Enclosure 1

Response to Air Quality RAIs

4-6 Air Quality Impacts:

A. Provide additional information, specified below, on air emission inventories expected during road construction, site preparation (pre-construction), construction, and operation of the proposed GLE facility.

1. Provide anticipated $PM_{2.5}$ emissions expected during road construction, site preparation (pre-construction), construction, and operation of the proposed GLE facility.
2. To facilitate the evaluation of impacts on global climate change, provide greenhouse gas emissions (e.g., CO_2) associated with the site preparation (pre-construction), construction, and operation activities for the proposed GLE facility.
3. Provide emissions of criteria pollutants, including both PM_{10} and $PM_{2.5}$, during facility operation from: (1) the GLE mechanical-draft cooling tower; (2) cylinder-handling activities (e.g., diesel-powered gantry or fork lift) between the main GLE buildings and cylinder pads; and (3) hauling traffic of product cylinders between the GLE facility and other facilities at the Wilmington Site.
4. Provide air emissions of criteria pollutants, including both PM_{10} and $PM_{2.5}$, by pollutant and by source category (similar to ER Table 4.6-1) along with emission factors, activity levels, and control efficiencies for road construction, site preparation (pre-construction), construction, and operation of the proposed GLE facility.

The air emissions estimates for construction and operation of the Proposed GLE Facility have been updated. The air emissions estimates are provided below in two sections. The first section presents the air emissions estimates for the criteria air pollutants: particulate matter (PM) (both the PM_{10} and $PM_{2.5}$ categories), nitrogen oxides (NO_x), sulfur dioxide (SO_2), volatile organic compounds (VOC), and carbon monoxide (CO). The following section presents air emissions estimates for greenhouse gases.

<u>Criteria Air Pollutant Emissions</u>

Separate sets of criteria air pollutant emissions were made for four phases of the Proposed GLE Facility project.

- *Proposed GLE Facility Early Construction (Year 2011).*
- *Proposed GLE Facility Building Construction (Year 2012).*
- *Proposed GLE Facility Final Construction/Startup (Years 2013-2017).*
- *Proposed GLE Facility Operation (Years 2018-2048)*

*The emission factors, activity levels, control efficiencies, and other assumptions used for each set of air emissions estimates are presented in **Tables 4-6-1** through **4-6-4**. For each identified parameter, the parameter value selected for the emissions estimates is identified and the basis for the value selection is described. The Proposed GLE Facility design, construction schedule, and operating plans have not been finalized at this time. To provide upper bound estimates of the criteria air emissions from each of the GLE Facility project phases for the purpose of assessing air quality impacts, conservative values for were used for those*

site-specific parameters for which definitive values are not available at this time in the project development (i.e., the assumed vales were selected such that air emissions estimates would be maximized for a given air emission source). Examples of these parameters include the period of time required to complete a construction activity such as site preparation and mix of off-road construction equipment operated at the site to complete the activity... The estimates for average daily and average annual criteria air pollutant emissions from the specific sources associated with each of the Proposed GLE Facility project phases are presented in ***Tables 4-6-5*** *through* ***4-6-8****.*

*The emission estimates for the Proposed GLE Facility phases with construction activities (****Tables 4-6-5*** *through* ***4-6-7****) indicate the largest source of criteria air emissions are PM emissions from fugitive dust generated by outdoor construction activities during the Early Construction and Building Construction Phases. Small quantities of NO_x, SO_2, VOC, and CO emissions are released by the off-road construction equipment needed for construction activities and from the construction worker automobiles and construction material trucks traveling to and from the Proposed GLE Facility project site.*

*The emission estimates for the Operation Phase (****Table 4-6-8****) indicate that the Proposed GLE Facility would not be a major source of any criteria air pollutant as defined under U.S. Environmental Protection Agency (EPA) or North Carolina Division of Air Quality (NC DAQ) air permitting requirements. The laser uranium-enrichment process would be conducted totally indoors inside the main GLE operations building. Most of the heat generated by the process lasers would be used for the building interior space heating and to meet other process-heat demands. The only stationary combustion sources planned to be installed at the Proposed GLE Facility would be auxiliary diesel generator units. The other notable criteria air pollutant emissions sources at the Proposed GLE Facility would be 1) the PM emissions from mechanical draft cooling towers, 2) emissions from the motor vehicles operated for onsite for the handling and transport of UF_6 cylinders, and 3) automobile and truck traffic associated with the GLE Facility operations. Other small, miscellaneous sources of criteria air pollutant emissions are described in Section 4.6.2.2.1.3 of the GLE ER.*

<u>Greenhouse Gas Emissions</u>

The greenhouse gas (GHG) emissions associated with the GLE Facility project primarily are from the mobile and stationary combustion sources that operate during each of the project phases. Over 90% of the GHG emissions released by combustion sources are carbon dioxide (CO_2). Smaller quantities of methane (CH_4) and nitrous oxide (N_2O) are also emitted from combustion sources. Average annual estimates of the CO_2, CH_4, and N_2O emissions from each phase of the Proposed GLE Facility project were calculated by multiplying the estimated volume of fuel consumed for each combustion source type by an appropriate fuel-specific GHG emission factor. There are no significant sources of hydofluorocarbons (HFCs) associated with the Proposed GLE Facility laser uranium-enrichment process. There is the limited potential for some releases of HFCs from leakage and recharging of air conditioning systems used for office and other related interior spaces in Proposed GLE Facility buildings.

The estimates for the average annual GHG emissions from the specific sources associated with each of the Proposed GLE Facility project phases are presented in ***Table 4-6-9****. The GHG estimates for off-road construction equipment presented for the Early Construction and Building Construction Phases are based on the very conservative assumption that the entire mix of off-road construction equipment assumed for the phase (see* ***Tables 4-6-1*** *and* ***4-6-2*** *respectively) operates the entire day of every day of the construction period. In actuality, different of combinations of the assumed off-road equipment would be for different stages of construction (i.e., not all of the assumed equipment always would be onsite at the same time)*

*Consequently, actual off-road equipment diesel fuel consumption and consequently the GHG emissions from the Proposed GLE Facility construction phases are expected to be lower that the estimated levels indicated in **Table 4-6-9**.*

B. Provide air dispersion modeling for operational emission sources such as auxiliary diesel generator units, cooling tower, and onsite traffic. No air dispersion modeling during facility operation was included in the ER.

*A new air dispersion modeling analysis for the Proposed GLE Facility using the AERMOD model has been performed with a new set of assumptions based on the updated information regarding the Proposed GLE Facility design, local metrological data, and the new set of criteria air pollutant emissions estimates presented in **Tables 4-6-5** through **4-6-8**. The results of new air dispersion modeling for each of the four Proposed GLE Facility phases are presented in **Tables 4-6-12** through **4-6-16**. The air dispersion modeling for the Operation Phase presented in **Table 4-6-16** includes emissions from the Proposed GLE Facility auxiliary diesel generator units, cooling tower, and onsite traffic. The predicted maximum off-site concentrations presented in **Tables 4-6-12** through **4-6-16** include ambient background concentrations for the pollutants for which ambient air monitoring data are available (see **Tables 4-6-10** and **4-6-11**).*

The new air monitoring results predict maximum off-site concentrations resulting from the Proposed GLE Facility criteria air pollutant emissions to be less than the level of the comparable ambient air quality standard with the exception of the 24-hour average PM concentrations predicted for the Early Construction and Building Construction Phases. The 24-hour average PM concentration results for the air dispersion modeling are discussed further below in the response to RAI 4-6-D.

C. Provide additional information, specified below, to justify AERMOD modeling choices or provide updated AERMOD analyses taking into account the comments and recommendations listed below. The AERMOD model was used to estimate potential air quality impacts as reported in the ER, but independent analyses conducted by NRC noted discrepancies that diverge from typical air impact modeling practices.

1. Clarification is needed of the unit emission rates that were multiplied by actual emissions. For example, the emission rate for site preparation was estimated to be 1.15×10^{-4} lb/ft^2/work hour (in GLE_construction_phase_emission_factor.xls) but the value is listed as 1.15×10^{-4} lb/ft^2/work day in the summary worksheet which, in turn, was used for the final results. Clarify which unit emission rate is correct and revise the results if necessary.

As discussed above in the Response to RAI 4-6-B, a new air dispersion analysis has been performed for the Proposed GLE Facility. The emission rates referenced in this question no longer apply to the air dispersion analysis, and should be disregarded.

2. In reporting model results, include background concentrations representative of the Wilmington Site.

*As discussed in the Response to RAI 4-6-B, the predicted maximum off-site concentrations from the new air dispersion analysis for the Proposed GLE Facility presented in **Tables 4-6-12** through **4-6-16** include ambient background concentrations for the pollutants for which ambient air monitoring data are available. **Tables 4-6-10** and **4-6-11** are updated*

versions of tables originally presented in GLE ER Section 3.6 that include ambient air quality monitoring data that was measured by the NC DAQ at monitoring stations in New Hanover County, NC, and was reported to EPA's Air Quality System (AQS) for the years 2007 and 2009. Ambient PM_{10} monitoring data representative of the Proposed GLE Facility site are available from the AQS only for the months of February and March in 2008 (see ***Tables 4-6-10*** *and* ***4-6-11****).*

3. Provide additional justification of the use of meteorological data from the Wilmington Airport in the AERMOD model or revise the model using data from a site with surface conditions representative of both the measurement and application sites.

Meteorological data used in the AERMOD model were reprocessed using "onsite" data from the nearby Horticultural Crop Research Station in Castle Hayne, NC. National Weather Service observations from the Wilmington International Airport were used to supplement the "onsite" data, where data were incomplete at the Crop Research Station. Surface roughness length, Bowen ratio, and albedo were estimated based on National Land Cover Data (NLCD) 1992 land cover data for the area surrounding the Crop Research Station, which is considered the primary meteorological data. The wet, dry, average estimation which is used for Bowen ratio, however, is based on 30 years of climate data for the Wilmington International Airport, obtained from the National Climatic Data Center, because the Crop Research Station did not have data for a full 30 year period of record to perform this estimation.

4. Provide a justification for the dry and wet deposition used in the PM_{10} modeling or provide an air dispersion modeling analysis with 1) PM_{10} conservatively assumed to act as a gas and 2) no dry and wet deposition.

The new modeling analysis was run for both PM_{10} and $PM_{2.5}$. While dry and wet deposition were not calculated for the final results, the concentration results were calculated assuming that dry and wet depletion of the plume does take place. While it is correct that neglecting depletion would result in a higher, more conservative, PM_{10} and $PM_{2.5}$ concentration result, fugitive dust from construction activities would be released at ground level. Gravitational settling, interaction with the ground and vegetation, and precipitation events would be expected to deplete the plume, therefore applying plume depletion should give a more realistic concentration result.

5. Provide a justification as to why the most recent five years of data from the Wilmington International Airport and Morehead City/Newport, North Carolina stations were not used in the analysis or re-perform the analysis using more recent data.

Meteorological data used in the new dispersion modeling analysis were based on 5 years of surface data from Wilmington International Airport, upper air data from Charleston International Airport, and "onsite" data from the Horticultural Crop Research Station , which is immediately east of the GE-Wilmington Site. The years chosen for this analysis were 2000, 2002, 2003, 2005, and 2006. The data for 2001 were not used due to the inability of the AERMET preprocessor to process the upper air data without error, while 2004 was discarded due to AERMET being unable to produce meteorological files for the complete year of data.[1] *The data selected for this analysis is considered to be representative of the variability expected*

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[1] *Surface data from 2007 and 2008 were not available as part of the dataset ordered to complete the GLE ER Document*[0].

in the local weather conditions for the years in which the proposed site preparation and construction of the Proposed GLE Facility would take place, since the data are from recent years and climate conditions have little variability over the short term.

Charleston International Airport was chosen as the upper air station over Beaufort-Morehead City Airport after considering the similarities in climatologic and geographic setting. The specific reasons for selecting Charleston International Airport are:

- *Charleston International Airport was chosen as the upper air station over Beaufort-Morehead City Airport after considering the similarities in climatologic and geographic setting. The specific reasons for selecting Charleston International Airport are:*
- *Charleston International Airport is more similar in distance inland to the application site and Wilmington International Airport, than Beaufort-Morehead City Airport. Charleston International Airport lies approximately 14 miles from the ocean, while Morehead City's airport is only about 3 miles from the ocean. The application site lies approximately 11 miles inland, and the Wilmington International Airport is about 7 to 8 miles inland. This will affect the timing of boundary layer development, as well as that of the sea breeze frontal passage.*
- *Beaufort-Morehead City Airport is on a peninsula and thus surrounded by water. Charleston International Airport is inland, having a similar setting to the application site and Wilmington International Airport. The proximity of large waterbodies and geographic setting will affect the meteorological conditions.*
- *The orientation of the coastline near the application site and Wilmington International Airport is approximately the same as it is at Charleston International Airport. However, Beaufort-Morehead City Airport is near a coastline with a very different orientation, which will affect the direction from which sea breeze related wind blows at the upper air station.*
- *Based on Climate data obtained from the National Climatic Data Center, Charleston International Airport has similar wind speeds when compared month by month to that of Wilmington International Airport. Wind speeds at the Beaufort-Morehead City Airport are dissimilar to those measured at the Wilmington International Airport. The wind direction measured at Charleston is similar to that measured at the Wilmington International Airport, than Beaufort-Morehead City Airport when compared on a month by month basis.*

6. Clarify which settings were used to obtain both 24-hour and annual average concentrations and revise the model input parameters to use information representing conditions from 7 a.m. to 4 p.m. of weekends as well as weekdays if necessary.

The new AERMOD runs use the HROFDY keyword, which allows the user to vary the emission source strength by time. For these runs it is assumed that the workers would work for 9 hours per day, starting at 7 AM. Therefore, the multiplier was set to 0.0 for the first 6 hours, 1.0 for the next 9 hours starting at 7 AM, and 0.0 for the last 9 hours of each day. Weekends were included as work days.

7. Determine surface moisture conditions used to calculate the Bowen ratio based on the 30-year climatological data for the Wilmington airport (e.g., 1971-2000 normals if 2004-2008

meteorological data are used) or provide additional justification for the use of wet surface moisture conditions to calculate the ratio.

Surface moisture used to calculate the Bowen ratio was determined for each individual year used in modeling. This was accomplished by comparing each year's total amount of precipitation based on National Weather Service observations at the Wilmington International Airport against a distribution of precipitation probabilities for 30 years of climate data, accessed on-line from the National Climatic Data Center (http://www.ncdc.noaa.gov/oa/ncdc.html).

D. With a typical control efficiency of 50% from water spraying for fugitive dust emissions, preliminary independent analysis conducted by NRC indicates that the total (background plus modeled) 24-hour concentration at the northern site boundaries could exceed the ambient air quality standard during site preparation. Reexamine the assumptions and modeling parameters used to estimate the air quality impacts at these locations and specify the dust control measures that will be used to mitigate the impacts.

The assumptions used to estimate impacts from fugitive dust emissions generated by construction activities for the Proposed GLE Facility project have been reviewed and updated as presented in ***Table 4-6-1*** *and* ***4-6-2.*** *Using these updated assumptions and the new PM emissions estimates presented in* ***Tables 4-6-5*** *and* ***4-6-6*** *based on these assumptions****,*** *new air dispersion modeling was performed that included results to assess the 24-hour average ambient PM_{10} and $PM_{2.5}$ concentration impacts at the northern site boundaries for the Proposed GLE Facility. The predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentrations including ambient PM background concentrations based on the new air dispersion analysis for the Proposed GLE Facility are presented in* ***Tables 4-6-12*** *through* ***4-6-16*** *for the four Proposed GLE Facility phases*

Ambient PM_{10} monitoring data for EPA's Air Quality System database applicable to the Wilmington Site are available only for February and March, 2008 (see ***Tables 4-6-10*** *and* ***4-6-11****). Insufficient data are available to determine annual average PM_{10} concentration. Furthermore, $PM_{2.5}$ is a fraction of the PM_{10} concentrations in the ambient air (i.e., the measured PM_{10} concentration includes the concentration of $PM_{2.5}$ in the ambient air). Therefore, the long-term average PM_{10} concentration cannot less than the long-term $PM_{2.5}$ concentrations measured at a site. Review of the available PM_{10} ambient monitoring data summarized in* ***Table 4-6-11*** *shows that the highest 24-hour PM_{10} concentration measured in February and March, 2008 (21 $\mu g/m^3$) is less than the long-term 24-hour average $PM_{2.5}$ concentration (24 $\mu g/m^3$). For the purpose of including a credible order-of-magnitude estimate of the existing PM_{10} background concentrations to assess off-site ambient PM_{10} concentrations resulting from activities at the Proposed GLE Facility, the long-term 24-hour and annual average $PM_{2.5}$ long-term concentrations presented in Table 4-6-1 are used to the represent PM_{10} background concentrations. This assumption is made recognizing that the corresponding the actual long-term ambient PM_{10} concentrations for the site would be somewhat higher.*

Compliance with ambient air quality standards is determined by long-term ambient air quality monitoring at predetermined monitoring station locations using methods and analysis procedures established by EPA for the federal ambient air quality standards and the NC DAQ for the state ambient air quality standards. The ambient are standards are not intended to be used for direct assessment of localized ambient air pollutant concentrations from temporary emission sources such as construction projects. However, the comparison of the predicted air dispersion modeling ambient concentrations with the appropriate ambient air quality standard levels presented in ***Tables 4-6-11*** *through* ***4-6-15*** *do provide an order-of-magnitude indicator of*

any potential air quality impacts from the Proposed GLE Facility construction and operation activities.

The air dispersion modeling results based on a conservative set of assumptions indicate that the predicted maximum 24-hour average PM_{10} concentrations from construction activities associated with the Early Construction and Building Construction Phases at certain times may exceed a level of 150 μg/m^3 at off-site locations adjacent to the Wilmington Site property boundary. The specific predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentration values shown in ***Tables 4-6-12*** *and* ***4-6-14*** *are considered to be upper bound estimates because of the set of conservative assumptions used for the construction practices occurring during the Proposed GLE Facility Early Construction and Building Construction Phases. The predicted 24-hour average concentrations represent a day on which construction activity is occurring continuously throughout the Proposed GLE Facility site (e.g., earthmoving operations are being conducted and the soil is being actively disturbed over the entire approximately 148 acre site continuously for the entire 9-hour construction work day). To this scenario is applied the PM_{10} emission factor for worst-case conditions (0.42 ton/acre/month). Worst-case conditions are defined for application of this emission factor to be those construction sites with active large-scale earth moving operations. In actuality, this assumed construction scenario is likely to occur for only for short durations or not all at the Proposed GLE Facility site with construction activity typically being concentrated in a potion of the project site on any given work day.*

Because of the predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentration values from the air dispersion modeling, the potential for localized temporary fugitive dust impacts from Proposed GLE Facility was further investigated. ***Table 4-6-13*** *presents the predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentrations (including ambient background concentrations) that would occur with the construction of the onsite access road to the Proposed GLE Facility site. This activity is assumed to be complete with the first 30 days of the Early Construction Period before site preparation work begins on the Proposed GLE Facility Site. The air dispersion modeling results in* ***Table 4-6-13*** *show predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentrations below the levels of the corresponding PM ambient air quality standards.*

The high predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentration values shown in ***Tables 4-6-12*** *and* ***4-6-14*** *occur at receptors on the Wilmington Site boundary very near the Proposed GLE Facility site. At the off-site receptor location identified at nearest existing residence along the Wilmington Site northern boundary the predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentration values are significantly lower. The predicted maximum off-site 24-hour average ambient PM_{10} and $PM_{2.5}$ concentration values at this off-site location are as follows:*

<u>Early Construction Phase</u>

PM_{10} 80.4 μg/m^3 + 24 μg/m^3 (background) = 104.4 μg/m^3

$PM_{2.5}$ 10.6 μg/m^3 + 24 μg/m^3 (background) = 34.6 μg/m^3

<u>Building Construction Phase</u>μμ

PM_{10} 63.6 μg/m3 + 24 μg /m^3 (background) = 87.6 μg/m^3

$PM_{2.5}$ 8.2 μg/m3 + 24 μg /m^3 (background) = 32.2 μg/m^3

While the assumptions used for air dispersion analysis likely overstate the actual maximum 24-hour average PM_{10} and $PM_{2.5}$ concentrations that would occur from construction activities associated with the Proposed GLE Facility Early Construction and Building

Construction Phase, the magnitude of the predicted PM concentrations do suggest that there is at least the potential for levels of fugitive dust emission generated by certain shot-term construction activities at the Proposed GLE Facility site to temporarily impact existing neighborhoods located adjacent to the northeast boundary of the Wilmington Site.

Implementation of fugitive dust control practices at large construction sites reduce the levels of PM emissions actually released to the atmosphere. During the Proposed GLE Facility construction phases, good practice fugitive dust control measures for construction sites would be implemented to mitigate fugitive dust emissions impacts. These control measures would include:

- *Periodic watering of the areas of Proposed GLE Facility site where construction activities actively disturb the soil to reduce generation of fugitive dust from such activities, as dictated by site weather conditions.*
- *Periodic watering of the unpaved portions of the onsite access road as needed depending to reduce dust generated by motor vehicle traffic on the roadway, as dictated by site weather conditions..*
- *Limiting vehicle speeds on the unpaved portions of the onsite access road and within the construction site to less than 15 mph to reduce dust generated by motor vehicle traffic on the roadway.*
- *Removing dirt from truck tires by driving over a gravel pad prior to leaving the Proposed GLE Facility site or unpaved access road to avoid spreading sediments on paved roads.*
- *Covering trucks carrying soil and debris to reduce dust emissions from the back of trucks driving on onsite and public roadways.*
- *Completing paving of the entire length of the Proposed GLE Facility onsite access road and the parking lots as soon as practicable.*

Table 4-6-1. Input Parameters Used for Proposed GLE Facility Air Emissions Estimates Early Construction Phase

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
A. General assumptions	A.1	Period	Year 2011	GLE tentative schedule as of November 2009
	A.2	Average daily number of workers onsite	95 workers	GLE estimate as of November 2009
	A.3	Activities	Access road construction and site clearing, grading, and preparation of site for erection of buildings. Final paving of on-site access road and parking areas at end of phase.	GLE tentative plans as of November 2009
	A.4	Start date	April 1, 2011	GLE tentative schedule as of November 2009
	A.5	Weekly work schedule	Sunday through Saturday, 7 a.m. to 4 p.m.	Typical new construction work practices
	A.6	Total number of work days per year	270 days	Calculated based on Construction Start Date (A.4) and Weekly Work Schedule (A.5) and assuming no work on 5 holidays (Memorial Day, 4th of July, Labor Day, Thanksgiving, Christmas)
B. Fugitive dust emissions from Proposed GLE Facility onsite access road construction	B.1	Total road length	1.64 miles	GLE preliminary design information as of November 2009
	B.2	Road length for road segments using existing onsite paved roads	0.45 mile	GLE preliminary design information as of November 2009
	B.3	Road length for road segments using existing onsite unpaved roads	1.19 miles	GLE preliminary design information as of November 2009
	B.4	Area of construction activity with disturbed soil	8.85 acres	GLE preliminary design information as of November 2009. Road length for unpaved road segment (B.3) times an assumed average width of 60 feet for the road right-of –way along the length of the road segment.
	B.5	Number of days to complete activity	30 days	Assumed value based on professional judgment
	B.6	PM_{10} emission rate	0.42 ton/acre/month (worst case conditions factor)	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1, Table 3-2.* September 2006. http://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf

Table 4-6-1. (continued)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
B. Fugitive dust emissions from Proposed GLE Facility onsite access road construction	B.7	$PM_{2.5}$ to PM_{10} ratio	0.1	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1,* page 3-8. September 2006. http://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf
	B.8	Fugitive dust control mitigation practices implemented	Wet suppression by periodic water spraying of disturbed soil in active construction area using water truck.	Common new construction site preparation work practices
	B.9	Fugitive dust control mitigation practices PM10 control efficiency	74%	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1,* Table 3-6. Entry for "construction activities with 2.1-hour watering interval"). September 2006.
C. Fugitive dust emissions from Proposed GLE Facility site preparation (excluding onsite access road construction)	C.1	Area of construction activity with disturbed soil	148.7 acres	Proposed GLE Facility site area plus additional area potentially subject to construction activity for stormwater retention system and utilities based on GLE preliminary design as of November 2009.
	C.2	Number of days to complete activity	240 days	Total number of construction days per year (A.6) – Days to complete road (B.5)
	C.3	PM_{10} emission rate	0.42 ton/acre/month (worst case conditions factor)	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1,* page 3-8. September 2006.
	C.4	$PM_{2.5}$ to PM_{10} ratio	0.1	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1,* page 3-8. September 2006.
	C.5	Fugitive dust control mitigation practices implemented	Wet suppression by periodic water spraying of disturbed soil in active construction area using water truck	Common new construction site preparation work practices
	C.6	Fugitive dust control mitigation practices PM_{10} control efficiency	74%	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1,* Table 3-6. Entry for "construction activities with 2.1-hour watering interval"). September 2006.

Table 4-6-1. (continued)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
D. Fugitive dust emissions from construction motor vehicle traffic on completed Proposed GLE Facility onsite access road	D.1	Unpaved onsite access road segment length	1.19 miles	Parameter B.3
	D.2	Surface silt content	19%	Weighted-average of site-specific data for soils identified on unpaved road segment using data presented in *GLE ER, Section 3.3 – Geology and Soils (December 2008)*, Table 3.3-1 and an adaption of Figure 3.3-24 to show new access road route. For calculation used, 0.77 mile of road is on Murville fine sand soil (0.6% silt) and 0.42 mile of road is on Pantego loam sol (44% silt)
	D.3	Average daily number of motor vehicle trips to construction site	200 trips per day (each trip is a one-way trip along the entire length of the onsite road between the Proposed GLE Facility site and entrance on Castle Hayne Road).	Number of vehicle trips estimated using Institute of Transportation Engineers (ITE) standard Average Daily Trip (ADT) rate for industrial manufacturing land use of ADT = 2.1 per employee. The ITE defines manufacturing facilities as areas where the primary activity is the conversion of raw material or parts into finished products. The ITE trip generation rates are total vehicle rates that include trucks. ITE, *Trip Generation Handbook, 2nd Edition.* Institute of Transportation Engineers, Washington, DC. 2004.
	D.4	Average weight of motor vehicles traveling on onsite access road	9,700 lb/vehicle (4.85 ton/vehicle)	Calculated weighted average based on assumed average daily vehicle mix for 200 vehicle trips per day (D.3) as follows: Vehicle Type / Average Vehicle Weight(lb) / % of Total Trips per day Automobiles / 3,000 / 90% (180 trips) Heavy-duty diesel trucks / 70,000 / 10% (20 trips) (3,000×0.9+70,000×0.1) = 9,700 lb.
	D.5	Average vehicle speed traveling on unpaved segment of onsite access road	15 miles per hour (mph)	Wilmington Site currently has vehicle speed limits of 20 mph on facility roads and 10 mph in parking areas. Assume implementation of 15 mph speed limit on unpaved portions of access road as part of site fugitive dust control mitigation practices
	D.6	PM_{10} emission rate (uncontrolled)	1.36 lb/VMT	Calculated value for fugitive dust emissions from unpaved roads using U.S. EPA, *AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 13.2.2, Equation 1a*. November 2006.
	D.7	$PM_{2.5}$ emission rate (uncontrolled)	0.14 lb/VMT	Calculated value for fugitive dust emissions from unpaved roads using U.S. EPA, *AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 13.2.2, Equation 1a*.

Table 4-6-1. (Continued)

<table>
<tr><th>Air Emission Source</th><th colspan="2">Parameter</th><th>Parameter Value</th><th>Basis for Selected Input</th></tr>
<tr><td rowspan="4">D. Fugitive dust emissions from construction motor vehicle traffic on completed Proposed GLE Facility onsite access road</td><td>D.8</td><td>Fugitive dust control mitigation practices implemented</td><td>• 15 mph speed limit restriction
• Wet suppression by water spraying of roadway</td><td>Common work practices use to mitigate fugitive dust emissions from unpaved roads at construction sites</td></tr>
<tr><td>D.9</td><td>Wet suppression fugitive dust control efficiency for unpaved roads</td><td>55%</td><td>Western Regional Air Partnership. WARP Fugitive Dust Handbook, Chapter 6: Unpaved Roads, Section 6.5, Table 6-7. September 2006.</td></tr>
<tr><td>D.10</td><td>PM_{10} emission rate (controlled)</td><td>[PM_{10} emission rate (uncontrolled)] × 0.55</td><td>Calculated value using Parameters D.6 and D.8</td></tr>
<tr><td>D.11</td><td>$PM_{2.5}$ emission rate (controlled)</td><td>[PM_{10} emission rate (uncontrolled)] × 0.55</td><td>Calculated value using Parameters D.7 and D.8</td></tr>
<tr><td rowspan="2">E. Vehicle emissions from off-road diesel-powered construction equipment used for Early Construction phase activities</td><td>E.1</td><td>Average daily off-road equipment mix at site. Entire mix of equipment assumed to be in operation each work day.</td><td><table><tr><th>Equipment Type</th><th>Number Onsite</th></tr><tr><td>Dozer</td><td>4</td></tr><tr><td>Loader</td><td>4</td></tr><tr><td>Grader</td><td>2</td></tr><tr><td>Compactor/roller</td><td>2</td></tr><tr><td>Excavator</td><td>1</td></tr><tr><td>Water truck</td><td>1</td></tr><tr><td>Paver</td><td>1</td></tr></table></td><td>Assumed mix of off-road construction equipment in operation based on typical types of construction equipment used for site preparation and road construction.</td></tr>
<tr><td>E.2</td><td>Emission factors</td><td>Site-specific composite emission factors for equipment mix in Parameter E.1<table><tr><th>Pollutant</th><th>lb/hr</th></tr><tr><td>PM_{10}</td><td>1.5</td></tr><tr><td>$PM_{2.5}$</td><td>1.4</td></tr><tr><td>NO_x</td><td>8.2</td></tr><tr><td>SO_2</td><td>0.02</td></tr><tr><td>VOC</td><td>0.6</td></tr><tr><td>CO</td><td>4.8</td></tr></table></td><td>Calculated emission factors for each equipment type using U.S. EPA. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression Engines. EPA-420-P-04-009. U.S. EPA, Office of Transportation, Washington, DC. 2004.
Summed the individual equipment type emissions times the number of each equipment type to obtain the overall composite hourly emission rate factors.
These factors are based on the conservative that all of the equipment is in operation.</td></tr>
</table>

Table 4-6-1. (continued)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
F. Vehicle emissions from automobile and truck traffic associated with Early Construction Phase activities	F.1	Number of days of automobile and truck traffic on onsite access road	270 days	Parameter A.6
	F.2	Average daily number of motor vehicle trips to site	200 trips (each trip is a one-way trip including the entire length of the onsite road between the Proposed GLE Facility site and entrance on Castle Hayne Road).	Number of vehicle trips estimated using Institute of Transportation Engineers (ITE) standard Average Daily Trip (ADT) rate for industrial manufacturing land use of ADT = 2.1 per employee. The ITE defines manufacturing facilities as areas where the primary activity is the conversion of raw material or parts into finished products. The ITE trip generation rates are total vehicle rates that include trucks. ITE, *Trip Generation Handbook, 2nd Edition.* Institute of Transportation Engineers, Washington, DC. 2004
	F.3	Percentage of daily trips by gasoline engine automobiles	90%	Assumed value based on professional judgment
	F.4	Percentage of daily trips by diesel engine heavy duty trucks	10%	Assumed value based on professional judgment
	F.5	Average VMT onsite per trip	1.64 miles	Onsite access road length based on GLE preliminary design information as of November 2009
	F.6	Average VMT offsite per trip by automobiles	10 miles	Assumed value based on professional judgment
	F.7	Average VMT offsite per trip by trucks	100 miles	Assumed value based on professional judgment
	F.8	Emission Estimation method	CO, VOC, NO_x, SO_2, and PM_{10} Factors developed using EPA's MOBILE6.2 vehicle emission factor model.	MOBILE6 Vehicle Emission Modeling Software is the standard method currently approved by the U.S. EPA for determining on-road motor vehicle emission factors for air emission inventories. Available at < http://www.epa.gov/OMS/m6.htm>
	F.9	MOBILE6.2 Input Values	MOBILE6.2 Input Values CALENDAR YEAR = 2018 MIN/MAX TEMP = 35.8ºF 56.3ºF FUEL RVP = 9.0 All other input parameters set at the MOBILE6.2 default values and assumptions.	CALENDAR YEAR corresponds to year of Construction period (Parameter A.1) MIN/MAX TEMP are the monthly mean temperatures for January from the *GLE Environmental Report, Section 3.6 – Meteorology, Climatology, and Air Quality (December 2008)*, Table 3.6-1. (The MOBILE6.2 default evaluation month is January). FUEL RVP is the maximum RVP allowed in attainment areas in North Carolina

Table 4-6-1. (concluded)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
F. Vehicle emissions from automobile and truck traffic associated with Early Construction Phase activities	F.10	$PM_{2.5}$ to PM_{10} ratio	$PM_{2.5}$ Factor based on PM_{10} Factor applying a $PM_{2.5}$ to PM_{10} ratio = 0.97	Standard $PM_{2.5}$ to PM_{10} ratio applied by U.S. EPA to mobile sources combusting petroleum derived fuels
	F.11	Automobile emission factors	Use Light Duty Gasoline Vehicle (LDGV) factors for automobiles Pollutant / gram/VMT PM_{10} / 0.025 $PM_{2.5}$ / 0.024 NO_x / 0.549 SO_2 / 0.007 VOC / 0.656 CO / 13.08	Calculated 2011 values using MOBILE6.2
	F.12	Truck emission factors	Use Heavy Duty Diesel Vehicle (HDDV) factors for trucks Pollutant / gram/VMT PM_{10} / 0.136 $PM_{2.5}$ / 0.132 NO_x / 6.360 SO_2 / 0.013 VOC / 0.381 CO / 1.627	Calculated 2011 values using MOBILE6.2

Table 4-6-2. Input Parameters Used for Proposed GLE Facility Air Emissions Estimates
Building Construction Phase

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
A. General assumptions	A.1	Period	Year 2012	GLE tentative schedule as of November 2009
	A.2	Average daily number of workers onsite	680 workers	GLE estimate as of November 2009
	A.3	Activities	Erection of Main GLE Facility building and ancillary buildings and structures	GLE tentative plans as of November 2009
	A.4	Start date	January 1, 2012	GLE tentative schedule as of November 2009
	A.5	Weekly work schedule	Sunday through Saturday, 7 a.m. to 4 p.m.	Typical new construction work practices
	A.6	Total number of construction days per year	359 days	Calculated based on Construction Start Date (A.4) and Weekly Work Schedule (A.5) and assuming no work on 6 holidays (January1, Memorial Day, 4th of July, Labor Day, Thanksgiving, Christmas)
B. Fugitive dust emissions from Proposed GLE Facility building construction activities	B.1	Onsite access road and parking areas	Assumed to have been paved at the end of the Early Construction Phase	GLE tentative plans as of November 2009
	B.2	Area of predominate construction activity	117.2 acres	Proposed GLE Facility site area based GLE preliminary design as of November 2009
	B.3	Number of days to complete activity	359 days	Parameter A.6
	B.4	PM_{10} emission rate	0.11 ton/acre/month (average conditions factor)	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1,* page 3-8. September 2006. http://www.wrapair.org/forums/dejf/fdh/content/FDHandbook_Rev_06.pdf
	B.5	$PM_{2.5}$ to PM_{10} ratio	0.1	Western Regional Air Partnership. *WARP Fugitive Dust Handbook, Chapter 3; Construction and Demolition, Section 3.2.1,* page 3-8. September 2006.

(continued)

Table 4-6-2. (continued)

<table>
<tr><th>Air Emission Source</th><th colspan="2">Parameter</th><th>Parameter Value</th><th>Basis for Selected Input</th></tr>
<tr><td rowspan="2">C. Vehicle emissions from off-road diesel-powered construction equipment used for Building Construction phase activities</td><td>C.1</td><td>Average daily off-road equipment mix at site. Entire mix of equipment assumed to be in operation each work day.</td><td><table><tr><th>Equipment Type</th><th>Number Onsite</th></tr><tr><td>Crane</td><td>2</td></tr><tr><td>Tractor/backhoe</td><td>4</td></tr><tr><td>Forklift</td><td>4</td></tr><tr><td>Aerial lift</td><td>4</td></tr><tr><td>Air compressor</td><td>4</td></tr></table></td><td>Assumed mix of off-road construction equipment in operation based on typical types of construction equipment used for constructing large industrial buildings.</td></tr>
<tr><td>C.2</td><td>Emission factors</td><td>Site-specific composite emission factors for equipment mix in Parameter E.1<table><tr><th>Pollutant</th><th>lb/hr</th></tr><tr><td>PM_{10}</td><td>0.8</td></tr><tr><td>$PM_{2.5}$</td><td>0.7</td></tr><tr><td>NO_x</td><td>4.0</td></tr><tr><td>SO_2</td><td>0.01</td></tr><tr><td>VOC</td><td>0.3</td></tr><tr><td>CO</td><td>4.5</td></tr></table></td><td>Calculated emission factors for each equipment type using U.S. EPA. Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression Engines. EPA-420-P-04-009. U.S. EPA, Office of Transportation, Washington, DC. 2004.
Summed the individual equipment type emissions times the number of each equipment type to obtain the overall composite hourly emission rate factors.
These factors are based on the conservative that all of the equipment is in operation.</td></tr>
</table>

Table 4-6-2. (continued)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
D. Vehicle emissions from automobile and truck traffic associated with Building Construction Phase activities	D.1	Number of days of automobile and truck traffic on onsite access road	359 days	Parameter A.6
	D.2	Average number of motor vehicle trips to site per work day	1,428 trips (each trip is a one-way trip including the entire length of the onsite road between the Proposed GLE Facility site and entrance on Castle Hayne Road).	Number of vehicle trips estimated using Institute of Transportation Engineers (ITE) standard Average Daily Trip (ADT) rate for industrial manufacturing land use of ADT = 2.1 per employee. The ITE defines manufacturing facilities as areas where the primary activity is the conversion of raw material or parts into finished products. The ITE trip generation rates are total vehicle rates that include trucks. ITE, *Trip Generation Handbook, 2nd Edition.* Institute of Transportation Engineers, Washington, DC. 2004.
	D.3	Percentage of daily trips by gasoline engine automobiles	90%	Assumed value based on professional judgment
	D.4	Percentage of daily trips by diesel engine heavy duty trucks	10%	Assumed value based on professional judgment
	D.5	Average VMT onsite per trip	1.64 miles	Onsite access road length based on GLE preliminary design information as of November 2009
	D.6	Average VMT offsite per trip by automobiles	10 miles	Assumed value based on professional judgment
	D.7	Average VMT offsite per trip by trucks	100 miles	Assumed value based on professional judgment
	D.8	Emission Estimation method	CO, VOC, NO_x, SO_2, and PM_{10} Factors developed using EPA's MOBILE6.2 vehicle emission factor model.	MOBILE6 Vehicle Emission Modeling Software is the standard method currently approved by the U.S. EPA for determining on-road motor vehicle emission factors for air emission inventories. Available at < http://www.epa.gov/OMS/m6.htm>
	D.9	MOBILE6.2 Input Values	MOBILE6.2 Input Values CALENDAR YEAR = 2018 MIN/MAX TEMP = 35.8ºF 56.3ºF FUEL RVP = 9.0 All other input parameters set at the MOBILE6.2 default values and assumptions.	CALENDAR YEAR corresponds to year of Building Construction (A.1) MIN/MAX TEMP are the monthly mean temperatures for January from the *GLE ER, Section 3.6 – Meteorology, Climatology, and Air Quality (December 2008)*, Table 3.6-1. (The MOBILE6.2 default evaluation month is January). FUEL RVP is the maximum RVP allowed in attainment areas in North Carolina
	D.10	$PM_{2.5}$ to PM_{10} ratio	$PM_{2.5}$ Factor based on PM_{10} Factor applying a $PM_{2.5}$ to PM_{10} ratio = 0.97	Standard $PM_{2.5}$ to PM_{10} ratio applied by U.S. EPA to mobile sources combusting petroleum derived fuels

Table 4-6-2. (concluded)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
D. Vehicle emissions from automobile and truck traffic associated with Building Construction Phase activities	D.11	Automobile emission factors	Use Light Duty Gasoline Vehicle (LDGV) factors for automobiles Pollutant: gram/VMT PM_{10}: 0.025 $PM_{2.5}$: 0.024 NO_x: 0.498 SO_2: 0.007 VOC: 0.597 CO: 12.59	Calculated 2012 values using MOBILE6.2
	D.12	Truck emission factors	Use Heavy Duty Diesel Vehicle (HDDV) factors for trucks Pollutant: gram/VMT PM_{10}: 0.136 $PM_{2.5}$: 0.132 NO_x: 5.481 SO_2: 0.013 VOC: 0.352 CO: 1.418	Calculated 2012 values using MOBILE6.2

Table 4-6-3. Input Parameters Used for Proposed GLE Facility Air Emissions Estimates Final Construction/Startup Phase

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
A. General assumptions	A.1	Period	Years 2013-2017	GLE tentative schedule as of November 2009
	A.2	Average daily number of workers onsite	743 workers	Average annual number of workers based on GLE estimates for Years 2013-2017 as of November 2009
	A.3	Activities	Concurrent indoor construction activities with staged testing and startup of process units as completed	GLE tentative plans as of November 2009
	A.4	Start date	January 1, 2013	GLE tentative schedule as of November 2009
	A.5	Weekly work schedule	24 hour/day, 7 day/week	Typical new construction work practices
	A.6	Total number of work days per year	365 days	Calculated based on Start Date (A.4) and Weekly Work Schedule (A.5)
B. Fugitive dust emissions from Proposed GLE Facility construction	B.1	Assume all construction activities involve installation of process equipment installed inside buildings erected in Building Construction phase based on GLE tentative plans as of November 2009.		
C. Proposed GLE Facility mechanical draft cooling towers	C.1	Proposed GLE Facility production will be incrementally ramped up to full production over the 5-year Final Construction/Startup Phase. Conservatively assume the same parameter values as used for full production conditions under Operation Phase – see Table 4-6-4		
D. Proposed GLE Facility auxiliary diesel generator units	D.1	Proposed GLE Facility production will be incrementally ramped up to full production over the 5-year Final Construction/Startup Phase. Conservatively assume the same parameter values as used for full production conditions under Operation Phase – see Table 4-6-4		
E. Proposed GLE Facility onsite transfer vehicles (OSTVs) used for moving UF_6 cylinders to and from the outdoor cylinder storage pads	E.1	Proposed GLE Facility production will be incrementally ramped up to full production over the 5-year Final Construction/Startup Phase. Conservatively assume the same parameter values as used for full production conditions under Operation Phase – see Table 4-6-4		
F. Mobile source emissions from diesel engine truck used for transfer of product cylinders to onsite Fuel Manufacturing Operations (FMO) facility	F.1	Proposed GLE Facility production will be incrementally ramped up to full production over the 5-year Final Construction/Startup Phase. Conservatively assume the same parameter values as used for full production conditions under Operation Phase – see Table 4-6-4		

Table 4-6-3. (continued)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
G. Vehicle emissions from automobile and truck traffic associated with Final Construction/Startup Phase activities	G.1	Number of days of automobile and truck traffic on onsite access road	365 days	Parameter A.6
	G.2	Average number of motor vehicle trips to site per work day	1,559 trips (each trip is a one-way trip including the entire length of the onsite road between the Proposed GLE Facility site and entrance on Castle Hayne Road).	Number of vehicle trips estimated using Institute of Transportation Engineers (ITE) standard Average Daily Trip (ADT) rate for industrial manufacturing land use of ADT = 2.1 per employee. The ITE defines manufacturing facilities as areas where the primary activity is the conversion of raw material or parts into finished products. The ITE trip generation rates are total vehicle rates that include trucks. ITE, *Trip Generation Handbook, 2nd Edition.* Institute of Transportation Engineers, Washington, DC. 2004
	G.3	Percentage of daily trips by gasoline engine automobiles	90%	Assumed value based on professional judgment
	G.4	Percentage of daily trips by diesel engine heavy duty trucks	10%	Assumed value based on professional judgment
	G.5	Average VMT onsite per trip	1.64 miles	Onsite access road length based on GLE preliminary design information as of November 2009
	G.6	Average VMT offsite per trip by automobiles	10 miles	Assumed value based on professional judgment
	G.7	Average VMT offsite per trip by trucks	100 miles	Assumed value based on professional judgment
	G.8	Emission Estimation method	CO, VOC, NO_x, SO_2, and PM_{10} Factors developed using EPA's MOBILE6.2 vehicle emission factor model.	MOBILE6 Vehicle Emission Modeling Software is the standard method currently approved by the U.S. EPA for determining on-road motor vehicle emission factors for air emission inventories. Available at < http://www.epa.gov/OMS/m6.htm>
	G.9	MOBILE6.2 Input Values	MOBILE6.2 Input Values CALENDAR YEAR = 2015 MIN/MAX TEMP = 35.8ºF 56.3ºF FUEL RVP = 9.0 All other input parameters set at the MOBILE6.2 default values and assumptions.	CALENDAR YEAR corresponds midyear in Final Construction/Startup Period of 2013-2017 (A.1) MIN/MAX TEMP are the monthly mean temperatures for January from the *GLE Environmental Report, Section 3.6 – Meteorology, Climatology, and Air Quality (December 2008)*, Table 3.6-1. (The MOBILE6.2 default evaluation month is January). FUEL RVP is the maximum RVP allowed in attainment areas in North Carolina
	G.10	$PM_{2.5}$ to PM_{10} ratio	$PM_{2.5}$ Factor based on PM_{10} Factor applying a $PM_{2.5}$ to PM_{10} ratio = 0.97	Standard $PM_{2.5}$ to PM_{10} ratio applied by U.S. EPA to mobile sources combusting petroleum derived fuels

Table 4-6-3. (concluded)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
G. Vehicle emissions from automobile and truck traffic associated with Final Construction/Startup Phase activities	G.11	Automobile emission factors	Use Light Duty Gasoline Vehicle (LDGV) factors for automobiles Pollutant: gram/VMT PM_{10}: 0.025 NO_x: 0.024 CO: 0.379 SO_2: 0.007 PM_{10}: 0.475 $PM_{2.5}$: 11.64	Calculated 2015 values using MOBILE6.2
	G.12	Truck emission factors	Use Heavy Duty Diesel Vehicle (HDDV) factors for trucks Pollutant: gram/VMT PM_{10}: 0.136 $PM_{2.5}$: 0.132 NO_x: 3.507 SO_2: 0.013 VOC: 0.304 CO: 0.840	Calculated 2015 values using MOBILE6.2

Table 4-6-4. Input Parameters Used for Proposed GLE Facility Air Emissions Estimates Operation Phase

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
A. General assumptions	A.1	Period	Years 2018-2048	GLE tentative schedule as of November 2009
	A.2	Average daily number of workers onsite	350 workers	GLE estimate as of November 2009
	A.3	Activities	Full capacity fuel enrichment operations	GLE tentative plans as of November 2009
	A.4	Start date	January 1, 2018	GLE tentative schedule as of November 2009
	A.5	Weekly work schedule	24 hour/day, 7 day/week	Typical new construction work practices
	A.6	Total number of work days per year	365 days	Calculated based on Start Date (A.4) and Weekly Work Schedule (A.5)
B. Proposed GLE Facility mechanical draft cooling towers	B.1	Number of cooling towers	2	GLE preliminary design information as of November 2009
	B.2	Number of cells per cooling tower	8	GLE preliminary design information as of November 2009
	B.3	Cooling water flow rate per cell	17,500 gal/min	GLE preliminary design information as of November 2009
	B.4	Cooling water Total Dissolved Solids (TDS) content	858 ppm	Based on the mechanical draft cooling towers operating at the existing manufacturing facilities at the Wilmington Site as provided to NRC in "Attachment 1. Follow-up to NRC Questions from May 18-20 site visit" included with letter sent to NRC June 2009.
	B.5	Emission factor estimation method	Multiplication of total liquid drift for cooling tower by the TDS fraction in circulating water and assuming that once the water evaporates all remaining solid particles are within the PM_{10} range	Conservatively high method recommend by U.S. EPA for cases when cooling tower data are available as presented in U.S. EPA, *AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 13.4 Wet Cooling Towers,* January 1995, p.13.4-3.
	B.6	Total Liquid Drift Factor for induced draft cooling tower	1.7 lb/1,000 gal	U.S. EPA, *AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 13.4 Wet Cooling Towers,* January 1995, value for induced drat cooling tower from Table 13.4-1
	B.7	PM_{10} emission factor for induced draft cooling tower per cell	0.0015 lb/1,000 gal	Site-specific calculated value using U.S. EPA method (B.5 and B.6) and TDS value (B.4)
	B.8	$PM_{2.5}$ to PM_{10} ratio	1	Assumed value based on typical cooling tower drift particle composition

Table 4-6-4. (continued)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
C. Proposed GLE Facility auxiliary diesel generator units	C.1	Number of generator units	2 units	GLE preliminary design information as of November 2009
	C.2	Diesel generator unit horsepower rating	382 hp	GLE preliminary design information as of November 2009
	C.3	Diesel fuel sulfur content	0.2%	Based on NC DAQ air permit conditions for the existing emergency diesel generators at the Wilmington Site
	C.4	Annual operation	240 hr/yr per unit	Based on NC DAQ air permit conditions for the existing emergency diesel generators at the Wilmington Site
	C.5	GLE diesel generator unit emission rates	Pollutant / Emission Rate [lb/hr] PM_{10} 0.27 $PM_{2.5}$ 0.27 NO_x 5.0 SO_2 0.62 VOC 0.25 CO 2.1	Emission rates [lb/hr] calculated by inputting the GLE diesel generator unit horsepower rating and fuel sulfur content into the Large Diesel and All Dual-Fuel Engines Emissions Calculator Spreadsheet (LGD2009 Revision A) issued by the North Carolina Department of Environment and Natural Resources, Division of Air Quality, Raleigh, NC. March 27, 2000. Available at ttp://daq.state.nc.us/cgi-bin/permit_forms.cgi?id=intlarge&type=sheets. (accessed November 8, 2009). Assume VOC is the non-methane total organic compound (NMTOC) rate provided in the NC DAQ spreadsheet
D. Proposed GLE Facility onsite transfer vehicles (OSTVs) used for moving UF_6 cylinders to and from the outdoor cylinder storage pads	D.1	Number of OSTVs	2 OSTV	GLE preliminary plans as of November 2009
	D.2	OSTV type	Diesel engine forklift (Other options are propane and electric-powered OSTV)	OSTV option being considered as provided to NRC in "Attachment 1. Follow-up to NRC Questions from May 18-20 site visit" included with letter sent to NRC June, 2009.
	D.3	OSTV engine horsepower	75 hp	Assumed value based on professional judgment
	D.4	Operating hours per day	3	GLE preliminary design information as of November 2009
	D.5	OSTV emission factors	Pollutant / Emission Rate [g/hp-hr] PM_{10} 0.6496 $PM_{2.5}$ 0.6301 NO_x 3.1450 SO_2 0.0049 VOC 0.1980 CO 4.1657	Calculated emission factors for a 75 hp forklift using U.S. EPA. *Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling – Compression Engines.* EPA-420-P-04-009. U.S. EPA, Office of Transportation, Washington, DC. 2004.

Table 4-6-4. (continued)

Air Emission Source	Parameter		Parameter Value	Basis for Selected Input
E. Mobile source emissions from diesel engine truck used for transfer of product cylinders to onsite Fuel Manufacturing Operations (FMO) facility	E.1	Number of vehicles	1	GLE preliminary plans as of November 2009
	E.2	Vehicle type	Heavy duty diesel engine truck	GLE preliminary plans as of November 2009
	E.3	Operating interval	1 round trip per week	GLE preliminary plans as of November 2009
	E.4	Distance traveled per onsite trip	2 miles	Estimated onsite driving distance between Proposed GLE Facility and FMO
	E.5	Emission factors	Emission factors (g/VMT) for diesel engine trucks calculated for year 2018 using U.S. EPA MOBILE6.2	Use emission factors in Parameter F.12
F. Vehicle emissions from automobile and truck traffic associated with Operation phase activities	F.1	Number of days of automobile and truck traffic on onsite access road	365 days	Parameter A.6
	F.2	Average number of motor vehicle trips to site per work day	735 trips (each trip is a one-way trip including the entire length of the onsite road between the Proposed GLE Facility site and entrance on Castle Hayne Road).	Number of vehicle trips estimated using Institute of Transportation Engineers (ITE) standard Average Daily Trip (ADT) rate for industrial manufacturing land use of ADT = 2.1 per employee. The ITE defines manufacturing facilities as areas where the primary activity is the conversion of raw material or parts into finished products. The ITE trip generation rates are total vehicle rates that include trucks. ITE, *Trip Generation Handbook, 2nd Edition.* Institute of Transportation Engineers, Washington, DC. 2004.
	F.3	Percentage of daily trips by gasoline engine automobiles	90%	Assumed value based on professional judgment
	F.4	Percentage of daily trips by diesel engine heavy duty trucks	10%	Assumed value based on professional judgment
	F.5	Average VMT onsite per trip	1.64 miles	Onsite access road length based on GLE preliminary design information as of November 2009
	F.6	Average VMT offsite per trip by automobiles	10 miles	Assumed value based on professional judgment
	F.7	Average VMT offsite per trip by trucks	100 miles	Assumed value based on professional judgment
	F.8	Emission Estimation method	CO, VOC, NO_x, SO_2, and PM_{10} Factors developed using EPA's MOBILE6.2 vehicle emission factor model.	MOBILE6 Vehicle Emission Modeling Software is the standard method currently approved by the U.S. EPA for determining on-road motor vehicle emission factors for air emission inventories. Available at < http://www.epa.gov/OMS/m6.htm>

Table 4-6-4. (concluded)

<table>
<tr><th>Air Emission Source</th><th colspan="2">Parameter</th><th>Parameter Value</th><th>Basis for Selected Input</th></tr>
<tr><td rowspan="4">F. Vehicle emissions from automobile and truck traffic associated with Operation phase activities</td><td>F.9</td><td>MOBILE6.2 Input Values</td><td>MOBILE6.2 Input Values
CALENDAR YEAR = 2018
MIN/MAX TEMP = 35.8ºF 56.3ºF
FUEL RVP = 9.0
All other input parameters set at the MOBILE6.2 default values and assumptions.</td><td>CALENDAR YEAR corresponds to first year of extended Operating period (A.1)
MIN/MAX TEMP are the monthly mean temperatures for January from the GLE Environmental Report, Section 3.6 – Meteorology, Climatology, and Air Quality (December 2008), Table 3.6-1. (The MOBILE6.2 default evaluation month is January).
FUEL RVP is the maximum RVP allowed in attainment areas in North Carolina</td></tr>
<tr><td>F.10</td><td>$PM_{2.5}$ to PM_{10} ratio</td><td>$PM_{2.5}$ Factor based on PM_{10} Factor applying a $PM_{2.5}$ to PM_{10} ratio = 0.97</td><td>Standard $PM_{2.5}$ to PM_{10} ratio applied by U.S. EPA to mobile sources combusting petroleum derived fuels</td></tr>
<tr><td>F.11</td><td>Automobile emission factors</td><td>Use Light Duty Gasoline Vehicle (LDGV) factors for automobiles
<table>
<tr><th>Pollutant</th><th>gram/VMT</th></tr>
<tr><td>PM_{10}</td><td>0.025</td></tr>
<tr><td>$PM_{2.5}$</td><td>0.024</td></tr>
<tr><td>NO_x</td><td>0.300</td></tr>
<tr><td>SO_2</td><td>0.007</td></tr>
<tr><td>VOC</td><td>0.403</td></tr>
<tr><td>CO</td><td>11.060</td></tr>
</table></td><td>Calculated 2018 values using MOBILE6.2</td></tr>
<tr><td>F.12</td><td>Truck emission factors</td><td>Use Heavy Duty Diesel Vehicle (HDDV) factors for trucks
<table>
<tr><th>Pollutant</th><th>gram/VMT</th></tr>
<tr><td>PM_{10}</td><td>0.136</td></tr>
<tr><td>$PM_{2.5}$</td><td>0.132</td></tr>
<tr><td>NO_x</td><td>2.272</td></tr>
<tr><td>SO_2</td><td>0.013</td></tr>
<tr><td>VOC</td><td>0.279</td></tr>
<tr><td>CO</td><td>0.585</td></tr>
</table></td><td>Calculated 2018 values using MOBILE6.2</td></tr>
</table>

Table 4-6-5. Estimated Criteria Air Pollutants Emissions for Proposed GLE Facility - Early Construction Phase (Year 2011)

Table 4-6-5a. Average Daily Onsite Air Emissions from Onsite Access Road Construction During Month 1 of the Early Construction Phase						
Air Emission Source	Average Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Fugitive dust emissions from Proposed GLE Facility onsite access road construction	63.0	6.3				
Mobile source emissions from off-road construction equipment used for onsite access road construction	13.4	13.0	73.5	0.14	5.6	42.8
Mobile source emissions from onsite gasoline engine automobile traffic associated with Early Construction Phase activities	0.02	0.02	0.36	0.004	0.43	8.5
Mobile source emissions from onsite diesel engine truck traffic associated with Early Construction Phase activities	0.01	0.01	0.46	0.001	0.03	0.12
TOTAL	76.4	19.3	74.3	0.14	6.0	51.4

Table 4-6-5b. Average Daily Onsite Air Emissions from Site Preparation Activities During Months 2 through 9 of Early Construction Phase						
Air Emission Source	Average Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Fugitive dust emissions from Proposed GLE Facility site preparation (excluding onsite road construction)	1,082.5	108.3				
Fugitive dust emissions from construction motor vehicle traffic on Proposed GLE Facility unpaved onsite access road	4.8	0.5				
Mobile source emissions from off-road construction equipment used for GLE Facility site preparation	13.4	13.0	73.5	0.14	5.6	42.8
Mobile source emissions from onsite gasoline engine automobile traffic associated with Early Construction Phase activities	0.02	0.02	0.36	0.004	0.4	8.5
Mobile source emissions from onsite diesel engine truck traffic associated with Early Construction Phase activities	0.01	0.01	0.46	0.001	0.03	0.12
TOTAL	1,100.7	121.7	74.3	0.14	6.0	51.4

Table 4-6-5c. Average Daily Offsite Air Emissions from Motor Vehicle Traffic Associated with Early Construction Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.10	0.10	2.2	0.03	2.6	51.7
Diesel engine truck traffic	0.54	0.52	25.2	0.05	1.5	6.4
TOTAL	0.64	0.62	27.4	0.08	4.1	58.2

Table 4-6-5. (concluded)

Table 4-6-5d. Average Annual Onsite Air Emissions Source Associated with Early Construction Phase						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Fugitive dust emissions from Proposed GLE Facility onsite access road construction	0.95	0.09				
Fugitive dust emissions from Proposed GLE Facility site preparation (excluding onsite road construction)	129.9	13.0				
Fugitive dust emissions from construction motor vehicle traffic on Proposed GLE Facility unpaved onsite access road	0.6	0.1				
Mobile source emissions from off-road construction equipment used for onsite access road construction	0.20	0.19	1.1	0.002	0.08	0.6
Mobile source emissions from off-road construction equipment used for GLE Facility site preparation	1.60	1.55	8.8	0.017	0.67	5.1
Mobile source emissions from onsite gasoline engine automobile traffic associated with Early Construction Phase activities	0.002	0.002	0.048	0.001	0.06	1.1
Mobile source emissions from onsite diesel engine truck traffic associated with Early Construction Phase activities	0.001	0.001	0.062	0.0001	0.004	0.02
TOTAL	133.2	14.9	10.0	0.02	0.8	6.9

Table 4-6-5e. Average Annual Offsite Air Emissions from Motor Vehicle Traffic Associated with Early Construction Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.01	0.01	0.3	0.004	0.4	7.0
Diesel engine truck traffic	0.07	0.07	3.4	0.01	0.2	0.9
TOTAL	0.09	0.08	3.7	0.01	0.6	7.9

Table 4-6-6. Estimated Criteria Air Pollutants Emissions for Proposed GLE Facility - Building Construction Phase (Year 2012)

Table 4-6-6a. Average Daily Onsite Air Emissions Associated with Building Construction Phase						
Air Emission Source	Average Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Fugitive dust emissions from Proposed GLE Facility building construction activities	860.9	86.1				
Mobile source emissions from off-road construction equipment used for building construction	6.8	6.6	36.1	0.1	2.6	40.2
Mobile source emissions from onsite gasoline engine automobile traffic associated with Building Construction Phase activities	0.12	0.11	2.3	0.03	2.8	58.4
Mobile source emissions from onsite diesel engine truck traffic associated with Building Construction Phase activities	0.07	0.07	2.8	0.01	0.18	0.73
TOTAL	867.9	92.8	41.2	0.10	5.6	99.4

Table 4-6-6b. Average Daily Offsite Air Emissions from Motor Vehicle Traffic Associated with Building Construction Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.71	0.69	14.10	0.19	16.9	356.4
Diesel engine truck traffic	3.85	3.74	155.16	0.37	10.0	14.1
TOTAL	4.56	4.42	169.3	0.56	26.9	370.5

Table 4-6-6. (concluded)

Table 4-6-6a. Average Annual Onsite Air Emissions Associated with Building Construction Phase						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Fugitive dust emissions from Proposed GLE Facility building construction activities	154.5	15.5				
Mobile source emissions from off-road construction equipment used for building construction	1.2	1.2	6.5	0.01	0.47	7.2
Mobile source emissions from onsite gasoline engine automobile traffic associated with Building Construction Phase activities	0.02	0.02	0.42	0.01	0.50	10.5
Mobile source emissions from onsite diesel engine truck traffic associated with Building Construction Phase activities	0.01	0.01	0.51	0.001	0.03	0.13
TOTAL	155.8	16.7	7.4	0.02	1.0	17.8

Table 4-6-6b. Average Annual Offsite Air Emissions from Motor Vehicle Traffic Associated with Building Construction Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.13	0.12	2.5	0.03	3.0	64.0
Diesel engine truck traffic	0.69	0.67	27.9	0.07	1.8	2.5
TOTAL	0.82	0.79	30.4	0.10	4.8	66.5

Table 4-6-7. Estimated Criteria Air Pollutants Emissions for Proposed GLE Facility Final Construction/Startup Phase (Year 2013-2017)

Table 4-6-7a. Average Daily Onsite Air Emissions Associated with Final Construction/Startup Phase						
Air Emission Source	Average Annual Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Stationary source emissions from main GLE facility operations building stack vent[a,c]	(b)	(b)	0	0	0	0
Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers[c]	9.8	9.8				
Stationary source emissions from Proposed GLE Facility from auxiliary diesel generator unit exhaust stacks[c,d]	0.54	0.54	10.0	1.24	0.50	4.2
Mobile source emissions from onsite transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads[c]	0.64	0.62	3.1	0.00	0.20	4.1
Mobile source emissions from diesel engine truck used to transfer product cylinders to onsite Fuel Manufacturing Operations (FMO) facility[c,e]	0.0006	0.0006	0.02	0.00006	0.001	0.004
Mobile source emissions from onsite gasoline engine automobile traffic associated with Final Construction/Startup Phase activities	0.13	0.12	1.92	0.07	1.54	59.0
Mobile source emissions from onsite diesel engine truck traffic associated with Final Construction/Startup Phase activities	0.08	0.07	1.98	0.01	0.17	0.47
TOTAL	11.2	11.2	7.0	0.08	1.9	63.6

[a] Emission estimates same as presented in Section 4.6.2.2 of the GLE ER, December 2008.

[b] Short-term gaseous releases including PM constituents potentially could occur inside the main GLE operations building during activities associated with the enrichment process operation, such as connection/disconnection of UF_6 cylinders to process equipment and equipment-maintenance activities. Any such gaseous releases will be contained within the main GLE operations building and routed to a high-efficiency, multi-stage emissions control system (see Section 4.6.2.2 of the GLE ER, December 2008).

[c] Proposed GLE Facility production will be incrementally ramped up to full production over the 5-year Final Construction/Startup Phase. Conservatively assume for the Final Construction/Startup Phase the same parameter values as used for full production conditions under Operation Phase.

[d] Emissions occur one day per week. Auxiliary diesel generator units would operate on a regular basis for testing 1 hour once per week, and as needed on an occasional, intermittent emergency basis during event facility power outage.

[e] Emissions from the diesel engine truck used for delivery of product cylinders to the onsite Fuel Manufacturing Operations (FMO) facility traveling on the Wilmington Site paved service roads. Tentative plans are for one delivery per week.

Table 4-6-7b. Average Daily Offsite Air Emissions from Motor Vehicle Traffic Associated with Final Construction/Startup Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.77	0.75	11.7	0.21	14.7	359.8
Diesel engine truck traffic	4.2	4.1	108.4	0.40	9.4	11.7
TOTAL	4.98	4.83	120.1	0.61	24.1	371.6

Table 4-6-7. (concluded)

Table 4-6-7c. Average Annual Onsite Air Emissions Associated with Final Construction/Startup Phase						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Stationary source emissions from main GLE facility operations building stack vent[a,c]	<0.1[b]	<0.1[b]	0	0	0	0
Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers[c]	1.79	1.79				
Stationary source emissions from Proposed GLE Facility from auxiliary diesel generator unit exhaust stacks[c]	0.06	0.06	1.20	0.15	0.06	0.50
Mobile source emissions from onsite transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads[c]	0.12	0.11	0.57	0.001	0.04	0.75
Mobile source emissions from diesel engine truck used to transfer product cylinders to onsite Fuel Manufacturing Operations (FMO) facility[c]	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0
Mobile source emissions from onsite gasoline engine automobile traffic associated with Final Construction/Startup Phase activities	0.02	0.02	0.35	0.01	0.28	10.8
Mobile source emissions from onsite diesel engine truck traffic associated with Final Construction/Startup Phase activities	0.01	0.01	0.36	0.001	0.03	0.09
TOTAL	2.0	2.0	2.5	0.16	0.4	12.1

[a] Emission estimates same as presented in Section 4.6.2.2 of the GLE ER, December 2008.

[b] Short-term gaseous releases including PM constituents potentially could occur inside the main GLE operations building during activities associated with the enrichment process operation, such as connection/disconnection of UF_6 cylinders to process equipment and equipment-maintenance activities. Any such gaseous releases will be contained within the main GLE operations building and routed to a high-efficiency, multi-stage emissions control system (see Section 4.6.2.2 of the GLE ER, December 2008).

[c] Proposed GLE Facility production will be incrementally ramped up to full production over the 5-year Final Construction/Startup Phase. Conservatively assume for the Final Construction/Startup Phase the same parameter values as used for full production conditions under Operation Phase.

Table 4-6-7d. Average Annual Offsite Air Emissions from Motor Vehicle Traffic Associated with Final Construction/Startup Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.14	0.14	2.1	0.04	2.7	65.7
Diesel engine truck traffic	0.77	0.74	19.8	0.07	1.7	2.1
TOTAL	0.91	0.88	21.9	0.11	4.4	67.8

Table 4-6-8. Estimated Criteria Air Pollutants Emissions for Proposed GLE Facility Operation Phase (Year 2018-2048)

Table 4-6-8a. Average Daily Onsite Air Emissions Associated with Operation Phase						
Air Emission Source	Average Annual Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Stationary source emissions from main GLE facility operations building stack vent[a]	(b)	(b)	0	0	0	0
Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers	9.80	9.80				
Stationary source emissions from Proposed GLE Facility from auxiliary diesel generator unit exhaust stacks[c]	0.54	0.54	10.0	1.24	0.50	4.2
Mobile source emissions from onsite transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads	0.64	0.62	3.1	0.00	0.20	4.1
Mobile source emissions from diesel engine truck used to transfer product cylinders to onsite Fuel Manufacturing Operations (FMO) facility[d]	0.0006	0.0006	0.02	0.00006	0.001	0.004
Mobile source emissions from onsite gasoline engine automobile traffic associated with Operation Phase activities	0.06	0.06	0.72	0.02	0.96	26.4
Mobile source emissions from onsite diesel engine truck traffic associated with Operation Phase activities	0.04	0.04	0.60	0.003	0.07	0.16
TOTAL	11.1	11.1	14.5	1.3	1.7	34.9

[a] Emission estimates same as presented in Section 4.6.2.2 of the GLE ER, December 2008.
[b] Short-term gaseous releases including PM constituents potentially could occur inside the main GLE operations building during activities associated with the enrichment process operation, such as connection/disconnection of UF_6 cylinders to process equipment and equipment-maintenance activities. Any such gaseous releases will be contained within the main GLE operations building and routed to a high-efficiency, multi-stage emissions control system (see Section 4.6.2.2 of the GLE ER, December 2008).
[c] Emissions occur one day per week. Auxiliary diesel generator units would operate on a regular basis for testing 1 hour once per week, and as needed on an occasional, intermittent emergency basis during event facility power outage.
[d] Emissions from the diesel engine truck used for delivery of product cylinders to the onsite Fuel Manufacturing Operations (FMO) facility traveling on the Wilmington Site paved service roads. Tentative plans are for one delivery per week.

Table 4-6-8b. Average Daily Offsite Air Emissions from Motor Vehicle Traffic Associated with Operation Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Daily Emissions (lb/day)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.36	0.35	4.37	0.10	5.9	161.1
Diesel engine truck traffic	1.98	1.92	33.10	0.19	4.1	4.4
TOTAL	2.35	2.28	37.5	0.29	9.9	165.5

Table 4-6-8. (concluded)

Table 4-6-8c. Average Annual Onsite Air Emissions Associated with Operation Phase						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Stationary source emissions from main GLE facility operations building stack vent[a]	<0.1[b]	<0.1[b]	0	0	0	0
Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers	1.79	1.79				
Stationary source emissions from Proposed GLE Facility from auxiliary diesel generator unit exhaust stacks	0.06	0.06	1.20	0.15	0.06	0.50
Mobile source emissions from onsite transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads	0.12	0.11	0.57	0.001	0.04	0.75
Mobile source emissions from diesel engine truck used to transfer product cylinders to onsite Fuel Manufacturing Operations (FMO) facility	~ 0	~ 0	~ 0	~ 0	~ 0	~ 0
Mobile source emissions from onsite gasoline engine automobile traffic associated with Operation Phase activities	0.01	0.01	0.13	0.00	0.18	4.82
Mobile source emissions from onsite diesel engine truck traffic associated with Operation Phase activities	0.01	0.01	0.11	0.001	0.01	0.03
TOTAL	2.0	1.9	2.0	0.15	0.3	6.1

[a] Emission estimates same as presented in Section 4.6.2.2 of the GLE ER, December 2008.
[b] Short-term gaseous releases including PM constituents potentially could occur inside the main GLE operations building during activities associated with the enrichment process operation, such as connection/disconnection of UF_6 cylinders to process equipment and equipment-maintenance activities. Any such gaseous releases will be contained within the main GLE operations building and routed to a high-efficiency, multi-stage emissions control system (see Section 4.6.2.2 of the GLE ER, December 2008).

Table 4-6-8d. Average Annual Offsite Air Emissions from Motor Vehicle Traffic Associated with Operation Phase Traveling on Roadways to and from the Proposed GLE Facility Site						
Air Emission Source	Average Annual Emissions (ton/yr)					
	PM_{10}	$PM_{2.5}$	NO_x	SO_2	VOC	CO
Gasoline engine automobile traffic	0.07	0.06	0.8	0.02	1.1	29.4
Diesel engine truck traffic	0.36	0.35	6.0	0.03	0.7	0.8
TOTAL	0.43	0.42	6.8	0.05	1.8	30.2

Table 4-6-9. Estimated Annual Greenhouse Gas (GHG) Emissions for Proposed GLE Facility

Proposed GLE Facility Phase	Air Emission Source	Fuel Type	Annual Fuel Consumption[a,b] (gal/yr)	GHG Emission Factor[c,d,e] (lb/gal of fuel)			Annual Average GHG Emissions (ton/yr)		
				CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
Early Construction	Off-road construction equipment	Diesel fuel	209,002	22.36	0.012	0.08	2,336.3	1.3	8.3
	Automobiles	Gasoline	87	19.41	0.03	0.42	0.8	0.001	0.02
	Diesel trucks	Diesel fuel	282	22.36	0.004	0.06	3.1	0.001	0.01
						Total	2,340.3	1.3	8.3
Building Construction	Off-road construction equipment	Diesel fuel	115,550	22.36	0.012	0.08	1,291.7	0.7	4.6
	Automobiles	Gasoline	621	19.41	0.03	0.42	6.0	1.9	0.6
	Diesel trucks	Diesel fuel	2,016	22.36	0.004	0.06	22.5	22.7	22.9
						Total	1,320.2	25.3	28.0
Final Construction/ Startup	Auxiliary diesel generator units[a]	Diesel fuel					10.4	0.006	0.001
	OSTV used for cylinder transfer	Diesel fuel	13,459	22.36	0.012	0.08	150.5	0.1	0.5
	Onsite diesel truck used for cylinder transfer	Diesel fuel	29	22.36	0.012	0.08	0.3	0.005	0.0001
	Automobiles	Gasoline	678	19.41	0.03	0.42	6.6	2.2	0.8
	Diesel trucks	Diesel fuel	2,201	22.36	0.004	0.06	21.4	23.5	25.9
						Total	189.1	25.8	27.2

(continued)

Table 4-6-9. (concluded)

Proposed GLE Facility Phase	Air Emission Source	Fuel Type	Annual Fuel Consumption[a,b] (gal/yr)	GHG Emission Factor[c,d,e] (lb/gal of fuel)			Annual Average GHG Emissions (ton/yr)		
				CO_2	CH_4	N_2O	CO_2	CH_4	N_2O
Operation	Auxiliary diesel generator units[f]	Diesel fuel					10.4	0.006	0.001
	OSTV used for cylinder transfer	Diesel fuel	13,459	22.36	0.012	0.08	150.5	0.1	0.5
	Onsite diesel truck used for cylinder transfer	Diesel fuel	29	22.36	0.012	0.08	0.3	0.005	0.0001
	Automobiles	Gasoline	678	19.41	0.03	0.42	3.1	0.5	0.1
	Diesel trucks	Diesel fuel	2,201	22.36	0.004	0.06	11.6	6.0	3.1
						Total	97.6	6.6	3.6

[a] Fuel consumption for off-road construction equipment and OSTV calculated using applicable parameters from **Tables 4-6-1** through **4-6-4** and using an average diesel fuel consumption rate of 1 gallon of diesel fuel burned per hour per 15 engine Hp.

[b] Fuel consumption for automobiles and trucks calculated using applicable parameters from **Tables 4-6-1** through **4-6-4** and using average fuel economy estimates calculated as part of the MOBILE6.2 emission factor runs.

- Automobiles fuel consumption = MOBILE6.2 Light Duty Gasoline Vehicle (LDGV) fuel economy factor of 24.1 miles per gallon (mpg)
- Truck fuel consumption = MOBILE6.2 Heavy Duty Diesel Vehicle (HDDV) fuel economy factor of 7.2 miles per gallon (mpg)

[c] CO_2 emission factors for mobile combustion sources from U.S. EPA. Office of Air and Radiation. *Climate Leaders Greenhouse Gas Inventory Protocol Core Module Guidance. Direct Emissions from Mobile Combustion Sources*. EPA430-K-08-004. May 2008.

[d] CH_4 and N_2O emission factors automobiles and trucks based on U.S. EPA. Office of Atmospheric Programs *U.S. Greenhouse Gas Emissions and Sinks: 1990-2007.* Table 2-15: Transportation-Related Greenhouse Gas Emissions (Tg CO2 Eq.) April 2009. Available at < http://www.epa.gov/climatechange/emissions/usinventoryreport.html>.

[e] CH_4 and N_2O emission factors for off-road construction equipment and OSTV from U.S. EPA. Office of Air and Radiation. Climate Leaders Inventory Calculator for Low Emitters. Available at <www.epa.gov/stateply/resources/lowemitters.html>.

[f] GHG Emissions for auxiliary diesel generator units calculated by inputting the GLE diesel generator unit horsepower rating and fuel sulfur content into the Large Diesel and All Dual-Fuel Engines Emissions Calculator Spreadsheet (LGD2009 Revision A) issued by the North Carolina Department of Environment and Natural Resources, Division of Air Quality, Raleigh, NC, June 30, 2008. Available at < http://daq.state.nc.us/cgi-bin/permit_forms.cgi?id=intlarge&type=sheets>.

Table 4-6-10. NC DAQ Ambient Air Quality Monitoring Stations Located in New Hanover County, NC
(Updated November 2009 version of Table 3.6-16 in GLE Environmental Report)

Ambient Air Quality Monitoring Station			Pollutants Monitored	Years of Data Collection
NC DAQ Station Name[a]	Address	Location		
Castle Hayne	6028 Holly Shelter Road Castle Hayne, NC	Lat. 34.364167 Long. -77.838611	$PM_{2.5}$ O_3 SO_2 [b]	1979–Present
Castle Hayne	6028 Holly Shelter Road Castle Hayne, NC	Lat. 34.364167 Long. -77.838611	PM_{10}	February and March 2008
New Hanover County [a, c]	2400 U.S. Highway 421 N Wilmington, NC	Lat 34.268403 Long. -77.956529	SO_2	1991–Present
Oleander & College [d]	Intersection of Oleander Drive and College Road Wilmington, NC	Lat. 34.210473 Long. -77.886096	CO	1997–2004
Battleship [e]	No. 1 Battleship Drive Wilmington, NC	Lat. 34.235556 Long. -77.955833	individual organic compounds[f]	2004–Present

Reference: North Carolina Division of Air Quality, Available at < http://daq.state.nc.us/monitor/>

[a] Name commonly used in NC DAQ documents to refer to site location. Note that while one of the stations is referred to as the New Hanover County station, all of the monitoring stations listed in the table are located in New Hanover County.

[b] Special purpose SO_2 monitor is operated at the Castle Hayne station January 1 to through December 31 every third year. This monitor was last operated at the Castle Hayne station in 2005 and is scheduled to operate next at the site in 2008.

[c] The NC-DAQ began monitoring for PM_{10} in the Wilmington MSA at the Castle Hayne site in February 2008 to collect data to use for PSD modeling for the coastal region. The Castle Hayne monitor was shut down on March 31, 2008, because of a wildfire in the vicinity of the monitoring site. The PM_{10} monitor was removed and relocated to a monitoring site outside of New Hanover County (Kenansville, NC) in January 2009.

[d] Monitoring station is located next to a sulfuric acid manufacturing facility in a unincorporated area of New Hanover County.

[e] Monitoring station shut down after 2004.

[f] Monitoring station is near the *USS North Carolina* memorial near the City of Wilmington downtown district.

[g] NC DAQ monitors for selected organic compounds from the EPA hazardous air pollutant (HAP) and NC DAQ toxic air pollutant (TAP) lists. HAPs and TAPs are not criteria air pollutants with ambient air quality standards.

Table 4-6-11. Comparison of Ambient Criteria Air Pollutant Monitoring Data Measured in New Hanover County, NC, to Corresponding Ambient Air Quality Standard Levels
(Updated version of Table 3.6-17 in GLE Environmental Report)

Criteria Air Pollutant [a]	Ambient Air Quality Standard	Measurements at NC DAQ Monitoring Stations [b]								Average for 2002 -2008 Period
		Data Format	Year 2002	Year 2003	Year 2004	Year 2005	Year 2006	Year 2007	Year 2008	
Carbon monoxide (CO)	35 ppm (1-hr average)	2nd maximum 1-hr average	4.0 ppm	4.6 ppm	3.3 ppm	c	c	c	c	4.0 ppm
	9 ppm (8-hr average)	2nd maximum 8-hr average	2.7 ppm	2.9 ppm	2.3 ppm	c	c	c	c	2.6 ppm
Ozone (O_3)	0.12 ppm (1-hr average)	2nd maximum 1-hr average	0.091 ppm	0.086 ppm	0.081 ppm	0.088 ppm	0.085 ppm	0.083 ppm	0.082 ppm	0.085 ppm
	0.08 ppm (8-hr average)	4th maximum 8-hr. average	0.080 ppm	0.076 ppm	0.070 ppm	0.075 ppm	0.070 ppm	0.079 ppm	0.063 ppm	0.073 ppm
Particulate Matter PM_{10}	150 $\mu g/m^3$ (24-hr average)	1st maximum 24-hr average	d	d	d	d	d	d	21 $\mu g/m^3$	21 $\mu g/m^3$
		Average of the 24-hr averages for monitoring period	d	d	d	d	d	d	14.8 $\mu g/m^3$	14.8 $\mu g/m^3$
Particulate Matter $PM_{2.5}$	35 $\mu g/m^3$ (NAAQS 24-hr average)	98th percentile 24-hr average	25 $\mu g/m^3$	18 $\mu g/m^3$	23 $\mu g/m^3$	25 $\mu g/m^3$	25 $\mu g/m^3$	26 $\mu g/m^3$	26 $\mu g/m^3$	24 $\mu g/m^3$
	15.0 $\mu g/m^3$ (annual average)	Annual average	10.5 $\mu g/m^3$	9.2 $\mu g/m^3$	10.5 $\mu g/m^3$	10.3 $\mu g/m^3$	9.8 $\mu g/m^3$	9.0 $\mu g/m^3$	10.4 $\mu g/m^3$	10.0 $\mu g/m^3$
Sulfur Dioxide (SO_2)[e]	0.14 ppm (24-hr average)	2nd maximum 24-hr average	0.040 ppm	0.046 ppm	0.022 ppm	0.022 ppm	0.030 ppm	0.027 ppm	0.028 ppm	0.031 ppm
	0.030 ppm (annual average)	Annual average	0.007 ppm	0.005 ppm	0.005 ppm	0.003 ppm	0.005 ppm	0.006 ppm	0.005 ppm	0.005 ppm

Reference: U.S. EPA Environmental Protection Agency. *Air Quality System (AQS)*. Database, U.S. Environmental Protection Agency, Office of Air and Radiation, Washington, DC. Available at <http://www.epa.gov/ttn/airs/airsaqs/>.

[a] The NC DAQ does not monitor for NO_2 at New Hanover County sites because attainment with applicable ambient air quality standards has been demonstrated.
[b] Measurements at the NC DAQ monitoring station(s) listed in **Table 4-6-10** with applicable pollutant monitors operating in the calendar year.
[c] Ambient CO monitoring discontinued after 2004.
[d] Ambient PM_{10} monitoring only during February and March in 2008.
[e] Measurement performed at the NC DAQ New Hanover County monitoring station.

Table 4-6-12. Comparison of Predicted Maximum Air Pollutant Concentrations to Ambient Air Quality Standard Levels Resulting from Proposed GLE Facility Early Construction Phase Activities

Air Pollutant	Averaging Time	Modeled Maximum Offsite Concentration from Proposed GLE Facility Emissions	Background Ambient Concentration[a]	Predicted Total Maximum Offsite Concentration	Primary Ambient Air Quality Standard[b,c]
Carbon monoxide (CO)	8-hour	0.03 ppm	2.6 ppm	2.63 ppm	9 ppm
	1-hour	0.1 ppm	4.0 ppm	4.1 ppm	35 ppm
Nitrogen dioxide (NO_2)	Annual average	1.1 $\mu g/m^3$	no data[d]	1.1 $\mu g/m^3$	100 $\mu g/m^3$
Particulate matter (PM_{10})	Annual average	16.2 $\mu g/m^3$	10 $\mu g/m^3$[e]	26.2 $\mu g/m^3$	50 $\mu g/m^3$
	24-hour	355.5 $\mu g/m^3$	24 $\mu g/m^3$[e]	379.5 $\mu g/m^3$	150 $\mu g/m^3$
Particulate matter ($PM_{2.5}$)	Annual average	1.9 $\mu g/m^3$	10 $\mu g/m^3$	11.9 $\mu g/m^3$	15 $\mu g/m^3$
	24-hour	16.2 $\mu g/m^3$	24 $\mu g/m^3$	40.2 $\mu g/m^3$	35 $\mu g/m^3$
Sulfur dioxide (SO_2)	Annual average	0.000001 ppm	0.005 ppm	0.005 ppm	0.030 ppm
	24-hour	0.00003 ppm	0.031 ppm	0.031 ppm	0.14 ppm

[a] Average of monitoring data measured by NC DAQ in New Hanover County, NC and reported to the U.S. EPA Air Quality System (AQS) for the years 2002 through 2008 (see **Tables 4-6-10** and **4-6-11**).

[b] Compliance with ambient air quality standards is determined by long-term ambient air quality monitoring at predetermined monitoring station locations using methods and analysis procedures established by the regulatory agencies. The ambient standards are not intended to be used for direct assessment of localized ambient air pollutant concentrations from specific emission sources. However, the comparison of the predicted air dispersion modeling ambient concentrations with the applicable ambient air quality standards presented in **Table 4-6-12** do provide an order-of-magnitude indicator of any potential air quality impacts from the Proposed GLE Facility construction activities.

[c] Standards listed are the federal National Ambient Air Quality Standards (NAAQS), which the State of North Carolina has adopted as state standards with the exception of the annual average standard for PM. The federal annual average NAAQS for PM has been revoked, but the level is still maintained as a North Carolina state standard.

[d] The NC DAQ does not monitor for NO_2 at New Hanover County sites because attainment with applicable ambient air quality standards has been demonstrated.

[e] Ambient PM_{10} monitoring data available only during February and March in 2008 (see **Tables 4-6-10** and **4-6-11**). Insufficient data was collected to determine annual average concentration. Furthermore, $PM_{2.5}$ is a fraction of the PM_{10} concentrations in the ambient air (i.e., the measured PM_{10} concentration includes the concentration of $PM_{2.5}$ in the ambient air). Therefore, the PM_{10} concentration cannot less than the $PM_{2.5}$ concentration at a site. Review of the available PM_{10} ambient monitoring data summarized in **Table 4-6-11** shows the highest 24-hour PM_{10} concentration measured in February and March, 2008 (21 $\mu g/m^3$) is less than the long-term 24-hour average $PM_{2.5}$ concentration (24 $\mu g/m^3$). For the purpose for including a credible order-of-magnitude estimate of PM_{10} background to assess offsite ambient PM_{10} concentrations resulting from activities at the Proposed GLE Facility, the long-term 24-hour and annual average $PM_{2.5}$ are used recognizing that the corresponding the actual long-term ambient PM_{10} concentrations for the site will be higher.

Table 4-6-13. Comparison of Predicted Maximum Air Pollutant Concentrations to Ambient Air Quality Standard Levels Resulting from Onsite Access Road Construction Activities during Proposed GLE Facility Early Construction Phase[a]

Air Pollutant	Averaging Time	Modeled Maximum Offsite Concentration from Proposed GLE Facility Emissions	Background Ambient Concentration[b]	Predicted Total Maximum Offsite Concentration	Primary Ambient Air Quality Standard[c,d]
Carbon monoxide (CO)	8-hour	0.01 ppm	2.6 ppm	2.61 ppm	9 ppm
	1-hour	0.1 ppm	4.0 ppm	4.1 ppm	35 ppm
Particulate matter (PM_{10})	24-hour	5.7 $\mu g/m^3$	24 $\mu g/m^3$[e]	29.7 $\mu g/m^3$	150 $\mu g/m^3$
Particulate matter ($PM_{2.5}$)	24-hour	1.6 $\mu g/m^3$	24 $\mu g/m^3$	25.6 $\mu g/m^3$	35 $\mu g/m^3$
Sulfur dioxide (SO_2)	24-hour	0.000006 ppm	0.031 ppm	0.031 ppm	0.14 ppm

[a] Onsite access road construction activity (other than final paving) is assumed to be completed within the first 30 days of the Early Construction Phase before site preparation work begins on the Proposed GLE Facility Site. Comparison to annual average air quality standards is not applicable to this construction activity scenario.

[b] Average of monitoring data measured by NC DAQ in New Hanover County, NC and reported to the U.S. EPA Air Quality System (AQS) for the years 2002 through 2008 (see **Tables 4-6-10** and **4-6-11**).

[c] Compliance with ambient air quality standards is determined by long-term ambient air quality monitoring at predetermined monitoring station locations using methods and analysis procedures established by the regulatory agencies. The ambient standards are not intended to be used for direct assessment of localized ambient air pollutant concentrations from specific emission sources. However, the comparison of the predicted air dispersion modeling ambient concentrations with the applicable ambient air quality standards presented in **Table 4-6-13** do provide an order-of-magnitude indicator of any potential air quality impacts from the Proposed GLE Facility construction activities.

[d] Standards listed are the federal **National Ambient Air Quality Standards** (NAAQS), which the State of North Carolina has adopted as state standards with the exception of the annual average standard for PM. The federal annual average NAAQS for PM has been revoked, but the level is still maintained as a North Carolina state standard.

[e] Ambient PM_{10} monitoring data available only during February and March in 2008 (see **Tables 4-6-10** and **4-6-11**). Insufficient data was collected to determine annual average concentration. Furthermore, $PM_{2.5}$ is a fraction of the PM_{10} concentrations in the ambient air (i.e., the measured PM_{10} concentration includes the concentration of $PM_{2.5}$ in the ambient air). Therefore, the PM_{10} concentration cannot less than the $PM_{2.5}$ concentration at a site. Review of the available PM_{10} ambient monitoring data summarized in **Table 4-6-11** shows the highest 24-hour PM_{10} concentration measured in February and March, 2008 (21 $\mu g/m^3$) is less than the long-term 24-hour average $PM_{2.5}$ concentration (24 $\mu g/m^3$). For the purpose for including a credible order-of-magnitude estimate of PM_{10} background to assess offsite ambient PM_{10} concentrations resulting from activities at the Proposed GLE Facility, the long-term 24-hour and annual average $PM_{2.5}$ are used recognizing that the corresponding the actual long-term ambient PM_{10} concentrations for the site will be higher.

Table 4-6-14. Comparison of Predicted Maximum Air Pollutant Concentrations to Ambient Air Quality Standard Levels Resulting from Proposed GLE Facility Building Construction Phase Activities

Air Pollutant	Averaging Time	Modeled Maximum Offsite Concentration from Proposed GLE Facility Emissions	Background Ambient Concentration[a]	Predicted Total Maximum Offsite Concentration	Primary Ambient Air Quality Standard[b,c]
Carbon monoxide (CO)	8-hour	0.03 ppm	2.6 ppm	2.63 ppm	9 ppm
	1-hour	0.2 ppm	4.0 ppm	4.2 ppm	35 ppm
Nitrogen dioxide (NO_2)	Annual average	0.6 $\mu g/m^3$	no data[d]	0.6 $\mu g/m^3$	100 $\mu g/m^3$
Particulate matter (PM_{10})	Annual average	12.8 $\mu g/m^3$	10 $\mu g/m^3$[e]	22.8 $\mu g/m^3$	50 $\mu g/m^3$
	24-hour	281.4 $\mu g/m^3$	24 $\mu g/m^3$[e]	305.4 $\mu g/m^3$	150 $\mu g/m^3$
Particulate matter ($PM_{2.5}$)	Annual average	1.4 $\mu g/m^3$	10 $\mu g/m^3$	11.4 $\mu g/m^3$	15 $\mu g/m^3$
	24-hour	34.5 $\mu g/m^3$	24 $\mu g/m^3$	58.5 $\mu g/m^3$	35 $\mu g/m^3$
Sulfur dioxide (SO_2)	Annual average	0.0000005 ppm	0.005 ppm	0.005 ppm	0.030 ppm
	24-hour	0.00001 ppm	0.031 ppm	0.031 ppm	0.14 ppm

[a] Average of monitoring data measured by NC DAQ in New Hanover County, NC and reported to the U.S. EPA Air Quality System (AQS) for the years 2002 through 2008 (see **Tables 4-6-10** and **4-6-11**).

[b] Compliance with ambient air quality standards is determined by long-term ambient air quality monitoring at predetermined monitoring station locations using methods and analysis procedures established by the regulatory agencies. The ambient standards are not intended to be used for direct assessment of localized ambient air pollutant concentrations from specific emission sources. However, the comparison of the predicted air dispersion modeling ambient concentrations with the applicable ambient air quality standards presented in **Table 4-6-14** do provide an order-of-magnitude indicator of any potential air quality impacts from the Proposed GLE Facility construction activities.

[c] Standards listed are the federal National Ambient Air Quality Standards (NAAQS), which the State of North Carolina has adopted as state standards with the exception of the annual average standard for PM. The federal annual average NAAQS for PM has been revoked, but the level is still maintained as a North Carolina state standard.

[d] The NC DAQ does not monitor for NO_2 at New Hanover County sites because attainment with applicable ambient air quality standards has been demonstrated.

[e] Ambient PM_{10} monitoring data available only during February and March in 2008 (see **Tables 4-6-10** and **4-6-11**). Insufficient data was collected to determine annual average concentration. Furthermore, $PM_{2.5}$ is a fraction of the PM_{10} concentrations in the ambient air (i.e., the measured PM_{10} concentration includes the concentration of $PM_{2.5}$ in the ambient air). Therefore, the PM_{10} concentration cannot less than the $PM_{2.5}$ concentration at a site. Review of the available PM_{10} ambient monitoring data summarized in **Table 4-6-11** shows the highest 24-hour PM_{10} concentration measured in February and March, 2008 (21 $\mu g/m^3$) is less than the long-term 24-hour average $PM_{2.5}$ concentration (24 $\mu g/m^3$). For the purpose for including a credible order-of-magnitude estimate of PM_{10} background to assess offsite ambient PM_{10} concentrations resulting from activities at the Proposed GLE Facility, the long-term 24-hour and annual average $PM_{2.5}$ are used recognizing that the corresponding the actual long-term ambient PM_{10} concentrations for the site will be higher.

Table 4-6-15. Comparison of Predicted Maximum Air Pollutant Concentrations to Ambient Air Quality Standard Levels Resulting from Proposed GLE Facility Final Construction/Startup Phase Activities

Air Pollutant	Averaging Time	Modeled Maximum Offsite Concentration from Proposed GLE Facility Emissions	Background Ambient Concentration[a]	Predicted Total Maximum Offsite Concentration	Primary Ambient Air Quality Standard[b,c]
Carbon monoxide (CO)	8-hour	0.1 ppm	2.6 ppm	2.7 ppm	9 ppm
	1-hour	0.1 ppm	4.0 ppm	4.1 ppm	35 ppm
Nitrogen dioxide (NO_2)	Annual average	0.1 $\mu g/m^3$	no data[d]	0.1 $\mu g/m^3$	100 $\mu g/m^3$
Particulate matter (PM_{10})	Annual average	0.1 $\mu g/m^3$	10 $\mu g/m^3$[e]	10.1 $\mu g/m^3$	50 $\mu g/m^3$
	24-hour	3.5 $\mu g/m^3$	24 $\mu g/m^3$[e]	27.5 $\mu g/m^3$	150 $\mu g/m^3$
Particulate matter ($PM_{2.5}$)	Annual average	0.1 $\mu g/m^3$	10 $\mu g/m^3$	10.1 $\mu g/m^3$	15 $\mu g/m^3$
	24-hour	3.5 $\mu g/m^3$	24 $\mu g/m^3$	27.5 $\mu g/m^3$	35 $\mu g/m^3$
Sulfur dioxide (SO_2)	Annual average	0.000004 ppm	0.005 ppm	0.005 ppm	0.030 ppm
	24-hour	0.003 ppm	0.031 ppm	0.034 ppm	0.14 ppm

[a] Average of monitoring data measured by NC DAQ in New Hanover County, NC and reported to the U.S. EPA Air Quality System (AQS) for the years 2002 through 2008 (see **Tables 4-6-10** and **4-6-11**).

[b] Compliance with ambient air quality standards is determined by long-term ambient air quality monitoring at predetermined monitoring station locations using methods and analysis procedures established by the regulatory agencies. The ambient standards are not intended to be used for direct assessment of localized ambient air pollutant concentrations from specific emission sources. However, the comparison of the predicted air dispersion modeling ambient concentrations with the applicable ambient air quality standards presented in **Table 4-6-15** do provide an order-of-magnitude indicator of any potential air quality impacts from the Proposed GLE Facility final construction and startup activities.

[c] Standards listed are the federal National Ambient Air Quality Standards (NAAQS), which the State of North Carolina has adopted as state standards with the exception of the annual average standard for PM. The federal annual average NAAQS for PM has been revoked, but the level is still maintained as a North Carolina state standard.

[d] The NC DAQ does not monitor for NO_2 at New Hanover County sites because attainment with applicable ambient air quality standards has been demonstrated.

[e] Ambient PM_{10} monitoring data available only during February and March in 2008 (see **Tables 4-6-10** and **4-6-11**). Insufficient data was collected to determine annual average concentration. Furthermore, $PM_{2.5}$ is a fraction of the PM_{10} concentrations in the ambient air (i.e., the measured PM_{10} concentration includes the concentration of $PM_{2.5}$ in the ambient air). Therefore, the PM_{10} concentration cannot less than the $PM_{2.5}$ concentration at a site. Review of the available PM_{10} ambient monitoring data summarized in **Table 4-6-11** shows the highest 24-hour PM_{10} concentration measured in February and March, 2008 (21 $\mu g/m^3$) is less than the long-term 24-hour average $PM_{2.5}$ concentration (24 $\mu g/m^3$). For the purpose for including a credible order-of-magnitude estimate of PM_{10} background to assess offsite ambient PM_{10} concentrations resulting from activities at the Proposed GLE Facility, the long-term 24-hour and annual average $PM_{2.5}$ are used recognizing that the corresponding the actual long-term ambient PM_{10} concentrations for the site will be higher.

Table 4-6-16. Comparison of Predicted Maximum Air Pollutant Concentrations to Ambient Air Quality Standard Levels Resulting from Proposed GLE Facility Operation Phase Activities

Air Pollutant	Averaging Time	Modeled Maximum Offsite Concentration from Proposed GLE Facility Emissions	Background Ambient Concentration[a]	Predicted Total Maximum Offsite Concentration	Primary Ambient Air Quality Standard[b,c]
Carbon monoxide (CO)	8-hour	0.1 ppm	2.6 ppm	2.7 ppm	9 ppm
	1-hour	0.1 ppm	4.0 ppm	4.1 ppm	35 ppm
Nitrogen dioxide (NO_2)	Annual average	0.1 $\mu g/m^3$	no data[d]	0.1 $\mu g/m^3$	100 $\mu g/m^3$
Particulate matter (PM_{10})	Annual average	0.1 $\mu g/m^3$	10 $\mu g/m^3$[e]	10.1 $\mu g/m^3$	50 $\mu g/m^3$
	24-hour	3.5 $\mu g/m^3$	24 $\mu g/m^3$[e]	27.5 $\mu g/m^3$	150 $\mu g/m^3$
Particulate matter ($PM_{2.5}$)	Annual average	0.1 $\mu g/m^3$	10 $\mu g/m^3$	10.1 $\mu g/m^3$	15 $\mu g/m^3$
	24-hour	3.5 $\mu g/m^3$	24 $\mu g/m^3$	27.5 $\mu g/m^3$	35 $\mu g/m^3$
Sulfur dioxide (SO_2)	Annual average	0.000004 ppm	0.005 ppm	0.005 ppm	0.030 ppm
	24-hour	0.003	0.031 ppm	0.034 ppm	0.14 ppm

[a] Average of monitoring data measured by NC DAQ in New Hanover County, NC and reported to the U.S. EPA Air Quality System (AQS) for the years 2002 through 2008 (see **Tables 4-6-10** and **4-6-11**).

[b] Compliance with ambient air quality standards is determined by long-term ambient air quality monitoring at predetermined monitoring station locations using methods and analysis procedures established by the regulatory agencies. The ambient standards are not intended to be used for direct assessment of localized ambient air pollutant concentrations from specific emission sources. However, the comparison of the predicted air dispersion modeling ambient concentrations with the applicable ambient air quality standards presented in **Table 4-6-16** do provide an order-of-magnitude indicator of any potential air quality impacts from the Proposed GLE Facility operations.

[c] Standards listed are the federal National Ambient Air Quality Standards (NAAQS), which the State of North Carolina has adopted as state standards with the exception of the annual average standard for PM. The federal annual average NAAQS for PM has been revoked, but the level is still maintained as a North Carolina state standard.

[d] The NC DAQ does not monitor for NO_2 at New Hanover County sites because attainment with applicable ambient air quality standards has been demonstrated.

[e] Ambient PM_{10} monitoring data available only during February and March in 2008 (see **Tables 4-6-10** and **4-6-11**). Insufficient data was collected to determine annual average concentration. Furthermore, $PM_{2.5}$ is a fraction of the PM_{10} concentrations in the ambient air (i.e., the measured PM_{10} concentration includes the concentration of $PM_{2.5}$ in the ambient air). Therefore, the PM_{10} concentration cannot less than the $PM_{2.5}$ concentration at a site. Review of the available PM_{10} ambient monitoring data summarized in **Table 4-6-11** shows the highest 24-hour PM_{10} concentration measured in February and March, 2008 (21 $\mu g/m^3$) is less than the long-term 24-hour average $PM_{2.5}$ concentration (24 $\mu g/m^3$). For the purpose for including a credible order-of-magnitude estimate of PM_{10} background to assess offsite ambient PM_{10} concentrations resulting from activities at the Proposed GLE Facility, the long-term 24-hour and annual average $PM_{2.5}$ are used recognizing that the corresponding the actual long-term ambient PM_{10} concentrations for the site will be higher.