/No)	Yes	Yes	Yes	Yes	Yes
Percent of PSD modeling SIL (%)	249.3	416.7	300.0	333.3	250.0

*Based on the worst-case operating scenario.

†Distance and direction measured from location of kiln stack, i.e., Grid Origin = UTM Easting (meters) 439,339.19, and UTM Northing 3,359,613.08.

Source: ECT, 2013.

Y:\GDP-13\PRJ\JXLM-PSD2-TBLS8.XLSX\823—10/22/2013

9.0 ADDITIONAL IMPACT ANALYSES

The additional impacts analysis, required for projects subject to PSD review, evaluates project impacts pertaining to associated growth; soils, vegetation, and wildlife; and visibility impairment. Each of these topics is discussed in the following subsections.

9.1 GROWTH IMPACT ANALYSIS

The purpose of the growth impact analysis is to quantify growth resulting from the construction and operation of the proposed project and assess air quality impacts that would result from that growth.

The Jacksonville Lime Project is being constructed to produce lime for sale on the open market; therefore, no significant secondary growth effects due to operation of the project are anticipated. Impacts associated with construction of the project will be minor. While not readily quantifiable, the temporary increase in vehicle miles traveled in the area would be insignificant, as would any temporary increase in vehicular emissions. There may be some noticeable increased traffic during the construction phase of the project, but it is not expected to cause any undue congestion. The construction period will be relatively short (i.e., it is expected that the plant can be built within 14 to 16 months). The peak number of construction workers during that time may reach 30 and will likely average less than 20.

This facility will not require a large workforce (i.e., it is designed to have approximately 22 fulltime employees). The increase in daily traffic should not be noticeable.

Since natural gas will be piped to the facility, and the bulk of other fuels and feed stone is expected to be delivered by ship, there will be few routine daily truck deliveries of bulk materials into or out of the facility. Occasional deliveries of parts and supplies will occur. Lime product will be loaded onto trucks and railcars for delivery to customers. An average of approximately 40 trucks per day will be required to carrying lime product and waste offsite. The expected level of traffic should not adversely affect the normal flow of traffic in and around the facility.

The increase in the demand of natural gas and other fuels due to the operation of the Jacksonville Lime facility will have no major impact on local fuel markets. No significant air quality impacts due to associated industrial/commercial growth are expected.

Duval County is classified as being in attainment of the NAAQS for all criteria pollutants. As discussed in Section 8.0, the relatively minor emissions associated with the operation of the Jacksonville Lime project will not cause any adverse air quality impacts and, therefore, will not endanger the air quality.

9.2 IMPACTS ON SOILS, VEGETATION, AND WILDLIFE

The Jacksonville Lime site is immediately bordered by low-density residential, industrial, and commercial land use. The St. Johns River borders the Keystone property to the north and east. There is a small park (i.e., Wigmore Park), largely consisting of open area to the southwest adjacent to the Keystone property.

Wildlife resources in the vicinity of Jacksonville Lime are fairly typical of northeast Florida. Based on a review of the limited literature on air pollutant effects on wildlife, it is unlikely that the levels of pollutants produced by the Jacksonville Lime project will cause injury or death to wildlife. Concentrations of pollutants will be low, emissions will be dispersed over a large area, and mobility of wildlife will minimize their exposure to any unusual concentrations caused by equipment malfunction or unique weather patterns.

Maximum air quality impacts in the vicinity due to Jacksonville Lime operations will be below the NAAQS. In fact, the air quality impacts were demonstrated to not significantly contribute to any predicted NAAQS violation or exceedance of a PSD increment. Accordingly, no adverse direct or indirect impacts on soils, vegetation, or wildlife in the vicinity of the Jacksonville Lime project are anticipated to occur as a result of the proposed project.

9.3 VISIBILITY IMPAIRMENT POTENTIAL

No visibility impairment at the local level is expected due to the types and quantities of emissions projected for the Jacksonville Lime project. Visible emissions from Jacksonville Lime will be 20 percent or less, excluding water, during normal operations. The Jacksonville Lime project will comply with all applicable FDEP requirements pertaining to visible emissions. Specifically, Jacksonville Lime will comply with the general visible emissions requirement listed under Section 62-296-320, Florida Administrative Code (F.A.C.).

10.0 CLASS I AREA IMPACT ANALYSIS

10.1 OVERVIEW

Comprehensive refined modeling was conducted to assess the Jacksonville Lime Class I area air quality impacts in accordance with EPA, Federal Land Managers (FLMs), and FDEP modeling guidance. This section provides the results of the Jacksonville Lime air quality assessment with respect to long-range transport air quality impacts at two PSD Class I areas: the Okefenokee and Wolf Island National Wilderness Areas (NWAs).

PSD Class I areas located within 300 km of Jacksonville Lime include the Okefenokee, Chassahowitzka, Bradwell Bay, Wolf Island, and St. Marks NWAs. Figure 10-1 provides the locations of the Class I areas in relation to the Jacksonville Lime project site. Everglades National Park is located more than 400 km south of Jacksonville Lime. The nearest PSD Class I areas are the Okefenokee NWA situated approximately 55 km (34 miles) to the northwest of Jacksonville Lime and the Wolf Island NWA situated approximately 112 km (70 miles) north northeast of Jacksonville Lime.

10.2 INITIAL SCREENING ANALYSIS

For new sources that will be located at a distance of 50 km or greater from a Class I area, the Federal Land Managers' Air Quality-Related Values Workgroup (FLAG) 2008 draft guidance on initial screening criteria recommends using the ratio of potential project emissions rates divided by the project's distance from a Class I area (i.e., Q/D or 10D Rule) to determine whether an assessment of Class I area air quality-related values (AQRVs) is necessary. This screening approach is similar to that implemented by EPA as part of its Regional Haze Regulation. Potential project emissions (i.e., Q) include SO_2, NO_2, PM_{10}, and sulfuric acid (H_2SO_4) mist annual emissions in tpy, based on 24-hour maximum allowable emissions. The distance (i.e., D) is the distance in km from the Class I area. For cases in which the calculated Q/D ratio is 10 or less, a Class I AQRV impact analyses is not required.

The Q/D ratio was calculated using Jacksonville Lime's annual potential emissions rates and the nearest distance to each of the five Class I areas located within 300 km of the site.

File M:\acad\090907\class1_300Km1 mxd

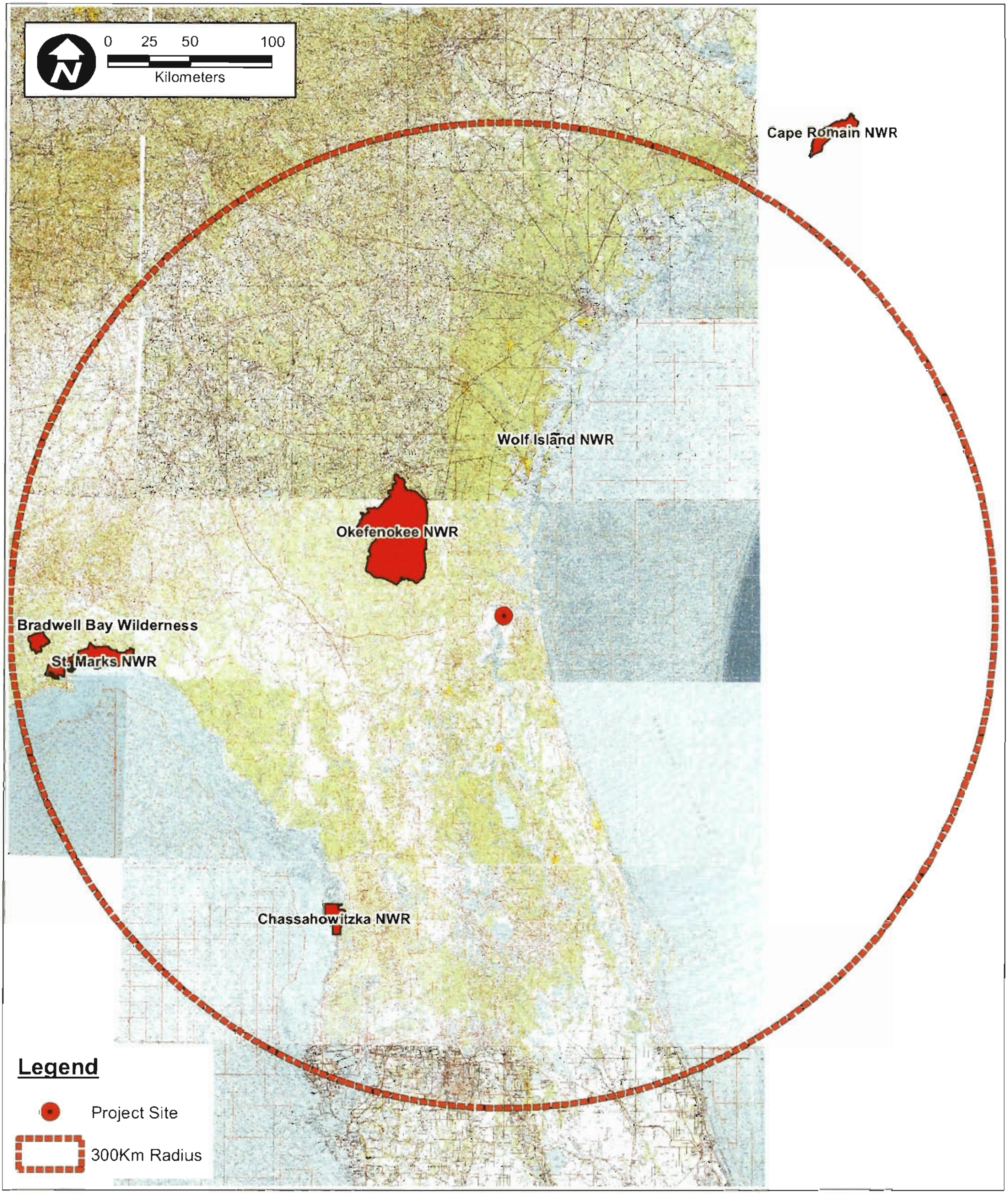


FIGURE 10-1.
CLASS I AREAS WITHIN 300 KM OF THE
JACKSONVILLE LIME SITE

Sources USGS 250k Topos, Florida and Georgia (1988,1992) , ECT. 2012

ECT Environmental Consulting & Technology, Inc.

Table 10-1 summarizes the NO_2, SO_2, H_2SO_4 mist, and PM_{10} potential annual emissions in tpy, the distance to each Class I area (km), and the calculated Q/D ratio for each Class I area. The calculated Q/D ratios are at or below the FLM threshold of 10 for all Class I areas. The SO_2 annual emissions reflect the lower fuel sulfur content determined from the Class II modeling. Therefore, Class I AQRV analyses are not required in accordance with the FLAG guidance.

Based on the initial screening results, the Jacksonville Lime analysis with respect to the PSD Class I increments addressed the two nearest PSD Class I areas; i.e., the Okefenokee and Wolf Island NWAs. Jacksonville Lime air quality impacts at the more distant PSD Class I areas will be lower than those predicted for the Okefenokee and Wolf Island NWAs.

10.3 GENERAL APPROACH

The required Class I area impact assessments were conducted using the CALPUFF dispersion model in accordance with the recommendations contained in the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts, the FLAG Phase I Report, and EPA's GAQM. In addition, an Air Quality Impact Analysis Modeling Protocol was submitted to FDEP and EPA Region 4 for review and comments. The air quality impact analyses conducted for Jacksonville Lime incorporates the comments and suggestions received from these regulatory agencies on the modeling protocol.

The CALPUFF model was employed in a refined mode using 3 years (2001 through 2003) of 4-km resolution CALMET data and Class I area receptor grids as recommended by the National Park Service (NPS). The CALPUFF suite of programs, including the CALPOST postprocessing program, was employed to develop estimates of Jacksonville Lime impacts at the Okefenokee and Wolf Island NWAs with respect to the PSD Class I increments.

Table 10-1. Jacksonville Lime PSD Class I Initial Screening Analysis

	NO_x	SO_2	H_2SO_4 Mist	PM_{10} (total)*	Totals
			tpy		
Potential emissions (Q)	344.7	156.8	1.6	61.5	564.6
	Okefenokee NWA	St. Marks NWA	Chassahowitzka NWA	Bradwell Bay NWA	Wolf Island NWA
Distance from Jacksonville Lime (D)	55	254	215	280	112
			tpy-km		
FLAG screening ratio (Q/D)	10	2	3	2	5

*Filterable and condensable PM.

Source: ECT, 2013.

10.4 MODEL SELECTION AND USE

Steady-state dispersion models do not consider temporal or spatial variations in plume transport direction, nor do they limit the downwind transport of a pollutant as a function of windspeed and travel time. Due to these limitations, conventional steady-state dispersion models, such as AERMOD, are not considered suitable for predicting air quality impacts at receptors located more than 50 km from an emissions source.

Because of the need to assess air quality impacts at PSD Class I areas, which are typically located at distances greater than 50 km from the emissions sources of interest, EPA and the FLMs initiated efforts to develop dispersion models appropriate for the assessment of long-range transport of air pollutants. The IWAQM was formed to coordinate the model development efforts of EPA and the FLMs.

The IWAQM work plan indicates that a phased approach would be taken with respect to the implementation of recommendations for long-range transport modeling. In Phase 1, the IWAQM would review current EPA modeling guidance and issue an interim modeling approach applicable to projects undergoing permit review. For Phase 2, a review would be made of other available long-range transport models and recommendations developed for the most appropriate modeling techniques.

The Phase 1 recommendation, issued in April 1993, is to use the Lagrangian puff model, MESOPUFF II, for long-range transport air quality assessments. The Phase 2 recommendations, issued in December 1998, are contained in the IWAQM Phase 2 Summary Report and Recommendations for Modeling Long-Range Transport Impacts. Additional FLM guidance with respect to the assessment of visibility and deposition impacts is provided in the FLAG Phase 1 report dated December 2000. The Phase 2 IWAQM recommendation is to apply the CALPUFF Modeling System to assess air quality impacts at distances greater than 50 km from an emissions source. In April 2003, EPA designated the CALPUFF model as a preferred model (i.e., a model listed in Appendix A to W of 40 CFR 51, Summaries of Preferred Air Quality Models) for use in assessing the long-range transport of air pollutants.

The EPA GAQM indicates that the CALPUFF modeling system is appropriate for long-range transport (source-receptor distances of 50 to several hundred kilometers) of emissions from point, volume, area, and line sources. All the receptors at the Class I areas evaluated are situated at distances greater than 50 km from Jacksonville Lime.

The EPA-approved version of the CALPUFF modeling suite was used for the Jacksonville Lime Class I area impact assessments. The EPA-approved CALPUFF modeling suite is comprised of the following programs:

- CALMET Version 5.8 Level: 070623
- CALPUFF Version: 5.8 Level: 070623
- CALPOST Version: 5.6394 Level: 070622

These programs were used to assess PSD Class I increment impacts.

The CALPUFF modeling system consists of three main components: CALMET, CALPUFF, and CALPOST. Each of these components is described in the following subsections.

10.4.1 CALMET

CALMET is a meteorological model that develops hourly wind and temperature fields on a three-dimensional gridded modeling domain. The meteorological file produced by CALMET for use by CALPUFF also includes two-dimensional parameters such as mixing height, surface characteristics, and dispersion properties.

CALMET requires a number of input data files to develop the gridded three- and two-dimensional meteorological file used by CALPUFF. The specific meteorological data used by the CALMET program include:

- Penn State/National Center for Atmospheric Research mesoscale model gridded, prognostic wind field data (terrain elevation, land use code, sea level pressure, rainfall amount, snow cover indicator, pressure, temperature/dew point, wind direction, and windspeed).

- Surface station weather data (windspeed, wind direction, ceiling height, opaque sky cover, air temperature, relative humidity, station pressure, and precipitation type code).
- Upper air sounding (mixing height) data (pressure, height above sea level, temperature, wind direction, and windspeed at each sounding).
- Surface station precipitation data (precipitation rates).
- Overwater data (air-sea surface temperature difference, air temperature, relative humidity, overwater mixing height, windspeed, and wind direction).
- Geophysical data (land use type, terrain elevation, surface parameters including surface roughness, length, albedo, Bowen ratio, soil heat flux, and vegetation leaf area index, and anthropogenic heat flux).

Further technical discussion of the CALMET model can be found in Section 2 of the User's Guide for the CALMET meteorological model dated January 2000.

Visibility Improvement–State and Tribal Association of the Southeast (VISTAS) has developed a 3-year (2001 through 2003) CALMET dataset for a fine, 4-km, subregional domain that covers all of Florida and the adjacent Class I areas of interest to Florida. The VISTAS 2001-2003 meteorological data was recently reprocessed by the U.S. Fish & Wildlife Service (USFWS) using the current EPA regulatory version of CALMET; i.e., Version 5.8, Level: 070623. This reprocessed fine-grid CALMET dataset (containing more than 250 gigabytes of data) was obtained from FDEP and was used in the Jacksonville Lime Class I impact assessments.

10.4.2 CALPUFF

CALPUFF is a transport and puff model that advects puffs of material from an emissions source. These puffs undergo various dispersion and transformation simulation processes as they are advected from an emissions source to a receptor of interest. The simulation processes include wet and dry deposition and chemical transformation. CALPUFF typically uses the gridded meteorological data created by the CALMET program. CALPUFF, when used in a screening mode, can also use nongridded meteorological data similar to that used by a steady-state dispersion model such as AERMOD. The distribution of puffs by CALPUFF explicitly incorporates the temporal and spatial variations in the meteorological fields thereby overcoming one of the main shortcomings of steady-state dispersion models. Further technical discussion of the CALPUFF model can be found in Section 2 of the User's Guide for the CALPUFF Model dated January 2000.

There are a number of optional CALPUFF input files that were not used for the Jacksonville Lime Class I area impact assessments. These include time-varying emissions rates, user-specified deposition velocities and chemical transformation conversion rates, complex terrain receptor and hill geometry data, and coastal boundary data.

CALPUFF generates output files consisting of hourly concentrations, deposition fluxes, and data required for visibility assessments for each receptor. These CALPUFF output files are subsequently processed by the POSTUTIL and CALPOST programs to provide impact summaries for the pollutants and averaging periods of interest.

The various CALPUFF program options are implemented by means of a control file. CALPUFF options selected for the Jacksonville Lime Class I area impact assessments conform to the recommendations contained in the IWQAM Phase 2 report and EPA's GAQM. Following is a list of the key CALPUFF model options selected for the Jacksonville Lime Class I impact assessments:

- CALPUFF domain configured to include the Jacksonville Lime emissions sources and all Class I receptors with a minimum 50-km buffer in all directions.
- 4-km spacing meteorological and computational grid.
- Class I receptors as defined by NPS.
- IWAQM default guidance, including Pasquill-Gifford dispersion coefficients.
- Integrated puff sampling methodology.
- No consideration of building downwash.

10.4.3 CALPOST

CALPOST is a postprocessing program used to process the concentration, deposition, and visibility files generated by CALPUFF. The CALPOST program was formulated to average and report pollutant concentrations or wet/dry deposition fluxes using the hourly data contained in the CALPUFF output files. CALPOST can produce summary tables of pollutant concentrations and depositions for each receptor for various averaging times and can develop ranked lists of these impacts. For visibility-related modeling (e.g., regional haze), CALPOST uses the CALPUFF generated pollutant concentrations to calculate extinction coefficients and other related indicators of visibility.

Similar to the CALPUFF program, the various CALPOST program options are implemented by means of a control file. CALPOST options selected for the Jacksonville Lime Class I impact assessments conform to the recommendations contained in the FLAG Phase I report.

10.5 RECEPTOR GRIDS

The Jacksonville Lime Class I area receptor grids included the Okefenokee NWA (500), and the Wolf Island NWA (30 discrete receptors) receptors identified by NPS for these two Class I areas. The Class I receptor locations, which are provided by NPS in geographic (latitude and longitude) coordinates, were converted to Lambert Conformal Conic coordinates consistent with the VISTAS fine 4-km CALMET grid parameters (i.e., two matching parallels, latitude/longitude of the projection origin, and coordinate datum) using the NPS Class I areas conversion program.

10.6 MODELED EMISSIONS SOURCES

Jacksonville Lime's modeled emissions sources included the lime kiln stacks, as well as the emissions points of the stone and lime handling and storage sources. The fugitive PM emissions from material handling were not included because of their low emissions rates and/or low release heights. Accordingly, these emissions sources will have negligible impacts at the distant Class I areas.

Maximum potential emissions rates were used for the Jacksonville Lime sources. The stack parameters and emissions rates used in the CALPUFF modeling assessments are the same as those previously presented in Tables 7-3 and 7-4.

10.7 MODEL RESULTS

Tables 10-2 through 10-5 summarize the Jacksonville Lime NO_2, SO_2, PM_{10}, and $PM_{2.5}$ impacts with respect to the PSD Class I SILs. Tables 10-2 and 10-3 provide the predicted impacts and locations of maximum impacts for the Okefenokee NWA, respectively. Tables 10-4 and 10-5 provide the predicted impacts and locations of maximum impacts for the Wolf Island NWA, respectively. These tables provides the highest annual average impacts (for NO_2, SO_2, PM_{10}, and $PM_{2.5}$), highest 3-hour average impacts (for SO_2), and highest 24-hour average impacts (for SO_2, PM_{10}, and $PM_{2.5}$) for the two Class I areas evaluated. As can be seen, all impacts are below the PSD Class I SILs for all pollutants and all averaging periods. Accordingly, a multisource cumulative assessment of air quality impacts with respect to the PSD Class I increments for NO_2, SO_2, PM_{10}, and $PM_{2.5}$ was not required.

Table 10-2. Class I Area CALPUFF Dispersion Model Results—Okefenokee NWA, Maximum Impacts

Pollutant/ Averaging Period	Year of Meteorology			Maximum Impact ($\mu g/m^3$)	PSD Class I SIL ($\mu g/m^3$)	Percent of PSD Class I SIL (%)	Exceed Class I SIL (Yes/No)
	2001	2002	2003				
SO_2							
High, 3-hour ($\mu g/m^3$)	0.217	0.199	0.237	0.237	1.0	23.7	No
High, 24-hour ($\mu g/m^3$)	0.118	0.076	0.096	0.118	0.2	59.0	No
Annual ($\mu g/m^3$)	0.00322	0.00463	0.00523	0.00523	0.1	5.2	No
NO_2							
Annual ($\mu g/m^3$)	0.00489	0.00678	0.00758	0.00758	0.1	7.6	No
$PM_{2.5}$							
High, 24-hour ($\mu g/m^3$)	0.0068	0.0049	0.0055	0.0068	0.07	9.7	No
Annual ($\mu g/m^3$)	0.00020	0.00029	0.00033	0.00033	0.06	0.5	No
PM_{10}							
High, 24-hour ($\mu g/m^3$)	0.0076	0.0059	0.0068	0.0076	0.3	2.5	No
Annual ($\mu g/m^3$)	0.00024	0.00034	0.00039	0.00039	0.2	0.2	No

Source: ECT, 2013.

Table 10-3. Class I Area CALPUFF Dispersion Model Results—Okefenokee NWA, Locations of Maximum Impacts

Parameter	Units	Averaging Period		
		3-Hour	24-Hour	Annual
SO_2				
Year of meteorology	—	2003	2001	2003
Receptor LCC Easting coordinate (X)	kilometers	1,419.904	1,422.463	1,422.463
Receptor LCC Northing coordinate (Y)	kilometers	-930.843	-926.646	-926.646
Receptor elevation	meters	36.0	36.0	36.0
	feet	118.1	118.1	118.1
Distance from lime kiln stack	kilometers	57.1	55.8	55.8
	miles	35.5	34.7	34.7
Direction vector from lime kiln stack*	degrees	283	288	288
PM_{10}				
Year of meteorology	—	N/A	2001	2003
Receptor LCC Easting coordinate (X)	kilometers	N/A	1,421.184	1,422.463
Receptor LCC Northing coordinate (Y)	kilometers	N/A	-928.745	-926.646
Receptor elevation	meters	N/A	36.0	36.0
	feet	N/A	118.1	118.1
Distance from lime kiln stack	kilometers	N/A	56.4	55.8
	miles	N/A	35.1	34.7
Direction vector from lime kiln stack*	degrees	N/A	285	288
NO_2				
Year of meteorology	—	N/A	N/A	2003
Receptor LCC Easting coordinate (X)	kilometers	N/A	N/A	1,422.463
Receptor LCC Northing coordinate (Y)	kilometers	N/A	N/A	-926.646
Receptor elevation	meters	N/A	N/A	36.0
	feet	N/A	N/A	118.1
Distance from lime kiln stack	kilometers	N/A	N/A	55.8
	miles	N/A	N/A	34.7
Direction vector from lime kiln stack*	degrees	N/A	N/A	288
$PM_{2.5}$				
Year of meteorology	—	N/A	2001	2003
Receptor LCC Easting coordinate (X)	kilometers	N/A	1,422.463	1,422.463
Receptor LCC Northing coordinate (Y)	kilometers	N/A	-926.646	-926.646
Receptor elevation	meters	N/A	36.0	36.0
	feet	N/A	118.1	118.1
Distance from lime kiln stack	kilometers	N/A	55.8	55.8
	miles	N/A	34.7	34.7
Direction vector from lime kiln stack*	degrees	N/A	288	288

*Direction from lime kiln stack toward impact location. For example, 270° means the highest impact is located due west of the lime kiln stack.

Source: ECT, 2013.

Table 10-4. Class I Area CALPUFF Dispersion Model Results—Wolf Island NWA, Maximum Impacts

Pollutant/ Averaging Period	Year of Meteorology 2001	2002	2003	Maximum Impact ($\mu g/m^3$)	PSD Class I SIL ($\mu g/m^3$)	Percent of PSD Class I SIL (%)	Exceed Class I SIL (Yes/No)
SO_2							
High, 3-hour ($\mu g/m^3$)	0.147	0.115	0.088	0.147	1.0	14.7	No
High, 24-hour ($\mu g/m^3$)	0.045	0.035	0.031	0.045	0.2	22.7	No
Annual ($\mu g/m^3$)	0.00184	0.00209	0.00230	0.00230	0.1	2.3	No
NO_2							
Annual ($\mu g/m^3$)	0.00221	0.00271	0.00297	0.00297	0.1	3.0	No
$PM_{2.5}$							
High, 24-hour ($\mu g/m^3$)	0.0023	0.0022	0.0022	0.0023	0.07	3.3	No
Annual ($\mu g/m^3$)	0.00013	0.00014	0.00016	0.00016	0.06	0.3	No
PM_{10}							
High, 24-hour ($\mu g/m^3$)	0.0021	0.0026	0.0024	0.0026	0.3	0.9	No
Annual ($\mu g/m^3$)	0.00013	0.00014	0.00015	0.00015	0.2	0.1	No

Source: ECT, 2013.

Table 10-5. Class I Area CALPUFF Dispersion Model Results—Wolf Island NWA, Locations of Maximum Impacts

Parameter	Units	Averaging Period 3-Hr	24-hr	Annual
SO_2				
Year of meteorology	—	2001	2001	2003
Receptor LCC Easting coordinate (X)	kilometers	1,485.385	1,488.690	1,489.472
Receptor LCC Northing coordinate (Y)	kilometers	-830.106	-835.192	-835.055
Receptor elevation	meters	1.0	1.0	1.0
	feet	3.3	3.3	3.3
Distance from lime kiln stack	kilometers	114.0	109.3	109.5
	miles	70.8	67.9	68.0
Direction vector from lime kiln stack*	degrees	5	7	7
PM_{10}				
Year of meteorology	—	N/A	2002	2003
Receptor LCC Easting coordinate (X)	kilometers	N/A	1,488.690	1,489.472
Receptor LCC Northing coordinate (Y)	kilometers	N/A	-835.192	-835.055
Receptor elevation	meters	N/A	1.0	1.0
	feet	N/A	3.3	3.3
Distance from lime kiln stack	kilometers	N/A	109.3	109.5
	miles	N/A	67.9	68.0
Direction vector from lime kiln stack*	degrees	N/A	7	7
NO_2				
Year of meteorology	—	N/A	N/A	2003
Receptor LCC Easting coordinate (X)	kilometers	N/A	N/A	1,489.472
Receptor LCC Northing coordinate (Y)	kilometers	N/A	N/A	-835.055
Receptor elevation	meters	N/A	N/A	1.0
	feet	N/A	N/A	3.3
Distance from lime kiln stack	kilometers	N/A	N/A	109.5
	miles	N/A	N/A	68.0
Direction vector from lime kiln stack*	degrees	N/A	N/A	7
$PM_{2.5}$				
Year of meteorology	—	N/A	2001	2003
Receptor LCC Easting coordinate (X)	kilometers	N/A	1,488.690	1,489.472
Receptor LCC Northing coordinate (Y)	kilometers	N/A	-835.192	-835.055
Receptor elevation	meters	N/A	1.0	1.0
	feet	N/A	3.3	3.3
Distance from lime kiln stack	kilometers	N/A	109.3	109.5
	miles	N/A	67.9	68.0
Direction vector from lime kiln stack*	degrees	N/A	7	7

*Direction from lime kiln stack toward impact location. For example, 270° means the highest impact is located due west of the lime kiln stack.

Source: ECT, 2013.

11.0 REFERENCES (VOLUME 2)

Earth Tech, Inc. 1997. Addendum to ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model. Concord, Massachusetts.

Environmental Consulting & Technology, Inc. (ECT). 2013. Jacksonville Lime Facility – Prevention of Significant Deterioration/Air Construction Permit Application. Prepared for Jacksonville Lime, LLC. Prepared by Environmental Consulting & Technology, Inc. August, 2013. Gainesville, Florida.

Neuman, R. 1980. Effects of Air Emissions on Wildlife Resources. U.S. Fish and Wildlife Services, Biological Services Program, National Power Plant Team, FWS/OBS-80/40.1.

U.S. Environmental Protection Agency (EPA). 1985. Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations [Revised]). EPA-450/4-80-023R. Research Triangle Park, North Carolina.

———. 1998. Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts. EPA-454/B-98-019. Research Triangle Park, North Carolina.

———. 2004a. User's Guide for the American Meteorological Society (AMS)/EPA Regulatory Model (AERMOD). EPA-454/B-03-001. Research Triangle Park, North Carolina.

———. 2004b. User's Guide for the AERMOD Terrain Preprocessor (AERMAP). EPA-454/B-03-003. Research Triangle Park, North Carolina.

———. 2004c. User's Guide for the AERMOD Meteorological Preprocessor (AERMET). EPA-454/B-03-002. Research Triangle Park, North Carolina.

———. 2006a. Addendum User's Guide for AERMOD. EPA-454/B-03-001. Research Triangle Park, North Carolina.

———. 2006b. Addendum User's Guide for AERMAP. EPA-454/B-03-003. Research Tri-angle Park, North Carolina.

———. 2006c. Addendum User's Guide for AERMET. EPA-454/B-03-002. Re-search Triangle Park, North Carolina.

———. 2009. Guideline on Air Quality Models (GAQM) (Revised). (Appendix W, 40 CFR 51).

U.S. Forest Service, National Park Service, U.S. Fish and Wildlife Service. 2010. Federal Land Managers' Air Quality-Related Values Workgroup (FLAG) Phase I Report. Revised.

APPENDIX G

AIR QUALITY MODELING PROTOCOLS

Environmental Consulting & Technology, Inc.

JACKSONVILLE LIME FACILITY

AIR QUALITY
DISPERSION MODELING PROTOCOL

Prepared for:

JACKSONVILLE LIME, LLC
Jacksonville, Florida

Prepared by:

ECT

Environmental Consulting & Technology, Inc.
6440 Southpoint Parkway, Suite 130
Jacksonville, Florida 32216

ECT No. 120604-0200

August 2012

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP) recommend that a protocol be established by an applicant when air quality dispersion modeling is to be conducted in support of a permit application subject to Prevention of Significant Deterioration (PSD) preconstruction review. Such an application is forthcoming for the proposed lime kiln project by Jacksonville Lime, LLC (a joint venture between Carmeuse Lime & Stone and Keystone Industries). The Jacksonville Lime Facility (Project) will be subject to PSD preconstruction review per Chapter 40, Part 52.21, Code of Federal Regulations (CFR), and Section 62-212.400, Florida Administrative Code (F.A.C.). Therefore, this modeling protocol is prepared and submitted to FDEP to present the modeling procedures to be employed for the referenced permit application. Key modeling methods, inputs, and options are presented in the following sections.

2.0 PROJECT OVERVIEW

Jacksonville Lime, LLC, is planning to construct and operate a lime manufacturing facility in Jacksonville, Florida. This facility will be comprised of two vertical lime kilns and associated raw material, fuel, and product storage and handling systems. The kiln process utilizes limestone (calcium/magnesium carbonate) and, with the application of heat, drives off carbon dioxide (CO_2) to produce lime (calcium oxide). The plant's primary Standard Industrial Classification (SIC) code is 3274: Lime. Its North American Industry Classification System (NAICS) code is 327410: Lime Manufacturing.

The physical address of the proposed facility is 1915 Wigmore Street, Jacksonville, Duval County, Florida. The property is located on the west bank of the St. Johns River in the industrialized center of Jacksonville, Florida (see Figure 1). The facility consists of approximately 110 acres of land situated on both sides of Wigmore Street. The main parcel (Site), on which the kilns are to be situated, is comprised of approximately 100 acres, and a second parcel of approximately 10 acres is located across Wigmore Street from the main parcel. The Site had been used as a kraft linerboard mill and manufacturing facility from 1938 until 2006. A chain-linked fence is located along the southern, western, and northern boundaries of the Site so as to restrict the Site from public access. A JEA peaking power plant primarily borders the southern vicinity. A mixture of both commercial and residential properties surrounds the western and northwestern boundaries. Residential housing is located approximately 450 feet (ft) north of the developed portion of the Site. The St. Johns River, which runs along the northeastern and eastern boundaries, serves as a natural barrier for the Site. Figure 2 illustrates the subject Site and surrounding properties.

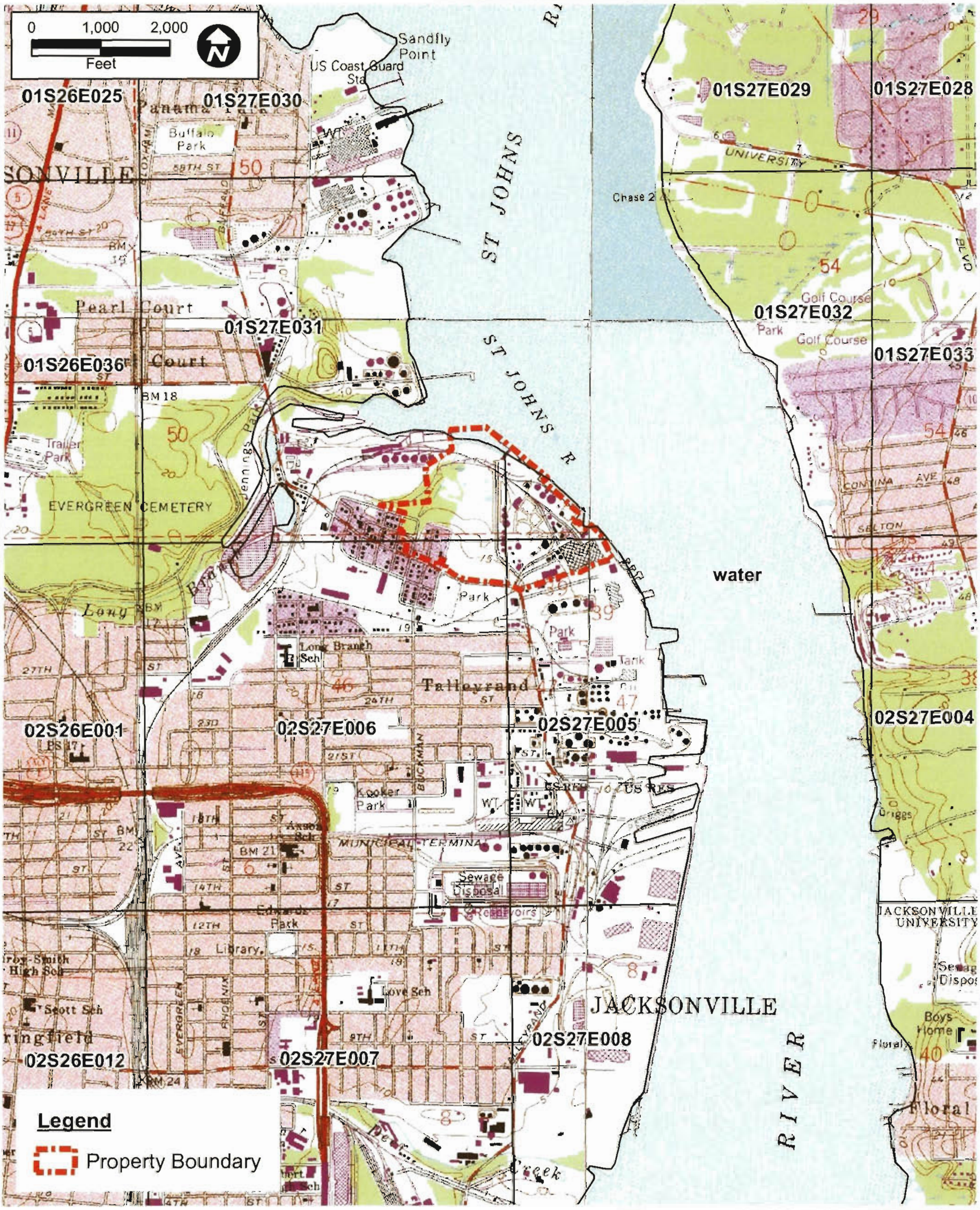
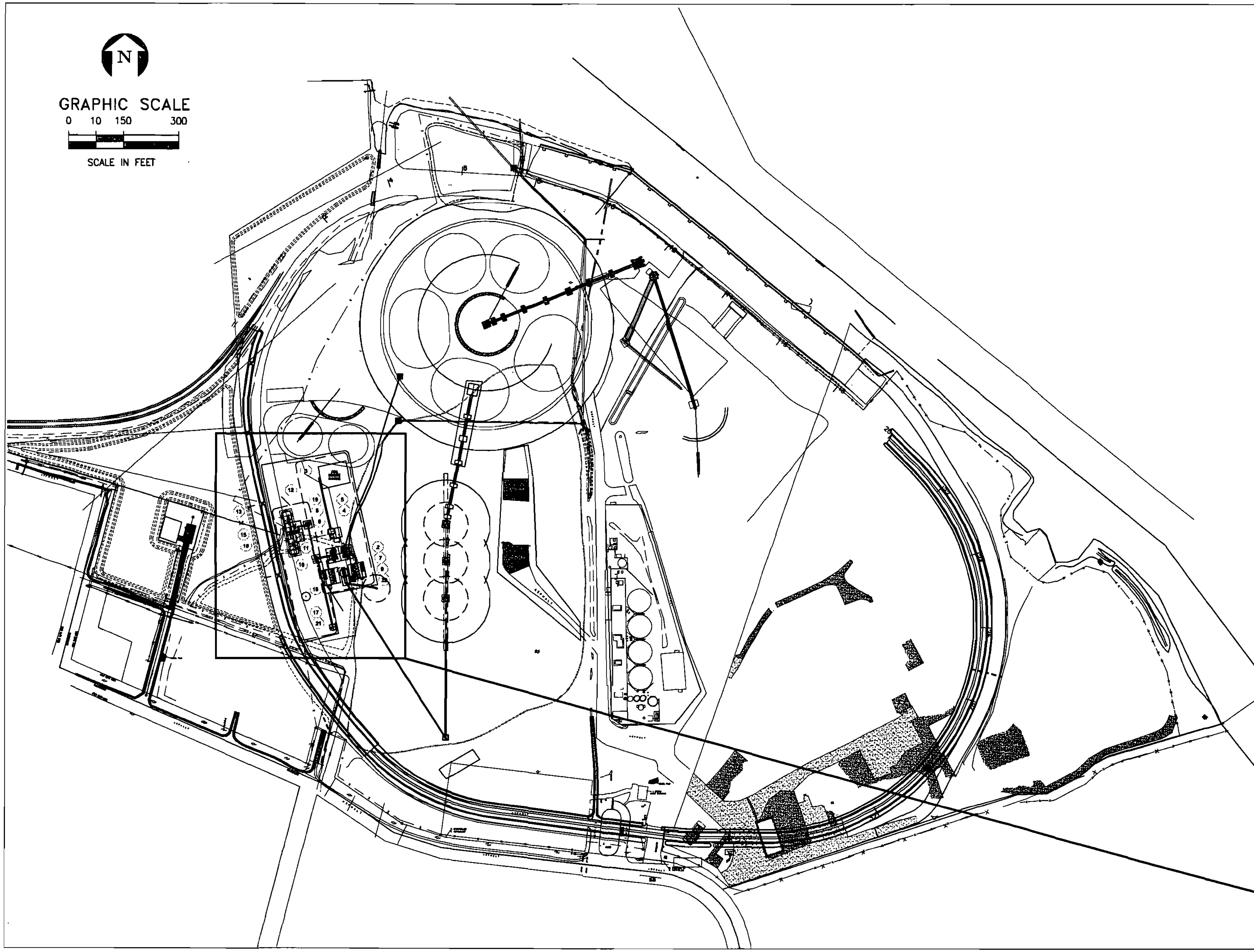


FIGURE 1.
PROJECT LOCATION
JACKSONVILLE LIME, LLC
1915 WIGMORE STREET, JACKSONVILLE, FLORIDA

Sources: USGS Topo, Jacksonville, Arlington, Eastport, Trout River (1988,1992) ; ECT, 2012.

ECT Environmental Consulting & Technology, Inc.



EU_ID	Description	Sources Controlled
1	Dust Collector	Limestone Transfer Sources to Kiln 1
2	Dust Collector	Limestone Transfer Sources to Kiln 2
3	Dust Collector	Coke Transfer from Stroage Bldg. to Hpper/Conveyors
4	Dust Collector	Coke Transfer to 50-ton Storage Bin
5	Dust Collector	Coke Processing at Ball Mill
6	Dust Collector	Coke Transfer to Kiln 1
7	Dust Collector	Coke Transfer to Kiln 2
8	Dust Collector	Kiln 1's 18-ton product hopper to belt conveyors
9	Dust Collector	Kiln 2's 18-ton product hopper to belt conveyors
10	Dust Collector	Belt Conveyors to Diverter to Roll Crusher
11	Dust Collector	Two-stage Roll Crusher
12	Dust Collector	Crushed Lime to Scrrens via Screw Conveyor
13	Dust Collector	Trasnfer final product to Loadout Silo 1
14	Dust Collector	Trasnfer final product to Loadout Silo 2
15	Dust Collector	Trasnfer final product to Loadout Silo 3
16	Dust Collector	Trasnfer final product to Loadout Silo 4
17	Dust Collector	Reject Lime Bin
18	Dust Collector	Baghouse Dust Storage Bin
19	Baghouse 1	Baghouse for Kiln 1
20	Baghouse 2	Baghouse for Kiln 2
21	Dust Collector	Truck Loadout of Reject Lime

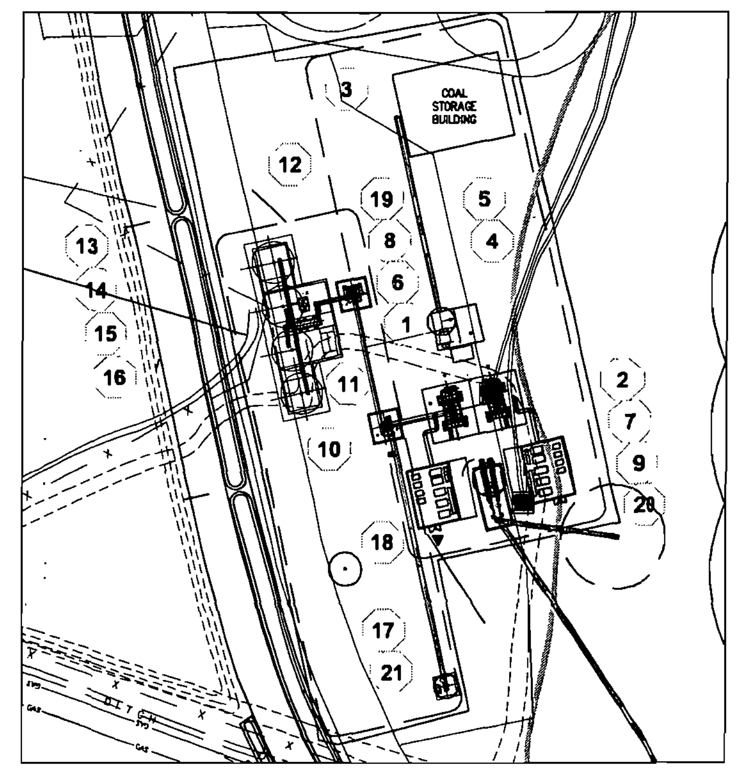


FIGURE 2.

SITE LAYOUT

JACKSONVILLE LIME, LLC

Sources: Processes Unlimited International, Inc.; ECT, 2012.

ECT Environmental Consulting & Technology, Inc.

3.0 EMISSIONS SOURCES

The proposed Jacksonville Lime facility will have the following air emissions sources:

- Raw material (limestone) handling operations consisting of fugitive particulate matter (PM) emissions sources (conveyor system, storage piles), and small point sources (enclosed screens, storage bins, and surge bins). PM emissions will be minimized by enclosure, wet suppression, and bin vent filters at storage bins.
- Two vertical lime kilns, where limestone will be calcined to produce lime and CO_2. PM emissions will be controlled by baghouses, and sulfur dioxide (SO_2) emissions will be controlled by natural scrubbing of limestone. Other pollutant emissions will be minimized by process design, proper operation, and best available control technology (BACT). Emissions will be discharged through two 133-ft-high stacks (one for each kiln).
- Product (lime) handling and storage operations using conveyors, crushers, holding bins, and storage silos. PM emissions will be minimized by enclosure, wet suppression as needed, and fabric filters.
- One fuel dryer.
- Two gas-fired emergency generators.

During the preapplication meeting, FDEP indicated that the gas-fired emergency generators do not need to be included in the air quality impact analysis. Furthermore, FDEP determined on February 29, 2012, that fugitive PM emissions are also excludable from air quality impact analysis, consistent with the requirements for a lumber mill project in Suwannee County, Florida. Appendix A contains a copy of an e-mail regarding this issue.

The proposed Project belongs to one of the 28 named source categories in the PSD regulations and thus is subject to the 100-tons-per-year (tpy) threshold for major source classification. Detailed Project emissions estimates and supporting calculations will be included with the PSD permit application. Based on a preliminary evaluation of anticipated worst-case annual operating scenarios, potential emissions of nitrogen oxides (NO_x), carbon monoxide (CO), SO_2, PM, particulate matter less than 10 microns (PM_{10}), and particulate matter less than 2.5 microns ($PM_{2.5}$) are each anticipated to exceed the applicable PSD significant emissions rates (SER). Project potential emissions of volatile organic compounds (VOCs), lead, fluorides, mercury, reduced sulfur compounds, and sulfuric acid (H_2SO_4) mist are each expected to be below the PSD SERs. Accordingly, Project NO_x, CO, SO_2, PM, PM_{10}, and $PM_{2.5}$ will be subject to the PSD new source review (NSR) air quality impact analysis requirements (see Table 1).

Table 1. Preliminary Estimated Annual Emissions

Pollutant	Kilns (tpy)	Others (tpy)	Facility Total (tpy)
SO_2*	201	<1	<250
NO_x*	251	<2	<300
PM	30	21	<55
PM_{10}*	30	21	<55
$PM_{2.5}$*	30	10	<45
CO*	301	<1	<350
VOC	14	<1	>15
H_2SO_4 mist	2	Negligible	<7
Lead†	0.04	Negligible	<0.6
Hydrochloric acid (HCl)†	19	Negligible	<20

*Subject to PSD review.
†Hazardous air pollutant (HAP).

Source: ECT, 2012.

4.0 MODELING APPROACH FOR CLASS II AREA IMPACTS

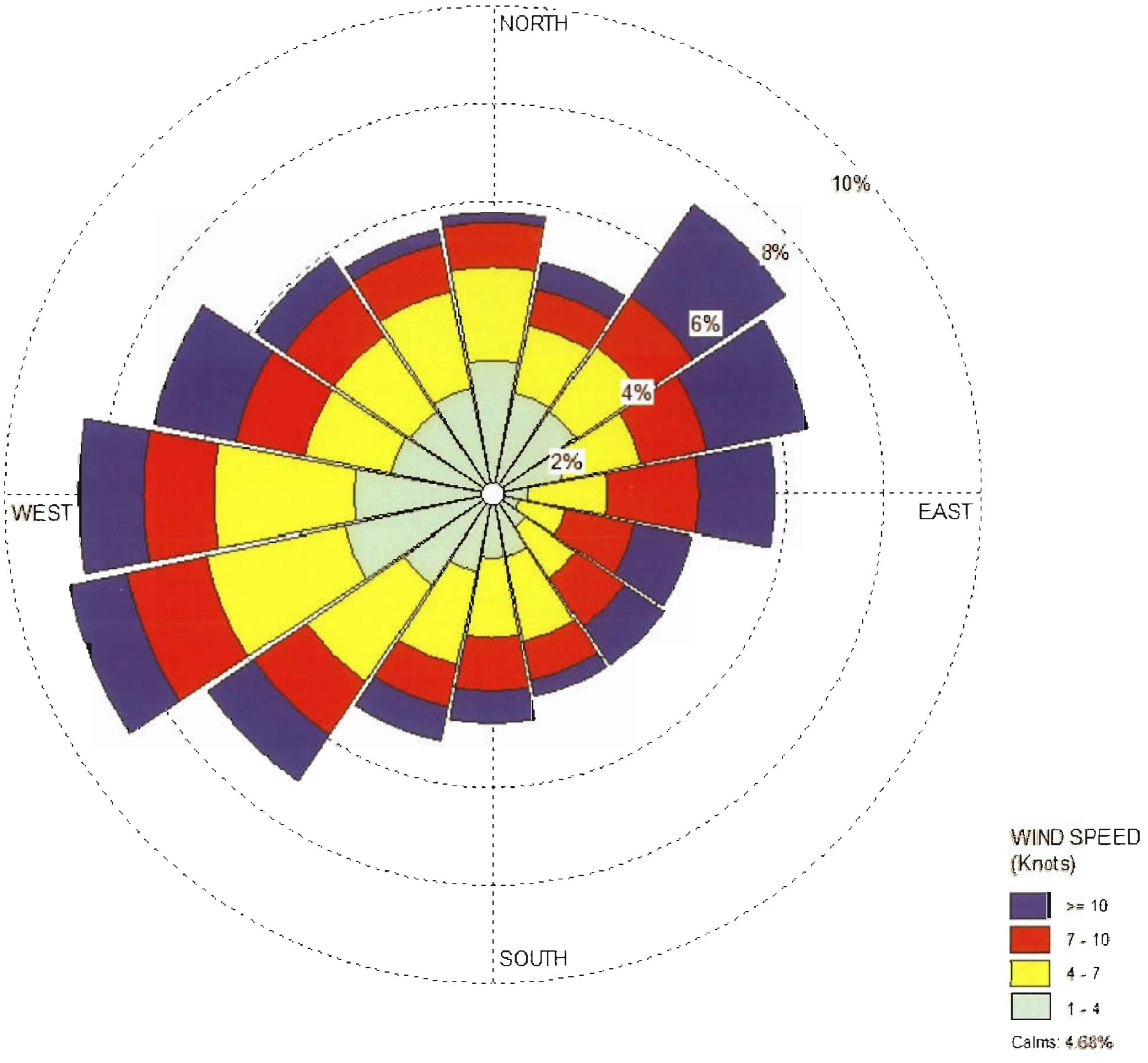
For Class II area impact assessments, the latest version of American Meteorological Society (AMC)/EPA Regulatory Model (AERMOD) (Version 12060) modeling system will be used.

The basic approach to the modeling assessment will be as follows:

- Evaluate various operating scenarios that address various fuel options for the kilns (coal, pet-coke, lignite, and natural gas) and raw materials (dolomitic and high calcium limestone) and determine the worst-case scenario and emissions rates for each applicable pollutant.
- Run AERMOD to determine maximum impacts within 15 kilometers (km) of the Site for each applicable pollutant and averaging time. If the predicted impacts do not decrease with distance toward 15 km, additional receptors will be added beyond 15 km.
- For pollutants/averaging times with significant Class II area impacts, obtain emissions inventory and background ambient monitoring data from FDEP and use AERMOD to determine cumulative impacts from onsite sources as well as offsite sources for comparison with PSD Class II increments and/or National Ambient Air Quality Standards (NAAQS).
- Compliance with the new 1-hour NO_x and SO_2 ambient air quality standards (AAQS) will be determined in accordance with EPA guidance memorandums.

When using AERMOD, the following inputs will be employed:

- Building Wake Effects (Downwash)—Inputs based on EPA's Building Profile Input Program for PRIME (BPIPPRM) (Version 04274).
- Meteorological Data—5 years of AERMOD-ready meteorological data (2006 through 2010), provided by FDEP, using raw data from the Jacksonville International Airport and surface characteristics of the proposed project location. Figure 3 presents a 5-year wind rose of the project location.
- Receptors—Placed in areas considered to be ambient air or accessible by the public:



NOTE: Based on Jacksonville International Airport Data and Surface Chracteristics of Project Location.

FIGURE 3.

WIND ROSE (2006 - 2010)

JACKSONVILLE LIME, LLC

Sources: FDEP, 2012; ECT, 2012.

ECT Environmental Consulting & Technology, Inc.

- Universal Transverse Mercator (UTM) coordinate system will be used.
- Property line (or fence line) receptors will be spaced at 50-meter intervals.
- Cartesian rectangular receptor grids of 100-meter spacing to approximately 2 km, 500-meter spacing to 5 km, 1-km spacing to 10 km, and 2.5-km spacing to 15 km. The receptor grids used for the ambient impact analysis will be refined following preliminary modeling, as necessary, to ensure the highest ambient impacts for each pollutant and averaging period have been identified using a receptor spacing of no more than 100 meters.

- Terrain Elevations—Site, source, and receptor elevations will be incorporated into the modeling assessment and will be based on U.S. Geological Survey (USGS) National Elevation Dataset (NED) terrain data in geo-referenced tagged image file format (GeoTIFF).

5.0 MODELING APPROACH FOR CLASS I AREA IMPACTS

The PSD Class I areas to be evaluated for this project (see Figure 4), including their distances, are as follows:

- Okefenokee National Wildlife Refuge (NWR): 55.4 km.
- Wolf Island NWR: 108.3 km.
- Chassahowitzka NWR: 202.9 km
- St. Marks NWR: 227.4 km.
- Bradwell Bay NWR: 277.2 km.

Preliminary Class I screening analysis showed that the annual emissions/distance (Q/D) ratios are below the screening criteria of 10 for all five of the Class I areas listed; thus, there is no need to conduct AQRV analyses (e.g., wet/dry deposition, visibility) for this project. A letter has been sent to the Federal Land Managers (FLM) to request their concurrences. Appendix A contains a copy of this letter.

When using the CALPUFF modeling system to perform the Class I increment assessment, the following options will be employed:

- Modeling Options—The most recent recommendations from the Interagency Workgroup on Quality Modeling (IWAQM) Phase 2, Federal Land Managers' AQRV Workgroup (FLAG) (2010 Revisions) Phase 1, and the National Park Service (NPS).
- Building Wake Effects (Downwash)—Inputs based on EPA's BPIPPRM (Version 04274).

For those PSD Class I areas that require air quality impact assessments, the required analyses will be conducted using the EPA Guideline on Air Quality Models (GAQM)-approved CALifornia PUFF (CALPUFF) suite of modeling programs, including CALMET, CALPUFF, POSTUTIL, and CALPOST. These programs will be used in accordance with the recommendations contained in the GAQM and Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for

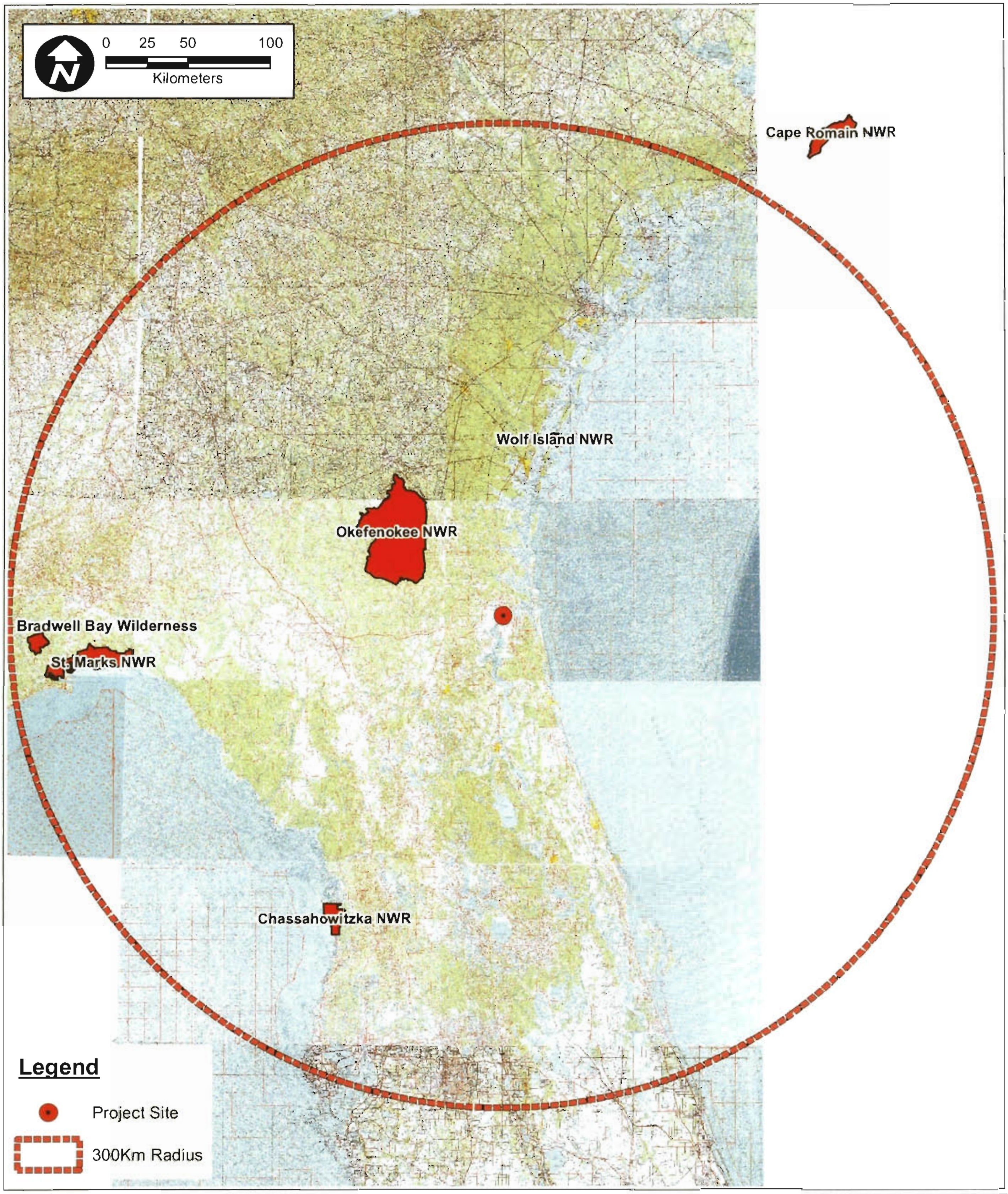


FIGURE 4.
CLASS I AREAS WITHIN 300 KM RADIUS
JACKSONVILLE LIME, LLC

Sources USGS 250k Topos, Florida and Georgia (1988,1992) , ECT, 2012

ECT Environmental Consulting & Technology, Inc.

Modeling Long-Range Transport Impacts, dated December 1998. The EPA-approved CALPUFF modeling suite is comprised of the following programs:

- CALMET Version: 5.8 Level: 070623
- CALPUFF Version: 5.8 Level: 070623
- POSTUTIL Version: 1.56 Level: 070627
- CALPOST Version: 5.6394 Level: 070622

These programs will be used to assess Project impacts with respect to the PSD Class I increments.

When using the CALPUFF modeling system to perform the Class I increment assessment, the following options will be employed:

- Modeling Options—The most recent recommendations from the GAQM and IWAQM Phase 2 Summary Report and Recommendations for Modeling Long-Range Transport Impacts, dated December 1998.
- Meteorological Data—The Visibility Improvement State and Tribal Association of the Southeast (VISTAS) developed a 3-year (2001 through 2003) CALMET dataset for a fine, 4-km, subregional domain that covers all of Florida and the adjacent Class I areas of interest to Florida (Domain 4). The VISTAS 2001 to 2003 meteorological data was reprocessed by the U.S. Fish and Wildlife Service using the current EPA regulatory version of CALMET (i.e., Version 5.8, Level 070623). This reprocessed fine-grid CALMET dataset (containing more than 250 gigabytes of data) was obtained from FDEP and will be used for the PSD Class I impact assessments.
- Receptors—Class I receptor locations, which are provided by NPS in geographic (latitude and longitude) coordinates, will be converted to Lambert Conformal Conic coordinates consistent with the VISTAS fine 4-km CALMET grid parameters (i.e., two matching parallels, latitude/longitude of the projection origin, and coordinate datum) using the NPS Class I areas conversion program.

APPENDIX A

MISCELLANEOUS CORRESPONDENCE

From: Lovin, Melody [Melody.Lovin@dep.state.fl.us]
Sent: Wednesday, February 29, 2012 11:15 AM
To: tdavis@ectinc.com
Cc: 'nhlaing@ectinc.com'
Subject: RE: Keystone Kiln Modeling

Hi Tom,

The department would also like to confirm that the modeling of fugitive PM emission sources will not
be required, in consistency with the methodology used in the Suwannee lumber mill project.
I will grab the off-site emission inventories for you today!

Melody

From: Tom Davis [mailto:tdavis@ectinc.com]
Sent: Wednesday, February 22, 2012 9:18 AM
To: Lovin, Melody
Cc: 'nhlaing@ectinc.com'
Subject: RE: Keystone Kiln Modeling

Melody,

Would appreciate the following:

1. Confirmation that modeling of fugitive PM emission sources is not required. Excluding fugitive
PM emission sources would be consistent with the approach used for the recently submitted
Suwannee lumber mill project.
2. Off-site emission inventories for NOx and SO2 - data for emission sources located within 55-
km of the project site (Duval, Nassau, Baker, Clay, and St. Johns Counties).
3. Raw meteorological data (2006 - 2010) for the Jacksonville International Airport. This data may
be needed if AERMET needs to be re-run with the project site surface characteristics.
4. Hourly ambient ozone data (2006 - 2010) for the Duval County Sheffield Elementary School
monitoring site (AIRS # 031-0077). This is the nearest ozone ambient monitoring site to the
project.

Pls contact me or D. Nay Hlaing if you have any questions.

Thanks.

Melody Lovin, M.S.
Meteorologist
Division of Air Resource Management
Office of Permitting & Compliance: Chemical
Combustion
melody.lovin@dep.state.fl.us
(850) 717-9084

Environmental Consulting & Technology, Inc.

August 14, 2012

Sent via email and USPS

Ms. Susan Johnson [susan_johnson@nps.gov]
Branch Chief - Policy, Planning & Permit Review
National Park Service
Air Resources Division
PO Box 25287
Denver CO 80225-0287

Ms. Sandra Silva [Sandra_V_Silva@fws.gov]
Chief, Branch of Air Quality
U.S. Fish and Wildlife Service
Air Quality Branch
7333 W. Jefferson Ave, Suite 375
Lakewood CO 80235-2017

Ms. Ann Acheson [aacheson@fs.fed.us]
National Air Program Manager
U.S. Forest Service
Air Quality Program
1400 Independence Ave, SW
Washington, DC 20250

Re: Jacksonville Lime, LLC
Prevention of Significant Deterioration Permit
Air Quality Related Values Assessment

Jacksonville Lime, LLC plans to construct and operate a nominal 550 ton per day lime kiln facility in Jacksonville, Duval County, Florida. The Prevention of Significant Deterioration (PSD) permit application is scheduled to be submitted to the Florida Department of Environmental Protection (FDEP). The project, called the Jacksonville Lime Facility, will include two lime kilns equipped with state-of-the-art emission control technologies including a fabric filter emission control system. The project UTM coordinates are Zone 17, 439,324 meters easting, and 3,359,615 meters northing.

Within 300 kilometers (km) of the proposed Jacksonville Lime Facility, there are five (5) PSD Class I areas: the Okefenokee National Wildlife Refuge (NWR), St. Marks NWR, Bradwell Bay NWR, Chassahowitzka NWR, and Wolf Island NWR. The nearest PSD Class I area is the Okefenokee NWR which is located approximately 55 km northwest of the project site at the nearest park boundary. A screening assessment with respect to the need to conduct Air Quality Related Values (AQRV) analyses was prepared using the Federal Land Manager's Air Quality Related Values Work Group (FLAG) [Phase I Report – Revised (2010)] Annual Emissions/Distance (Q/D) screening procedure.

[illegible]0 Southpoint Pkwy
Suite 120
Jacksonville, FL
32216

(904)
296-0544

FAX (904)
296-2473

The attached table shows the results of this assessment. As shown, the "Q/D" ratios for all PSD Class I areas are well below the screening criteria value of 10.0. Accordingly, we would appreciate receiving your concurrence that further AQRV analyses are not required for this project.

Please contact me at (904) 861-0522 or by email at dnhlaing@ectinc.com if you have any questions.

Sincerely,

Daniel N. Hlaing, P.E.

Attachment

cc: William Harris, Keystone Properties, LLC.
Jackie Padgett, Jacksonville Lime, LLC

Jacksonville Lime, LLC Lime Kiln Project
PSD Class I Air Quality Related Values (AQRV) Screening Analysis

A. Project Emissions

Potential Emissions (24-Hr Maximum Emission Rates)				
NO_x (tpy)	SO_2 (tpy)	H_2SO_4 Mist (tpy)	PM_{10} (tpy)	Totals - (Q) (tpy)
252.34	200.97	1.81	51.27	506.39

B. Nearest Distance to Class I Areas - (D)

Okefenokee NWR (km)	St. Marks NWR (km)	Bradwell Bay NWR (km)	Chassahowitzka NWR (km)	Wolf Island NWR (km)
55.4	227.4	277.2	202.9	108.3

C. NPS Screening Value[a]

Okefenokee NWR (ton/yr/km)	St. Marks NWR (ton/yr/km)	Bradwell Bay NWR (ton/yr/km)	Chassahowitzka NWR (ton/yr/km)	Wolf Island NWR (ton/yr/km)
9.1	2.2	1.8	2.5	4.7

[a] Screening Value = Total Emissions (Q) / Nearest Distance (D). Values of 10 or less do not require an AQRV analysis.

JACKSONVILLE LIME FACILITY

SUPPLEMENTAL
AIR QUALITY DISPERSION MODELING PROTOCOL
(USE OF TIER 3 METHOD FOR 1-HOUR NO_2 MODELING)

Prepared for:

JACKSONVILLE LIME, LLC
Jacksonville, Florida

Prepared by:

ECT Environmental Consulting & Technology, Inc.
6440 Southpoint Parkway, Suite 130
Jacksonville, Florida 32216

ECT No. 120604-0200

October 2013

TABLE OF CONTENTS

LIST OF TABLES

1.0 INTRODUCTION

Jacksonville Lime, LLC (a joint venture between Carmeuse Lime & Stone and Keystone Industries), is planning to construct and operate a lime manufacturing facility in Jacksonville, Florida. This facility will be comprised of two vertical lime kilns and associated raw material, fuel, and product storage and handling systems. The project will be subject to Prevention of Significant Deterioration (PSD) preconstruction review per Chapter 40, Part 52.21, Code of Federal Regulations (CFR), and Section 62-212.400, Florida Administrative Code (F.A.C.). Jacksonville Lime has retained Environmental Consulting & Technology, Inc. (ECT), to assist with preparation of a PSD permit application for the proposed project.

The U.S. Environmental Protection Agency (EPA) and Florida Department of Environmental Protection (FDEP) recommend that a protocol be established by an applicant when air quality dispersion modeling is to be conducted in support of a permit application subject to PSD preconstruction review. A greenhouse gas (GHG) PSD permit application for the proposed project was submitted to EPA in June 2012, and Volume 1 of the PSD permit application containing the best available control technology (BACT) analysis was submitted on August 28, 2013. A modeling protocol was prepared and submitted to FDEP in August 2012 to present the modeling procedures to be employed for the referenced permit application. Key modeling methods, inputs, and options were presented in that protocol.

This supplemental modeling protocol addresses the methods proposed to evaluate compliance with the 1-hour nitrogen dioxide (NO_2) ambient air quality standard. Comments received from EPA on prior submittals relating to the NO_2 analysis have been incorporated into this version of the protocol.

The new national ambient air quality standard (NAAQS) for 1-hour NO_2 became effective on April 12, 2010. The standard is achieved when the 3-year average of the 98^{th} percentile of the annual distribution of daily maximum 1-hour concentrations does not exceed 100 parts per billion (ppb) or 188 micrograms per cubic meter ($\mu g/m^3$).

Nitrogen oxides (NO_x) are produced during combustion, especially at high temperatures. NO_x produced in a combustion process may take different forms, but primarily consists of nitrogen oxide (NO) and NO_2. In comparing the predicted NO_x concentrations with the applicable NAAQS, it is necessary to estimate the amount of NO_2 at the receptor locations of interest.

As the flue gas exits the stack, it is assumed for modeling purposes that most of the NO_x initially exists in the form of NO, which is not a criteria pollutant. After leaving the stack, additional NO_2 is generated in the plume, and some NO_2 is destroyed. The following are typical atmospheric mechanisms:

- Oxidation of NO by ambient ozone (O_3): $NO + O_3 \rightarrow NO_2 + O_2$ (1)
- Oxidation of NO by reactive hydrocarbons: $NO + HC \rightarrow NO_2 + HC$ (2)
- Photo-dissociation of NO_2: $NO_2 + \text{sunlight} \rightarrow NO + O$ (3)

Oxidation of NO by ambient ozone (Reaction 1) is the main reaction, especially in rural areas. Although the reaction is rapid, it is limited by how quickly the plume expands as it travels downwind and how much ozone is available in the surrounding air. In general, the amount of NO_2 increases in the plume as it travels away from the stack until the reactions reach quasi-equilibrium.

Over the long term (e.g., annual averaging), it is acceptable to assume that the final NO_2 to NO_x ratio is a default conservative ambient ratio of 0.75 at all receptors regardless of its distance downwind, i.e., the predicted NO_2 concentration is simply 75 percent of the predicted NO_x concentration. This assumption is not necessarily valid for predicting short-term NO_2 concentrations (e.g., 1-hour averaging), especially when additional consideration is given regarding the changes in plume composition on an hour-by-hour basis due to atmospheric chemical reactions mentioned previously. As stated earlier, as the plume expands, more ozone is available for conversion of NO to NO_2 until equilibrium is reached.

2.0 EMISSIONS SOURCES

The proposed Jacksonville Lime facility will have the following NO_x emissions sources:

- Two vertical lime kilns sharing a common stack.
- One fuel dryer.

Table 1 presents the two locations and stack parameters of the Jacksonville Lime NO_x sources.

Table 1. Jacksonville Lime NO_x Sources Stack Parameters

Source	Mode ID	UTM Coordinates (meters) X	UTM Coordinates (meters) Y	Elevation (meters)	Emissions Rate (g/s)	Stack Height (meters)	Exhaust Temperature (K)	Exhaust Velocity (m/s)	Stack Diameter (meters)
Kiln	BM19	439,339.19	3,359,613.08	3.9624	10.4	65.0	418.71	20.0	1.457
Dryer	BM30	439,348.26	3,359,648.84	3.9624	0.0403	36.6	294.1	27.9	0.49

Note: g/s = gram per second. K = Kelvin. m/s = meter per second.

Source: ECT, 2013.

PSD regulations require that modeling be conducted to determine the maximum predicted impacts from the onsite sources, which are then compared to the applicable significant impact levels (SILs). The current EPA- and FDEP-recommended interim SIL for 1-hour NO_2 is 4 ppb or 7.5 $\mu g/m^3$. Since the preliminary modeling shows that the maximum predicted NO_2 impact from the proposed project will be in excess of the SIL, cumulative modeling will be conducted to determine compliance with the 1-hour standard of 188 $\mu g/m^3$ (98th percentile of the daily maximum 1-hour concentrations averaged over a 3-year period, or highest 8th high impacts in terms of modeling results). At this time, EPA has not established PSD increments for the 1-hour NO_2 standard.

FDEP provided information for offsite facilities, including location, potential emissions, and stack parameters. Several methods were considered, including the source gradient method described in the March 2011 guidance, for determining which offsite sources would be included in the modeling. In consultation with FDEP, it was decided to include sources that actually emit NO_x at a higher level and on a frequent enough basis to contribute to the annual distribution of maximum daily NO_2 values. This led to the inclusion of NO_x sources at the following facilities:

- JEA's Northside Generating Station (NGS)/St. Johns River Power Park (SJRPP).
- Anheuser Busch, Inc.
- Cedar Bay Generating Company, L.P.
- Anchor Glass Container Corporation.

Cedar Bay and JEA Northside/SJRPP are located approximately 6.5 and 9.3 kilometers (km) to the northeast of the Jacksonville Lime project, respectively. Anchor Glass is located approximately 8.1 km west of Jacksonville Lime, and Anheuser Busch is located approximately 6.6 km northwest of Jacksonville Lime. Table 2 shows the emissions rates and stack parameters used in the modeling.

Table 2. Offsite Sources of NO_x for Inclusion in Tier 3 Modeling

Facility Name	UTM Coordinates (meters)		Elevation	NO_x Emissions Rate		Stack Height		Exhaust Temperature		Exhaust Velocity		Exhaust Diameter	
Model ID	X	Y	(meters)	lb/hr	g/s	ft	meters	°F	K	ft/s	m/s	ft	meters
Jacksonville Electric Authority - Northside/SJRPP (ID 0310045)													
JEANOR16	447,050.00	3,366,790.00	3.95	3,689.29	464.85	640.16	195.12	155.73	341.89	76.80	23.41	22.31	6.80
JEANOR17	446,900.00	3,366,300.00	3.33	3,689.29	464.85	640.16	195.12	155.73	341.89	72.51	22.10	22.31	6.80
JEANOR3	446,820.00	3,365,150.00	2.72	1,511.35	190.43	300.08	91.46	329.74	438.56	62.01	18.90	23.01	7.01
JEANOR2	446,900.00	3,364,960.00	2.72	1,039.44	130.97	300.08	91.46	274.73	408.00	53.02	16.16	16.50	5.03
JEANOR6	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR7	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR8	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR9	446,750.00	3,365,500.00	3.10	373.25	47.03	30.01	9.15	799.74	699.67	136.48	41.60	12.90	3.93
JEANOR27	446,960.00	3,365,210.00	2.72	249.05	31.38	495.13	150.92	143.73	335.22	66.01	20.12	15.00	4.57
JEANOR26	446,870.00	3,365,180.00	2.75	249.05	31.38	495.13	150.92	143.73	335.22	66.01	20.12	15.00	4.57
JEANOR14	446,940.00	3,364,995.00	2.72	65.48	8.25	168.04	51.22	285.73	414.11	136.48	41.60	11.10	3.38
Cedar Bay Generating Co (ID 0310337)													
CEDBAY01	441,690.00	3,365,790.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
CEDBAY02	441,670.00	3,365,770.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
CEDBAY03	441,650.00	3,365,750.00	2.72	180.87	22.79	403.12	122.87	264.72	402.44	120.05	36.59	13.30	4.06
Anheuser Busch - Jacksonville Brewery (ID 0310006)													
ABUSCH27	437,910.00	3,366,860.00	5.34	75.08	9.46	100.03	30.49	284.74	413.56	64.01	19.51	5.81	1.77
ABUSCH2	437,960.00	3,367,060.00	5.58	36.83	4.64	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
ABUSCH1	437,940.00	3,367,040.00	5.03	36.83	4.64	100.03	30.49	419.74	488.56	53.02	16.16	3.60	1.10
ABUSCH4	437,910.00	3,366,980.00	4.14	36.83	4.64	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
ABUSCH3	437,960.00	3,366,060.00	6.07	36.83	4.64	100.03	30.49	419.74	488.56	53.61	16.34	3.58	1.09
Anchor Glass Container Corp (ID 0310005)													
ANCHOR3	431,480.00	3,357,720.00	7.30	106.35	13.40	113.02	34.45	599.74	588.56	44.62	13.60	5.00	1.52
ANCHOR4	431,500.00	3,357,500.00	7.30	54.29	6.84	122.05	37.20	418.73	488.00	38.02	11.59	5.00	1.52
ANCHOR1	431,420.00	3,357,710.00	7.30	34.52	4.35	48.00	14.63	749.75	671.90	105.41	32.13	2.95	0.90

Note: °F = degree Fahrenheit. ft/s = foot per second. K = Kelvin. m/s = meter per second.
ft = foot. g/s = gram per second. lb/hr = pound per hour.

Source: ECT, 2013.

3.0 MODELING APPROACH

EPA guidance on dispersion modeling is contained in EPA's Guideline on Air Quality Models (GAQM) codified in 40 CFR 51, Appendix W. In addition to these general modeling guidelines, three internal memorandums were written by EPA to further clarify the policy and guidelines regarding 1-hour NO_2 modeling to its regional air division directors. Applicability of Appendix W Modeling Guidance for the 1-hour NO_2 NAAQS can be found in a memorandum dated June 28, 2010, from Tyler Fox (Leader of Air Quality Modeling Group). The basis for approval of a Tier 3 procedure is contained in a March 1, 2011, memorandum (Additional Clarification Regarding Application of Appendix W Guidance for the 1-Hour NO_2 NAAQS), also from Tyler Fox to the directors. A third EPA internal memorandum (Guidance Concerning the Implementation of the 1-Hour NO_2 NAAQS for the PSD Program) was written by Stephen Page (Director of the Office of Air Quality Planning and Standards) and is dated June 20, 2010. The GAQM guidelines, as well as the guidance contained in these memorandums, will be followed in the modeling study for the proposed project.

Appendix W recommends three methods to estimate NO_2 concentrations as follows:

- Tier 1 (Total Conversion)—Assumes that NO_x emitted from a source is converted completely to NO_2. No adjustment is made to account for atmospheric chemistry mechanisms (see Section 2.0).
- Tier 2 (Ambient Ratio Method)—Predicted concentrations are multiplied by an empirically derived NO_2/NO_x ratio (e.g., 0.75 for the annual and 0.8 for the 1-hour average).
- Tier 3 (Ozone Limiting Method [OLM] or Plume Volume Molar Ratio Method [PVMRM])—OLM assumes that the amount of NO converted to NO_2 at any given receptor is controlled by the amount of available ozone (see Reaction 1 in Section 2.0). Reactions 2 and 3 are ignored in the OLM method. If the ozone concentration is less than the NO concentration, the amount of NO_2 by the reaction is limited. If the ozone concentration is greater than or equal to the NO concentration, all NO is assumed to be converted to NO_2. PVMRM implements a more refined approach by determin-

ing the conversion rate of NO_x to NO_2 based on the number of NO_x moles in the plume and the number of moles of ozone contained within the plume between the source and receptor. The current default for the upper bound ambient air NO_2/NO_x ratio is 0.9. Since OLM and PVMRM are considered nonregulatory options in the American Meteorological Society/U.S. Environmental Protection Agency Regulatory Model Improvement Committee (AERMIC) model (AERMOD), a case-by-case preapproval is required.

The OLM option with AERMOD is proposed for performing the Tier 3 modeling. The following subsections further discuss the methodology for assessing the Jacksonville Lime project.

3.1 IN-STACK NO_2 TO NO_x RATIO

EPA recommends in its March 1, 2011, memorandum that a default in-stack NO_2 fraction of 0.5 be used for input to the PVMRM and OLM options in AERMOD in the absence of more appropriate, source-specific information on in-stack ratios. The default ratio will be used for all sources except the Jacksonville Lime kilns and the coal boilers at JEA's NGS/SJRPP facilities, for which more detailed information is available.

3.1.1 JACKSONVILLE LIME KILNS

Information on the NO_2:NO_x ratio for lime kilns is available for two Carmeuse Lime and Stone facilities. Stack testing was completed for the Strasburg Rotary Kiln (U5) located in Virginia on December 8, 2011, and for the River Rouge facility located in Michigan on April 4, 2013. The capacity of these facilities is similar to the Jacksonville lime facility (Table 3).

Table 3. Facility Capacity Summary

	Fuel Feed (tph)	Stone Feed (tph)	Lime Production (tph)	Flow Rate (scf/hr)
Jacksonville Lime	2.2 to 4.1	29.4	16.5	1,483,440
Strasburg Facility	N/A	46.9	24.7	1,100,250
River Rouge Facility	6.0	45.7	21.6	4,995,840

Note: scf/hr = standard cubic foot per hour.
tph = ton per hour.

The Jacksonville Lime kiln will have somewhat less capacity than the two existing kilns but is a more efficient design, i.e., it will produce more lime per ton of fuel and per ton of stone feed. The average NO_2:NO_x ratio for the test runs were 0.045 and 0.040 for the Strasburg and River Rouge kilns, respectively (Table 4).

Table 4. NO_2:NO_x Ratio Results Summary

	Strasburg			River Rouge		
Test Run	NO_2 (ppm)	NO_x (ppm)	NO_2:NO_x Ratio	NO_2 (lb/hr)	NO_x (lb/hr)	NO_2:NO_x Ratio
Run 1	4.39	99.24	0.044	3.14	88.05	0.035
Run 2	3.25	103.27	0.031	3.56	87.81	0.041
Run 3	9.53	118.72	0.080	4.17	92.12	0.045
Run 4	3.32	145.54	0.023	N/A	N/A	N/A
Average	5.12	116.69	0.044	3.62	89.33	0.041

Source: ECT, 2013.

Based on the consistency of the results, it is proposed to use a NO_2:NO_x ratio of 0.05 for the Jacksonville Lime kilns in the Tier 3 modeling analysis.

3.1.2 JEA'S COAL-FIRED BOILERS

JEA SJRPP's two largest pulverized coal-fired boilers are dry-bottom, wall-fired units rated at 679.6 MW each. Although NO_2:NO_x ratio data is not available for these boilers, the Seminole Generating Station in Palatka operates similar dry-bottom, wall-fired, pulverized coal boilers, for which a limited amount of continuous emissions monitoring system (CEMS) data (i.e., 35 hours) was available. Table 5 provides a comparison of the boilers at the two facilities.

Table 5. Comparison of Boilers

Facility	Identical Unit IDs	Capacity (MW)	Heat Input (MMBtu/hr)	Controls
JEA	16 and 17	679.6	6,144	LNB, ESP, wet FGD, SCR
Seminole	1 and 2	735.9	7,172	LNB, ESP, wet FGD, SCR

Note: MMBtu/hr = million British thermal units per hour.

Source: ECT, 2013.

Since these boilers are so similar in design, it is believed that the NO_2:NO_x data is representative of the JEA units. Because the CEMS measurements for the Seminole facility resulted in NO_2:NO_x ratios that were consistently below 2 percent, a conservative NO_2:NO_x ratio of 0.1 is proposed for modeling the JEA SJRPP pulverized coal boilers.

JEA NGS operates two circulating fluidized bed coal boilers (Units 1 and 2). Approximately 5 months of CEMS data were available for Unit 1, and 4 months of data were available for Unit 2. The average NO_2:NO_x ratio was only 0.002 for Unit 1 and 0.004 for Unit 2. The maximum ratios measured were 0.875 and 0.031 for Units 1 and 2, respectively. A conservative NO_2:NO_x ratio of 0.1 is proposed for modeling the circulating fluidized bed units at JEA NGS.

3.2 BACKGROUND OZONE VALUES

Five years of hourly ozone data that coincide with the meteorological data used in the modeling study (2006 through 2010) were obtained from FDEP and will be used in this modeling study. This ozone data was measured at the most representative ozone monitor located at Duval County Sheffield Elementary School (Site ID 031-0077), which is located approximately 8 miles northeast of the proposed Jacksonville Lime facility (Figure 1). Of the three ozone monitors operated by FDEP in Duval County, this monitor is the most appropriate based on its location with respect to Jacksonville Lime and other offsite sources to be modeled, its network scale (SLAMS, Neighborhood), and the fact that it is situated downwind of the proposed Jacksonville Lime facility. Upon review of the wind rose for 2006 through 2010 (Figure 2), the prevailing winds are found to be mostly from the west and southwest.

Since the data is for the same meteorological period used in the modeling study each measured hourly ozone value is paired with the impact calculations for the corresponding hour on the same day and year. Missing ozone values will be filled in as follows:

- If 3 or fewer consecutive hours of ozone data are missing, linear interpolation will be used to fill in the gaps, based on the values of previous and subsequent hours.
- If 4 or more consecutive hours of ozone data are missing, the maximum monthly ozone concentration will be used to fill in the missing ozone data.

Table 6 provides the monthly high values in parts per billion (ppb) that were used to fill missing periods of 4 or more hours.

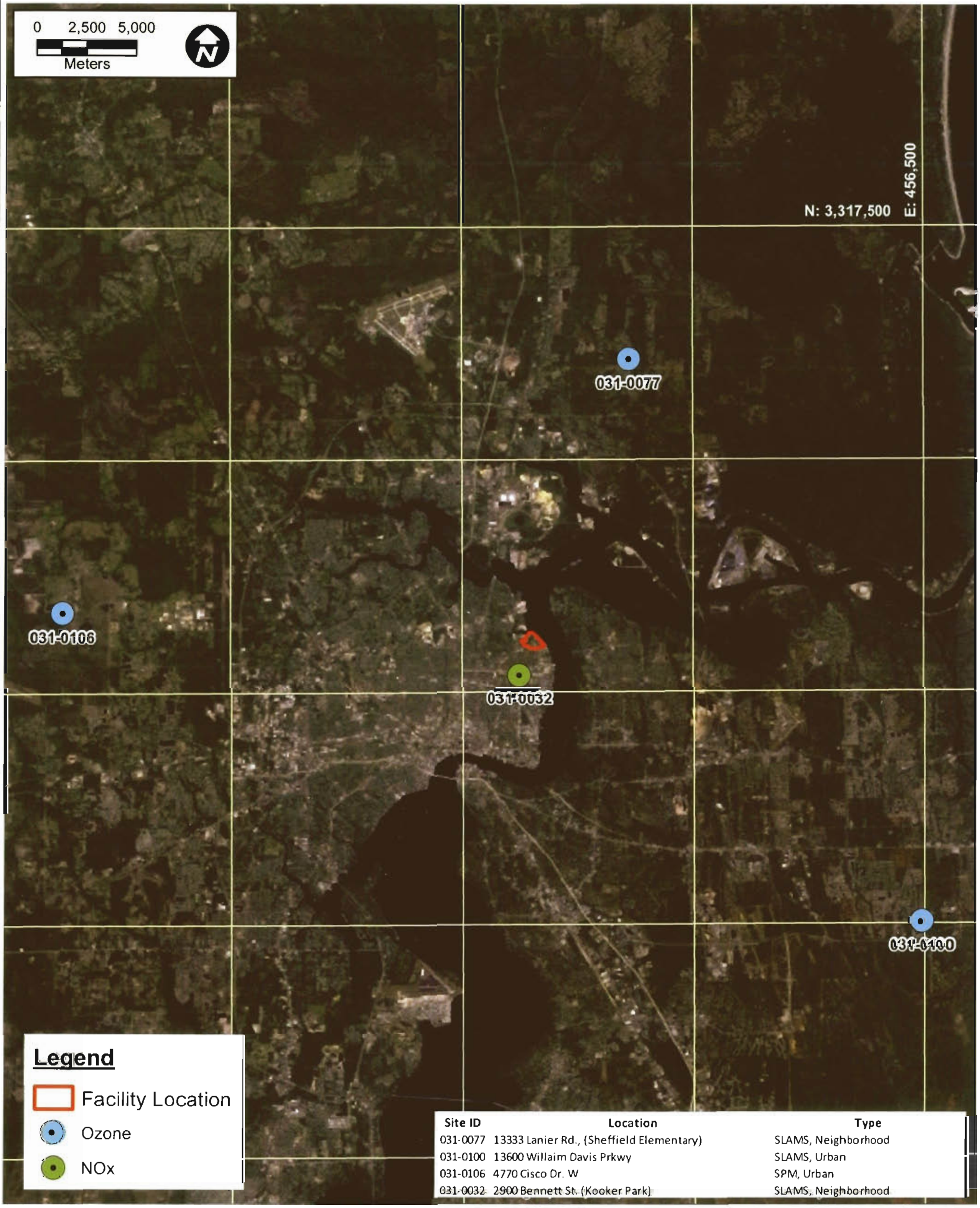
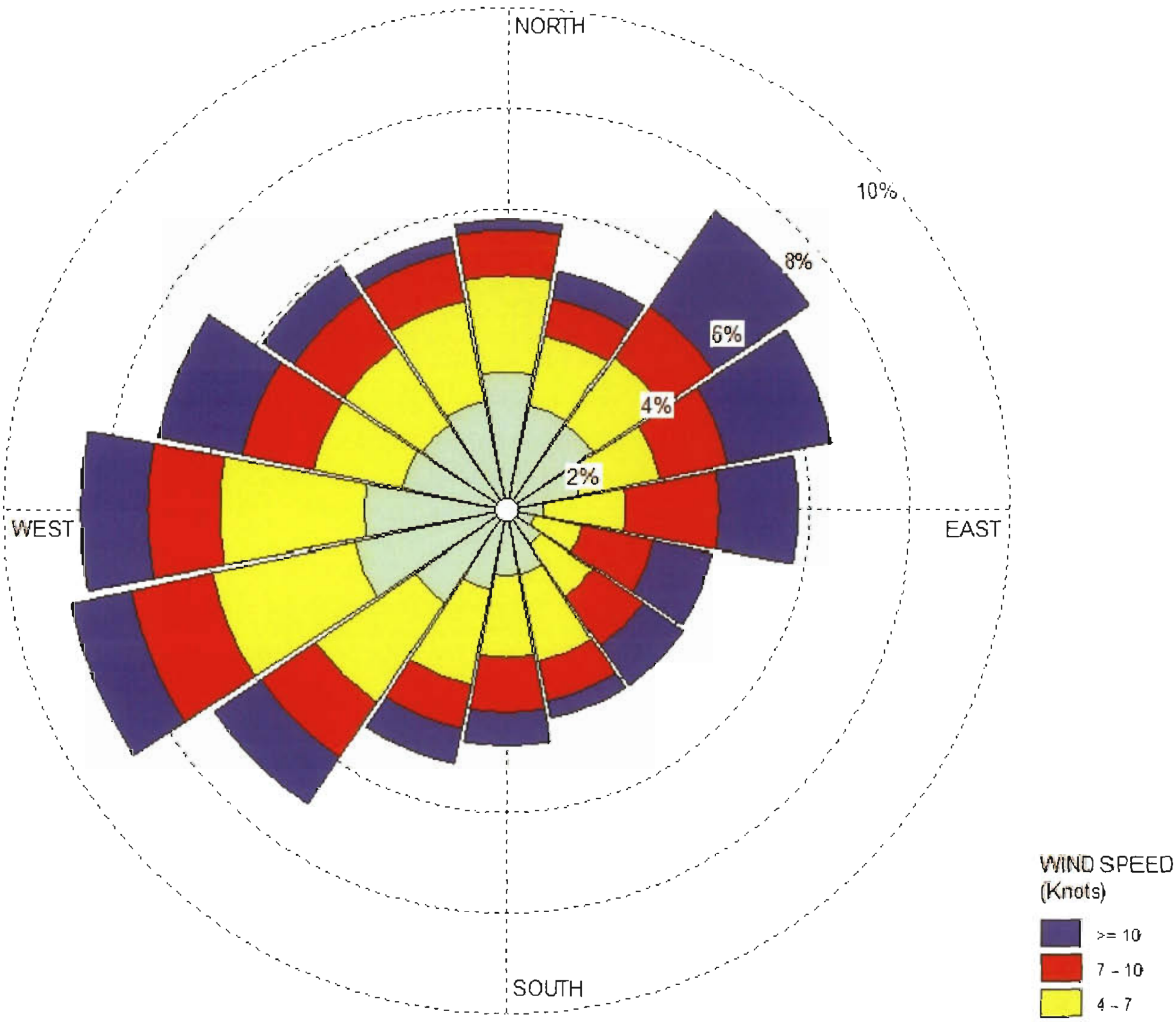


FIGURE 1.
OZONE AND NO_x MONITORS IN DUVAL COUNTY
JACKSONVILLE LIME, LLC

Sources: ESRI World Imagery, 2011; ECT, 2013.

ECT Environmental Consulting & Technology, Inc.



NOTE: Based on Jacksonville International Airport Data and Surface Chracteristics of Project Location.

FIGURE 2.

WIND ROSE (2006 THROUGH 2010)

JACKSONVILLE LIME, LLC

Sources: FDEP, 2012; ECT, 2012.

ECT Environmental Consulting & Technology, Inc.

Table 6. Monthly High Values

Month	2006	2007	2008	2009	2010
January	62	47	64	49	54
February	59	72	63	61	62
March	75	84	72	66	66
April	88	100	75	70	86
May	78	86	84	79	62
June	96	77	80	93	87
July	75	84	80	71	69
August	74	95	83	69	67
September	72	68	95	53	63
October	82	57	68	75	72
November	83	65	52	52	64
December	56	51	51	42	51

Source: ECT, 2013.

Table 7 shows the analysis of data completeness of the 2006 through 2010 hourly ozone dataset.

Table 7. Analysis of Data Completeness

Year	Number of Missing Hours	Total Number of Hours	Percent Completeness
2006	393	8,760	96.5
2007	744	8,760	91.5
2008	605	8,784	93.1
2009	312	8,760	96.4
2010	325	8,760	96.3
2006 through 2010	2,379	43,824	94.5

Source: ECT, 2013.

In accordance with EPA's June 18, 2010, 1-hour NO_2 modeling guidance, the OLMGROUP ALL option will be used, which specifies that all sources will potentially compete for the available ozone.

3.3 BACKGROUND NO_2 LEVELS

Based on a review of data obtained from EPA's AirData Website, which contains ambient monitoring data reported by FDEP, the nearest NO_2 monitoring station is the Kooker Park site located at 2900 Bennett Street in Jacksonville, Florida (Site ID 031-0032), which is less than 1 mile southwest of the proposed Jacksonville Lime facility. The Kooker Park site is the only NO_2 monitor operated by FDEP in Duval County (Figure 1).

Per the March 1, 2011, EPA guidance, several options are available for developing background air quality values for use in the cumulative modeling. It is proposed that the more detailed hour-of-day values be used in the modeling. Per the guidance memo, the hour-of-day background values were the 8^{th} highest value for each hour averaged over the 3 most recent years, i.e., 2010 through 2012 (Table 8).

AERMOD'S MAXDCONT option will be used to add the background concentrations to the predicted 1-hour impacts at each receptor to derive the maximum total 1-hour NO_2 impacts by rank.

With this supplemental modeling protocol, Jacksonville Lime is requesting FDEP/EPA approval on the use of Tier 3 modeling, proposed input data, and methodology.

Table 8. Hour-of-Day Background Values

Hour	2010	2011	2012	3-Year Average
1	33	27	27	29.0
2	30	25	25	26.7
3	32	27	24	27.7
4	31	27	21	26.3
5	29	26	22	25.7
6	30	27	24	27.0
7	32	25	27	28.0
8	33	29	26	29.3
9	31	27	24	27.3
10	27	26	22	25.0
11	29	26	20	25.0
12	22	25	15	20.7
13	16	29	15	20.0
14	13	25	14	17.3
15	15	25	14	18.0
16	15	25	16	18.7
17	18	27	17	20.7
18	27	29	23	26.3
19	38	26	30	31.3
20	39	25	34	32.7
21	41	27	36	34.7
22	40	27	32	33.0
23	38	26	32	32.0
24	36	27	29	30.7

Source: ECT, 2013.

APPENDIX H

AIR QUALITY MODELING FILES

Jacksonville Lime Dispersion Modeling File List (October 2013)

Description (Folder)	Number of Files	**Folder Name** File Name	File Description
CLASS II ANALYSIS			
		METDATA	
AERMOD MET DATA	5	JAX20YY.SFC	Jacksonville International Airport Surface Met Data 2006-2010
	5	JAX20YY.PFL	Jacksonville International Airport Upper Met Data 2006-2010
	1	JAX2006-10_V12345.SFC	JAX 5-yr Surface Met (2006-2010)
	1	JAX2006-10_V12345.PFL	JAX 5-yr Profile Met (2006-2010)
AERMOD Receptor File (Receptor)	1	Keystone-Carmeuse_Lime.ROU	Modeled receptors
		BPIP	
GEP Files (BPIP)	1	Jax_Lime2.BPI	Building Profile Input Program (BPIP) input file
	1	Jax_Lime2.OUT	Building Profile Input Program (BPIP) output file - brief
	1	Jax_Lime2.SUM	Building Profile Input Program (BPIP) output file - detailed
	Carbon Monoxide		
		CO	
CO - PSD SIL-1 Hour and 8 Hour (CO)	5	SIL_CO_YY_1H_8H.ADI	AERMOD input files for CO, 2006-2010 met data
	5	SIL_CO_YY_1H_8H.ADO	AERMOD output files for CO, 2006-2010 met data
	5	SILCO1HYY.PLT	1-hour plot files
	5	SILCO8HYY.PLT	8-hour plot files
	Nitrogen Dioxide		
		NO2 SIL ANNUAL	
NOx -PSD SIL-Annual (NOx) SIL	5	SIL_NOX_YY_Annual.ADI	AERMOD input files for NOx Annual SIL
	5	SIL_NOX_YY_Annual.ADO	AERMOD output files for NOx Annual SIL
	5	SILNOXAnnualYY.PLT	Annual plot files
		NO2 Increment Annual	
NOx -PSD Increment-Annual (NOx) INC	1	INCNOXAnn07.ADI	AERMOD input files for NOx Annual INC 2007 Only
	1	INCNOXAnn07.ADO	AERMOD output files for NOx Annual INC 2007 Only
	1	INCNOXAnnual07.PLT	Annual plot file
	1	NOXAnnual07.ROU	Significant receptors from SIL 2007
		NO2 Cumulative Annual	
NOx -NAAQS Cumulative-Annual (NOx) CUM	1	CUMNOXAnn07.ADI	AERMOD input files for NOx Annual NAAQS run 2007 Only
	1	CUMNOXAnn07.ADO	AERMOD output files for NOx Annual NAAQS run 2007 Only
	1	CUMNOXAnnual07.PLT	Annual plot file
	1	NOXAnnual07.ROU	Significant receptors from SIL 2007
		NO2 SIL 1-hr	
NOx -PSD SIL-1 Hour (NOx) SIL	5	SILNOX1HRTIER3.ADI	AERMOD input files for NOx Annual SIL
	5	SILNOX1HRTIER3.ADO	AERMOD output files for NOx Annual SIL
	5	SILNOX1HRTIER3.PLT	Annual plot files
		NO2 Cumulative 1 Hour	
NOx -PSD Increment-1 Hour (NOx) INC	1	CUMNOX1H_OLM11.ADI	AERMOD input files for NOx 1-hour NOx NAAQS run
	1	CUMNOX1H_OLM11.ADO	AERMOD output files for NOx 1-hour NAAQS run
	1	OLMCUM11.MAX	MAXDCONT File
	1	NOXTIER3SIL.ROU	Significant receptors from SIL RUN
	1	CUMNOX1H_OLM13.ADI	AERMOD input files for NOx 1-hour NOx NAAQS run
	1	CUMNOX1H_OLM13.ADO	AERMOD output files for NOx 1-hour NAAQS run
	1	OLMCUM13.MAX	MAXDCONT File
	1	NOX_NESTED.ROU	Nested 100 m spacing receptor grid
	Sulfur Dioxide		
		SO2 SIL	
SO_2 PSD SIL 1 Hour (SO2) SIL	1	SILSOX1HC.ADI	AERMOD input file for SO2, 2006 to 2010 met data
	1	SILSOX1HC.ADO	AERMOD output file for SO2, 2006 to 2010 met data
	1	SILSO21HC.PLT	1 Hour plot file
SO_2-PSD SIL-3 Hour (SO2) SIL	5	SIL_SO2_YY_3H.ADI	AERMOD input files for SO2, 2006 to 2010 met data
	5	SIL_SO2_YY_3H.ADO	AERMOD output files for SO2, 2006 to 2010 met data
	5	SILSO23HYY.PLT	3-hour plot files

Jacksonville Lime Dispersion Modeling File List (October 2013)

Description (Folder)	Number of Files	**Folder Name** File Name	File Description
SO_2-PSD SIL-Annual & 24 hour	5	SIL_SO2_YY_A_24.ADI	AERMOD input files for SO2, 2006 to 2010 met data
(SO2) SIL	5	SIL_SO2_YY_A_24.ADO	AERMOD output files for SO2, 2006 to 2010 met data
	5	SILSO224YY.PLT	24-hour plot files
	5	SILSO2AYY.PLT	Annual plot files
		SO2 Increment	
SO_2-PSD Increment-24 hour	5	INC_SO2_YY_24.ADI	AERMOD input files for SO2, 2006 to 2010 met data
(SO2) INC	5	INC_SO2_YY_24.ADO	AERMOD output files for SO2, 2006 to 2010 met data
	5	INC_SO2_24_YY.PLT	24-hour plot files
	1	SO2_INC.ROU	Signifcant Receptor File from SIL
		NO2 Cumulative	
SO_2 NAAQS 1-hour	1	CUMSO21HC.ADI	AERMOD input files for SO_2 1-hour NAAQS run
	1	CUMSO21HC.ADO	AERMOD output files for SO_2 1-hour NAAQS run
	1	CUMSO21HC.OUT	MAXDCONT File
	1	SO21HSILC.ROU	Significant receptors from SIL RUN
Particulate Matter 10			
		PM10 SIL	
PM_{10}-PSD SIL-Annual & 24 Hour	5	PMSILYY.ADI	AERMOD input files for PM10, 2006 to 2010 met data
(PM10) SIL	5	PMSILYY.ADO	AERMOD output files for PM10, 2006 to 2010 met data
	5	SIL_PM24 _YY.PLT	24 hour plot files
	5	SIL_PMANN_YY.PLT	Annual plot files
		PM10 Increment	
PM_{10}-PSD Increment -24 Hour	5	PMINC24YY.ADI	AERMOD input files for PM10, 2006 to 2010 met data
(PM10) INC	5	PMINC24YY.ADO	AERMOD output files for PM10, 2006 to 2010 met data
	5	INC_PM24_YY.PLT	24 hour plot files
	1	PM1024hr.ROU	24 hour receptors
PM_{10}-PSD Increment -Annual	4	PMINCAnnYY.ADI	AERMOD input files for PM10, 2007 to 2010 met data
(PM10) INC	4	PMINCAnnYY.ADO	AERMOD output files for PM10, 2007 to 2010 met data
	4	INC_PMANN_YY.PLT	Annual Plot Files
	1	PM10Annual.ROU	Annual Receptors
		PM10 Cumulative	
PM_{10}-PSD Cumulative -24 Hour	1	PM10_CUM_24hr5Y.ADI	AERMOD input files for PM10, 2006-2010 five year average
(PM10) CUM	1	PM10_CUM_24hr5Y.ADO	AERMOD output files for PM10, 2006 to 2010 met data
	1	PM10_CUM_24hr5Y.MAX	MAXDCONT File
	1	5YR_PM10_2hr.ROU	Annual receptors
Particulate Matter 2.5			
		PM25 SIL	
$PM_{2.5}$ PSD SIL-Annual	5	B_PM2.5_ANN_SILYY.ADI	AERMOD input files for PM2.5, 2006 to 2010 met data
(PM2.5) SIL	5	B_PM2.5_ANN_SILYY.ADO	AERMOD output files for PM2.5 2006 to 2010 met data
	5	SIL_BPM2.5ANNYY.PLT	Annual plot files
$PM_{2.5}$ PSD SIL-24 Hour	5	B_PM2.5_24_SILYY.ADI	AERMOD input files for PM2.5, 2006 to 2010 met data
(PM2.5) SIL	5	B_PM2.5_24_SILYY.ADO	AERMOD output files for PM2.5 2006 to 2010 met data
	5	SIL_BPM2.524_YY.PLT	Annual plot files
$PM_{2.5}$ PSD SIL Annual	5	B_PM2.5_ANN_SIL06.ADI	AERMOD input file for PM2.5, 2006 to 2010 met data
(PM2.5) SIL	5	B_PM2.5_ANN_SIL06.ADO	AERMOD output file for PM2.5 2006 to 2010 met data
	5	SIL_BPM2.5ANN06.PLT	Annual plot file
$PM_{2.5}$ 24-hour SIL	1	PM25SIL5YR.ADI	AERMOD input file for PM2.5, 2006 to 2010 met data
(PM2.5) SIL	1	PM25SIL5YR.ADO	AERMOD output file for PM2.5 2006 to 2010 met data
	1	PM25SIL5YR.PLT	Annual plot file
		PM25 Cumulative	
$PM_{2.5}$-Cumlative 24 hour	1	PM24CUMCOKE.ADI	AERMOD input file for PM25, 5-yr Met, coke fuel option
	1	PM24CUMCOKE.ADO	AERMOD output file for PM25, 5-yr Met, coke fuel option
	1	PM24CUMCOKE.MAX	MAXDCONT File
	1	PM24CUMWOOD.ADI	AERMOD input file for PM25, 5-yr Met, wood fuel option
	1	PM24CUMWOOD.ADO	AERMOD output file for PM25, 5-yr Met, wood fuel option
	1	PM24CUMWOOD.MAX	MAXDCONT File

Jacksonville Lime Dispersion Modeling File List (October 2013)

Description (Folder)	Number of Files	**Folder Name** File Name	File Description
		PM25 Increment	
$PM_{2.5}$-PSD Increment-24 hour	5	PM2.5INC24hrYY.ADI	AERMOD input files for PM2.5, 2006 to 2010 met data
(PM2.5) INC	5	PM2.5INC24hrYY.ADO	AERMOD output files for PM2.5 2006 to 2010 met data
	5	INC_PM2.5_24HR_YY.PLT	24 hour plot files
	1	B_PM2.5_24hr.ROU	24 hour receptors
CLASS I ANALYSIS			
CALPUFF Input (PUFF-INP)	3	JAX_LIME_YY	CALPUFF Input files, 2001-2003 Met Data
CALPUFF Output	3	JAX_LIME_YY.CON	Concentration output files, 2001-2003 Met Data
(PUFF-OUT)	3	JAX_LIME_YY.LST	List output files, 2001-2003 Met Data
		NO2	
CALPOST Input	3	JAX_LIME_NO2_OKE_YY.INP	Okefenokee National Park NO2 input files, 2001-2003 Met Data
(POST-IN)	3	JAX_LIME_NO2_WOLF_YY.INP	Wolf Island NWR NO2 input files, 2001-2003 Met Data
		PM	
	3	JAX_LIME_PM10_OKE_YY.INP	Okefenokee National Park PM10 input files, 2001-2003 Met Data
	3	JAX_LIME_PM10_WOLF_YY.INP	Wolf Island NWR PM10 input files, 2001-2003 Met Data
	3	JAX_LIME_PM2.5_OKE_YY.INP	Okefenokee National Park PM2.5 input files, 2001-2003 Met Data
	3	JAX_LIME_PM2.5_WOLF_YY.INP	Wolf Island NWR PM2.5 input files, 2001-2003 Met Data
		SO2	
	3	JAX_LIME_SO2_OKE_YY.INP	Okefenokee National Park SO2 input files, 2001-2003 Met Data
	3	JAX_LIME_SO2_WOLF_YY.INP	Wolf Island NWR SO2 input files, 2001-2003 Met Data
		NO2	
CALPOST Output	3	JAX_LIME_NO2_OKE_YY.LST	Okefenokee National Park NO2 output files, 2001-2003 Met Data
(POST-OUT)	3	JAX_LIME_NO2_WOLF_YY.LST	Wolf Island NWR NO2 output files, 2001-2003 Met Data
		PM	
	3	JAX_LIME_PM10_OKE_YY.LST	Okefenokee National Park PM10 output files, 2001-2003 Met Data
	3	JAX_LIME_PM10_WOLF_YY.LST	Wolf Island NWR PM10 output files, 2001-2003 Met Data
	3	JAX_LIME_PM2.5_OKE_YY.LST	Okefenokee National Park PM2.5 output files, 2001-2003 Met Data
	3	JAX_LIME_PM2.5_WOLF_YY.LST	Wolf Island NWR PM2.5 output files, 2001-2003 Met Data
		SO2	
	3	JAX_LIME_SO2_OKE_YY.LST	Okefenokee National Park SO2 output files, 2001-2003 Met Data
	3	JAX_LIME_SO2_WOLF_YY.LST	Wolf Island NWR SO2 output files, 2001-2003 Met Data
Total Files	320		

Source: ECT, 2013.