

| Early Construction | Building Construction | Final Construction/Startup | Operation |
|---|---|---|------------------------------------|
| Year 2011 | Year 2012 | Years 2013-2017 | Year 2018-2048 |
| 95 | 680 | 743 | 350 |
| Site preparation | Building construction | Final construction and operations startup | Production operations |
| 1-Apr-09 | 1-Jan-10 | 1-Jan-11 | 1-Jan-18 |
| Sunday through Saturday, 7 a.m. to 4 p.m. | Sunday through Saturday, 7 a.m. to 4 p.m. | Sunday through Saturday, 24 hr/day | Sunday through Saturday, 24 hr/day |
| 270 | 359 | 365 | 365 |
| 270 | 359 | 365 | 365 |
| 200 | 1,428 | 1,559 | 735 |
| 90% | 90% | 90% | 90% |
| 10% | 10% | 10% | 10% |
| 1.64 | 1.64 | 1.64 | 1.64 |
| 10 | 10 | 10 | 10 |
| 100 | 100 | 100 | 100 |
| 0.025 | 0.025 | 0.025 | 0.025 |
| 0.024 | 0.024 | 0.024 | 0.024 |
| 0.549 | 0.498 | 0.379 | 0.300 |
| 0.007 | 0.007 | 0.007 | 0.007 |
| 0.656 | 0.597 | 0.475 | 0.403 |
| 13.080 | 12.59 | 11.64 | 11.060 |
| 368 | 368 | 368 | 368 |
| 0.136 | 0.136 | 0.136 | 0.136 |
| 0.132 | 0.132 | 0.132 | 0.132 |
| 6.360 | 5.481 | 3.507 | 2.272 |
| 0.013 | 0.013 | 0.013 | 0.013 |
| 0.381 | 0.352 | 0.304 | 0.279 |
| 1.627 | 1.418 | 0.84 | 0.585 |
| 1,417 | 1416 | 1413 | 1,412 |

Fugitive dust emissions from
Proposed GLE Facility on-site access road construction

Fugitive dust emissions from
Proposed GLE Facility site preparation
(excluding on-site road construction)

Fugitive dust emissions from
construction motor vehicle traffic on
Proposed GLE Facility
unpaved on-site access road

Off-road equipment type and number
used for Early Construction

| |
|---|
| Total on-site access road length [miles] |
| Road length for paved segment of on-site access road [miles] |
| Road length for unpaved segment of on-site access road [miles] |
| Right-of-way width for unpaved segment of on-site access road [ft] |
| Area of construction activity with disturbed soil [acres] |
| Number of days to complete activity |
| PM ₁₀ emission rate [ton/acre/month] |
| PM _{2.5} to PM ₁₀ ratio |
| Fugitive dust control mitigation practices implemented |
| Fugitive dust control mitigation practices PM ₁₀ control efficiency |
| Area of construction activity with disturbed soil [acres] |
| Number of days to complete activity |
| PM ₁₀ emission rate [ton/acre/month] |
| PM _{2.5} to PM ₁₀ ratio |
| Fugitive dust control mitigation practices implemented |
| Fugitive dust control mitigation practices PM ₁₀ control efficiency |
| Unpaved on-site access road segment length [miles] |
| Surface silt content [%] |
| Average daily number of motor vehicle trips to construction site |
| Average weight of motor vehicles traveling on on-site access road [ton] |
| Average vehicle speed traveling on unpaved segment of on-site access road [mph] |
| PM ₁₀ emission rate (uncontrolled) as calculated by U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 13.2.2, Equation 1a. November 2006 [lb/VMT] |
| PM _{2.5} emission rate (uncontrolled) as calculated by U.S. EPA, AP 42, Fifth Edition, Volume I, Chapter 13: Miscellaneous Sources, Section 13.2.2, Equation 1a. November 2006. [lb/VMT] |
| Fugitive dust control mitigation practices implemented |
| Wet suppression fugitive dust control efficiency for unpaved roads |
| Dozer |
| Loader |
| Grader |
| Compactor/roller |
| Excavator |
| Water truck |
| Paver |

| |
|------|
| 1.64 |
| 0.45 |
| 1.19 |
| 60 |
| 8.65 |
| 30 |
| 0.42 |
| 0.10 |

This emission factor is based on 168 work hours per month basis.
 The emission factor remains at the published value data collected from field studies conducted by Mid Protection Agency provide directions for adjusting a site to which the emissions factor is applied from factor . If one is to adjust the published emissions observed at the MRI test sites, it follows that the (e.g., different typical rainfall or wind patterns) or the MRI test sites.

Wet suppression by periodic water spraying of disturbed soil in active construction area using water truck at 2-hour intervals

| |
|--------|
| 74% |
| 148.70 |
| 240 |
| 0.42 |
| 0.10 |

same as the above.
 See response to comment on 0.42 ton/acre/month

Wet suppression by periodic water spraying of disturbed soil in active construction area using water truck at 2-hour intervals

| |
|-----|
| 74% |
|-----|

| |
|-------|
| 1.19 |
| 18.9 |
| 200 |
| 4.9 |
| 15 |
| 2.808 |
| 0.281 |

surface silt content in the formula should be Corrected Cell C20 to report value as percent

Wet suppression by periodic water spraying of roadway

| |
|-----|
| 55% |
| 4 |
| 4 |
| 2 |
| 2 |
| 1 |
| 1 |
| 1 |

rs per month (MRI 1996), and thus this emission factor should be adjusted on 270 work hours

of 0.42 ton/acre/month. The emissions factor was originally developed using a limited amount of
lowest Research Institute (MRI) at several construction sites in the Western United States. It is
based on a per acre per month basis of construction activity. Neither MRI nor the U.S. Environmental
Agency published the emissions factor value on a site-specific basis to reflect different operating conditions at
the site conditions that were observed at the test sites where MRI collected data used to develop the
emissions factor value because the hours worked per month at a given site are different from the 168 hours
emissions factor value also should be adjusted to reflect any differences in meteorological conditions
soil conditions (e.g. loam, clay, sandy, etc.) that occur at the given site versus those that occurred at

emissions factor above.

in percent, not in fraction.

| Equipment Type | Engine hp | Load Factor | Number of Equipment Type used | Hourly Emissions (lb per work hour) | | | | | |
|-------------------------------|-----------|-------------|-------------------------------|-------------------------------------|-------------------|-----------------|-----------------|------|------|
| | | | | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Dozer | 175 | 0.59 | 4 | 0.43 | 0.42 | 2.38 | 0.00 | 0.18 | 1.39 |
| Loader | 175 | 0.59 | 4 | 0.43 | 0.42 | 2.38 | 0.00 | 0.18 | 1.39 |
| Grader | 175 | 0.59 | 2 | 0.18 | 0.17 | 0.98 | 0.00 | 0.07 | 0.57 |
| Compactor/roller | 120 | 0.59 | 2 | 0.15 | 0.14 | 0.82 | 0.00 | 0.06 | 0.48 |
| Excavator | 175 | 0.59 | 1 | 0.11 | 0.11 | 0.60 | 0.00 | 0.05 | 0.35 |
| Water truck | 175 | 0.59 | 1 | 0.11 | 0.11 | 0.60 | 0.00 | 0.05 | 0.35 |
| Paver | 120 | 0.59 | 1 | 0.07 | 0.07 | 0.41 | 0.00 | 0.03 | 0.24 |
| Total Hourly Emissions | | | | 1.5 | 1.4 | 8.2 | 0.02 | 0.6 | 4.8 |

AVERAGE DAILY EMISSION ESTIMATES

| On-Site Air Emissions Source Associated with Access Road Construction During Month 1 of the Early Construction Phase | Average Daily Emissions (lb/day) | | | | | |
|---|----------------------------------|-------------------|-----------------|-----------------|------|------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Fugitive dust emissions from Proposed GLE Facility on-site access road construction | 63.0 | 6.3 | | | | |
| Mobile source emissions from off-road construction equipment used for on-site access road construction | 13.4 | 13.0 | 73.5 | 0.14 | 5.6 | 42.8 |
| Mobile source emissions from on-site 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 on-site 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 |

| On-Site Air Emissions Source Associated with Site Preparation Activities During Months 2 through 9 of Early Construction Phase following completion of on-site access road | 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 on-site road construction) | 1,082.5 | 108.3 | | | | |
| Fugitive dust emissions from construction motor vehicle traffic on Proposed GLE Facility unpaved on-site access road | 300.0 | 30.0 | | | | |
| 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 on-site 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 on-site diesel engine truck traffic associated with Early Construction Phase activities | 0.01 | 0.01 | 0.46 | 0.001 | 0.03 | 0.12 |
| TOTAL | 1,395.9 | 151.2 | 74.3 | 0.14 | 6.0 | 51.4 |

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Early Construction Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Daily Emissions (lb/day) | | | | | |
|---|----------------------------------|-------------------|-----------------|-----------------|------|------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.10 | 0.10 | 2.2 | 0.03 | 2.6 | 51.7 |
| Mobile source emissions from diesel engine truck traffic | 0.60 | 0.58 | 27.95 | 0.06 | 1.67 | 7.15 |
| TOTAL | 0.70 | 0.68 | 30.1 | 0.08 | 4.3 | 58.9 |

AVERAGE ANNUAL EMISSION ESTIMATES

| On-Site Air Emissions Source Associated with Early Construction Phase | Average Annual Emissions (ton/yr) | | | | | |
|---|-----------------------------------|-------------------|-----------------|-----------------|-------|------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Fugitive dust emissions from Proposed GLE Facility on-site access road construction | 0.95 | 0.09 | | | | |
| Fugitive dust emissions from Proposed GLE Facility site preparation (excluding on-site road construction) | 129.9 | 13.0 | | | | |
| Fugitive dust emissions from construction motor vehicle traffic on Proposed GLE Facility unpaved on-site access road | 36.0 | 3.6 | | | | |
| Mobile source emissions from off-road construction equipment used for on-site 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 on-site 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 on-site diesel engine truck traffic associated with Early Construction Phase activities | 0.001 | 0.001 | 0.062 | 0.0001 | 0.004 | 0.02 |
| TOTAL | 168.7 | 18.4 | 10.0 | 0.02 | 0.8 | 6.9 |

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Early Construction Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Annual Emissions (ton/yr) | | | | | |
|---|-----------------------------------|-------------------|-----------------|-----------------|-----|-----|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.01 | 0.01 | 0.3 | 0.004 | 0.4 | 7.0 |
| Mobile source emissions from diesel engine truck traffic | 0.08 | 0.08 | 3.8 | 0.01 | 0.2 | 1.0 |
| TOTAL | 0.09 | 0.09 | 4.1 | 0.01 | 0.6 | 7.9 |

Fugitive dust emissions from
Proposed GLE Facility building construction

Off-road equipment type and number
used for Early Construction

| |
|--|
| Area of construction activity with disturbed soil [<i>acres</i>] |
| Number of days to complete activity |
| PM ₁₀ emission rate [<i>ton/acre/month</i>] |
| PM _{2.5} to PM ₁₀ ratio |
| Crane |
| Tractor/backhoe |
| Forklift |
| Aerial lift |
| Air compressor |

| |
|--------|
| 117.40 |
| 360 |
| 0.11 |
| 0.10 |
| 2 |
| 4 |
| 4 |
| 4 |
| 4 |

This emission factor is based on 168 work hours. The emission factor should be adjusted on 270 work hours. See response to comment for 0.42 ton/acre/month.

Per Table 4-6-14 of the 11/24/09 RAI responses included during this phase?

The 0.11 ton/acre/month emissions factor is a general emissions factor associated with site preparation. It is the standard emissions factor that assumes that all construction activities generate fugitive dust emissions generated by the actual type of activities conducted.

Application of this emissions factor to estimate fugitive dust emissions continually occurring over the entire 117 acre site. The site preparation areas to meet design, safety, and security requirements involved in the Building Construction Phase activities in the Building Construction Phase activities spreadsheet apply the 0.11 ton/acre/month emissions factor. Proposed GLE Facility building construction activities will generate maximum fugitive dust emissions that potentially could occur during the Building Construction Phase.

As described in Table 4-6-2 of the RAI Response, fugitive dust emissions from buildings and structures. All site preparation activities involve dust control typically used at construction sites to reduce windblown dust from open material storage piles. The dust control practice for the Building Construction Phase consists of the following:

hrs per month (MRI 1996), and thus this work hours per month basis. This emissions factor on Worksheet 2.

e, predicted PM10 and PM2.5 concentrations exceeded NAAQS. Why was fugitive dust control (e.g., 55%

eral emission factor intended to broadly represent fugitive dust emissions for all types of construction activity except practice emission factor used by regulatory agencies to estimate fugitive dust emissions generated by project construction activities produce the same amount of dust on a per acre basis. Thus, the amount of fugitive dust estimated by the emissions factor is based on the amount of construction being performed at a given time, but rather overall average fugitive dust emissions from the total

fugitive dust emissions from the Proposed GLE Facility Building Construction Phase is based on the conservative assumption that all construction activities will be occurring on the entire 117 acre site at any given time. In actuality, construction activities will only be occurring on a smaller portion of the 117 acre site at any given time. The emissions factor is based on the requirements for the Proposed GLE Facility. Information about the project construction activity schedule is not available over the phase period. Consequently, the fugitive dust emissions estimates for the Proposed GLE Facility Building Construction Phase are based on the assumption that construction activities will occur over the entire 117 acre project site. As a result, the estimated results overstate the actual fugitive dust emissions, and for the purpose of assessing the fugitive dust environmental impacts of the building construction activities that could occur but likely will not occur because the actual construction activities are being performed in an area significantly smaller than the 117 acre site.

For the purpose of the spreadsheet calculations the Building Construction Phase is assumed to consist of erection of building structures. For the purpose of the spreadsheet calculations the amount of dust generated by earth moving activities is assumed to have been completed. The on-site access road and parking areas are assumed to be completed. The amount of dust generated by earth moving and such activities that disturb the soil, dust generated by vehicle emissions, and dust generated by building erection and outfitting. Watering is not used to control fugitive dust from activities associated with building erection and outfitting. Thus, the emissions factor and site-specific assumptions used to estimate fugitive dust emissions for the Proposed GLE Facility Building Construction Phase are based on the assumption that construction activities will occur over the entire 117 acre project site.

6 control by twice-daily watering) not

not for the earth moving and grading activities
construction other than site preparation. The
emissions factor does not reflect the levels of
total area in which construction activity is being

assumption that the building construction activities are
limited. The 117 acres will have significant open
space available at this time to estimate the average acreage
during Construction Phase calculated by this
emissions that likely will be generated by the
roads represent an upper bound estimate of the
area, significantly less than 117 acres.

The Main GLE Facility building and the ancillary
roads are scheduled to be paved. Watering is a fugitive dust
control measure for traffic on unpaved roads and parking areas, and
watering is not an applicable fugitive dust control
measure for the GLE Facility Building Construction Phase.

| Equipment Type | Engine hp | Load Factor | Number of Equipment Type used | Hourly Emissions (lb per work hour) | | | | | |
|-------------------------------|-----------|-------------|-------------------------------|-------------------------------------|-------------------|-----------------|-----------------|------|------|
| | | | | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Crane | 175 | 0.43 | 2 | 0.11 | 0.10 | 0.84 | 0.00 | 0.06 | 0.33 |
| Tractor/backhoe | 100 | 0.21 | 4 | 0.12 | 0.12 | 0.58 | 0.00 | 0.04 | 0.77 |
| Forklift | 75 | 0.59 | 4 | | 0.25 | 1.23 | 0.00 | 0.08 | 1.62 |
| Aerial lift | 75 | 0.21 | 4 | 0.15 | | 0.51 | 0.00 | 0.06 | 0.97 |
| Air compressor | 75 | 0.43 | 4 | 0.13 | 0.12 | | 0.00 | 0.05 | 0.77 |
| Total Hourly Emissions | | | | 0.8 | 0.7 | | | 0.3 | 4.5 |

| On-Site Air Emissions Sources Associated with Building Construction Phase | 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 | 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 on-site gasoline engine automobile traffic | 0.12 | 0.11 | 2.3 | 0.03 | 2.8 | 58.4 |
| Mobile source emissions from on-site diesel engine truck traffic | 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 |

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Building Construction Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Daily Emissions (lb/day) | | | | | |
|--|----------------------------------|-------------------|-----------------|-----------------|-------|-------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.71 | 0.69 | 14.10 | 0.19 | 16.9 | 356.4 |
| Mobile source emissions from diesel engine truck traffic | 4.28 | 4.15 | 172.40 | 0.41 | 11.07 | 44.60 |
| TOTAL | 4.99 | 4.84 | 186.5 | 0.60 | 28.0 | 401.0 |

AVERAGE ANNUAL EMISSION ESTIMATES

| On-Site Air Emissions Sources Associated with Building Construction Phase | 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 | 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 on-site gasoline engine automobile traffic | 0.02 | 0.02 | 0.42 | 0.01 | 0.50 | 10.5 |
| Mobile source emissions from on-site diesel engine truck traffic | 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 |

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Building Construction Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Annual Emissions (ton/yr) | | | | | |
|--|-----------------------------------|-------------------|-----------------|-----------------|-----|------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.13 | 0.12 | 2.5 | 0.03 | 3.0 | 64.0 |
| Mobile source emissions from diesel engine truck traffic | 0.77 | 0.75 | 30.9 | 0.07 | 2.0 | 8.0 |
| TOTAL | 0.90 | 0.87 | 33.5 | 0.11 | 5.0 | 72.0 |

| | |
|---|---|
| Proposed GLE Facility Main operations building stack vent | PM ₁₀ emission rate |
| | PM _{2.5} to PM ₁₀ ratio |
| Proposed GLE Facility mechanical draft cooling towers | Number of cooling towers |
| | Number of cells per cooling tower |
| | Cooling water flow rate per cell [gal/hr] |
| | Cooling water Total Dissolved Solids (TDS) content [pp |
| | Total Liquid Drift Factor for induced draft cooling tower 13.4-1 in [lb/1,000 gal] |
| | PM ₁₀ emission factor for induced draft cooling tower per gal] |
| Proposed GLE Facility auxiliary diesel generator units | PM _{2.5} to PM ₁₀ ratio |
| | Number of diesel generator units |
| | Diesel generator unit horsepower rating [hp] |
| | Annual operation [hr/yr] |
| | Emission rates [lb/hr] calculated using NCDENR DAQ Large Diesel and All Dual-Fuel Engines Emissions Calculator Spreadsheet (LGD2009 Revision A) |
| Proposed GLE Facility on-site transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads | Number of OHTVs |
| | OHTV type |
| | OHTV engine horsepower |
| | Operating hours per day |
| | Emission factors [(g/hp-hr) for diesel engine forklifts calculated using U.S. EPA NONROAD (see Worksheet 6) |
| Mobile source emissions from diesel engine truck used for transfer of product cylinders to on-site Fuel Manufacturing Operations (FMO) facility | Number of vehicles |
| | Vehicle type |
| | Operating interval |
| | Distance travel per on-site trip [miles] |
| | Emission factors |

| | |
|-------------------|---|
| | 0.00 |
| | 1.00 |
| | 2 |
| | 8 |
| | 22,500 |
| m] | 858 |
| from Table | 1.7 |
| cell [lb/1,000 | 0.0015 |
| | 1 |
| | 2 |
| | 382 |
| | 240 |
| PM ₁₀ | 0.27 |
| PM _{2.5} | 0.27 |
| NO _x | 5.00 |
| SO ₂ | 0.62 |
| NMTOC (VOC) | 0.25 |
| CO | 2.10 |
| | 2 |
| | Diesel engine forklift or straddle carrier |
| | 75 |
| | 3 |
| PM ₁₀ | 0.6496 |
| PM _{2.5} | 0.6301 |
| NO _x | 3.1450 |
| SO ₂ | 0.0049 |
| VOC | 0.1980 |
| CO | 4.1657 |
| | 1 |
| | Heavy duty diesel engine truck |
| | 1 round trip per week |
| | 2 |
| | Emission factors (g/VMT) for diesel engine trucks calculated for year 2018 using U.S. EPA MOBILE6.2 for (see Worksheet 1) |

should be gal/hr, considering all calculated
 Converted input value to gal/hr. Used 3,000
 draft cooling towers operating at the existing
 "Attachment 1. Follow-up to NRC Questions,
 2009. The 3,000 gpm value is consistent with
 dispersion modeling for the project cooling towers

itions in this file

gal/min x 60 min/hr ÷ 8 cells. The 3,000 gpm value based on the mechanical g manufacturing facilities at the Wilmington Site as provided to NRC in from May 18-20 site visit" included with the GLE letter sent to NRC June h the cooling tower flow rate assumption used for the air pollutant owers.

PROPOSED GLE FACILITY FINAL CONSTRUCTION/STARTUP PHASE (Years 2013-2017)

AVERAGE HOURLY EMISSIONS ESTIMATES

| On-Site Air Emissions Sources Associated with Final Construction/Startup Phase | Average Hourly Emissions (lb/hr) | | | | | |
|---|----------------------------------|-------------------|-----------------|-----------------|-------|-------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Stationary source emissions from Main GLE facility operations building stack vent | 0 | 0 | | | | |
| Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers | 0.53 | 0.53 | | | | |
| Stationary source emissions from Proposed GLE Facility from auxiliary diesel generator unit exhaust stacks | 0.54 | 0.54 | 10.00 | 1.24 | 0.50 | 4.20 |
| Mobile source emissions from on-site transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads | 0.21 | 0.21 | 1.04 | 0.002 | 0.07 | 1.38 |
| Mobile source emissions from diesel engine truck used for transfer of product cylinders to on-site Fuel Manufacturing Operations (FMO) facility | (a) | (a) | (a) | (a) | (a) | (a) |
| Mobile source emissions from on-site gasoline engine automobile traffic associated with Operation Phase activities | 0.005 | 0.005 | 0.080 | 0.001 | 0.100 | 2.459 |
| Mobile source emissions from on-site diesel engine truck traffic associated with Operation Phase activities | 0.003 | 0.003 | 0.082 | 0.000 | 0.007 | 0.020 |

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

AVERAGE DAILY EMISSION ESTIMATES

| On-Site Air Emissions Sources Associated with Final Construction/Startup Phase | Average Daily 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 | 0 | 0 | | | | |
| Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers | 12.6 | 12.6 | | | | |
| Stationary source emissions from Proposed GLE Facility from auxiliary diesel generator unit exhaust stacks ^a | 0.5 | 0.5 | 10.0 | 1.2 | 0.5 | 4.2 |
| Mobile source emissions from on-site 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 on-site Fuel Manufacturing Operations (FMO) facility ^b | 0.0006 | 0.0006 | 0.02 | 0.00006 | 0.001 | 0.004 |
| Mobile source emissions from on-site gasoline engine automobile traffic associated with Operation Phase activities | 0.13 | 0.12 | 1.92 | 0.03 | 2.41 | 59.0 |
| Mobile source emissions from on-site diesel engine truck traffic associated with Operation Phase activities | 0.08 | 0.07 | 1.98 | 0.01 | 0.17 | 0.47 |
| TOTAL | 14.0 | 14.0 | 17.0 | 1.29 | 3.3 | 67.8 |

a. 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.

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

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Final Construction/Startup Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Daily Emissions (lb/day) | | | | | |
|---|----------------------------------|-------------------|-----------------|-----------------|------|-------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.77 | 0.75 | 11.7 | 0.21 | 14.7 | 359.8 |
| Mobile source emissions from diesel engine truck traffic | 4.7 | 4.5 | 120.5 | 0.4 | 10.4 | 28.9 |
| TOTAL | 5.45 | 5.28 | 132.2 | 0.66 | 25.1 | 388.7 |

AVERAGE ANNUAL EMISSION ESTIMATES

| On-Site Air Emissions Sources Associated with Final Construction/Startup Phase | 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 | 0 | 0 | | | | |
| Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers | 2.30 | 2.30 | | | | |
| 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 on-site 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 for transfer of product cylinders to on-site Fuel Manufacturing Operations (FMO) facility | ~ 0 | ~ 0 | ~ 0 | ~ 0 | ~ 0 | ~ 0 |
| Mobile source emissions from on-site gasoline engine automobile traffic associated with Operation Phase activities | 0.02 | 0.02 | 0.35 | 0.01 | 0.44 | 10.8 |
| Mobile source emissions from on-site diesel engine truck traffic associated with Operation Phase activities | 0.01 | 0.01 | 0.36 | 0.001 | 0.03 | 0.09 |
| TOTAL | 2.5 | 2.5 | 2.5 | 0.16 | 0.6 | 12.1 |

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Final Construction/Startup Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Annual Emissions (ton/yr) | | | | | |
|---|-----------------------------------|-------------------|-----------------|-----------------|-----|------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.14 | 0.14 | 2.1 | 0.04 | 2.7 | 65.7 |
| Mobile source emissions from diesel engine truck traffic | 0.85 | 0.83 | 22.0 | 0.08 | 1.9 | 5.3 |
| TOTAL | 0.99 | 0.96 | 24.1 | 0.12 | 4.6 | 70.9 |

| | |
|---|---|
| Proposed GLE Facility Main operations building stack vent | PM ₁₀ emission rate |
| | PM _{2.5} to PM ₁₀ ratio |
| Proposed GLE Facility mechanical draft cooling towers | Number of cooling towers |
| | Number of cells per cooling tower |
| | Cooling water flow rate per cell [gal/hr] |
| | Cooling water Total Dissolved Solids (TDS) content [pp |
| | Total Liquid Drift Factor for induced draft cooling tower 13.4-1 in [lb/1,000 gal] |
| | PM ₁₀ emission factor for induced draft cooling tower per gal] |
| Proposed GLE Facility auxiliary diesel generator units | PM _{2.5} to PM ₁₀ ratio |
| | Number of diesel generator units |
| | Diesel generator unit horsepower rating [hp] |
| | Annual operation [hr/yr] |
| | Emission rates [lb/hr] calculated using NCDENR DAQ Large Diesel and All Dual-Fuel Engines Emissions Calculator Spreadsheet (LGD2009 Revision A) |
| Proposed GLE Facility on-site transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads | Number of OSTVs |
| | OSTV type |
| | OSTV engine horsepower |
| | Operating hours per day |
| | Emission factors [(g/hp-hr) for diesel engine forklifts calculated using U.S. EPA NONROAD (see Worksheet 6) |
| Mobile source emissions from diesel engine truck used for transfer of product cylinders to on-site Fuel Manufacturing Operations (FMO) facility | Number of vehicles |
| | Vehicle type |
| | Operating interval |
| | Distance travel per on-site trip [miles] |
| | Emission factors |

| | |
|-------------------|---|
| | |
| | 1.00 |
| | 2 |
| | 8 |
| | 22,500 |
| m] | 858 |
| from Table | 1.7 |
| cell [lb/1,000 | 0.0015 |
| | 1 |
| | 2 |
| | 382 |
| | 240 |
| PM ₁₀ | 0.27 |
| PM _{2.5} | 0.27 |
| NO _x | 5.00 |
| SO ₂ | 0.62 |
| NMTOC (VOC) | 0.25 |
| CO | 2.10 |
| | 2 |
| | Diesel engine forklift or straddle carrier |
| | 75 |
| | 3 |
| PM ₁₀ | 0.6496 |
| PM _{2.5} | 0.6301 |
| NO _x | 3.1450 |
| SO ₂ | 0.0049 |
| VOC | 0.1980 |
| CO | 4.1657 |
| | 1 |
| | Heavy duty diesel engine truck |
| | 1 round trip per week |
| | 2 |
| | Emission factors (g/VMT) for diesel engine trucks calculated for year 2018 using U.S. EPA MOBILE6.2 for (see Worksheet 1) |

should be gal/hr, considering all calculated
 Converted input value to gal/hr. Used 3,000
 mechanical draft cooling towers operating at
 NRC in "Attachment 1. Follow-up to NRC Query
 June 2009. The 3,000 gpm value is consistent
 dispersion modeling for the project cooling towers

AVERAGE DAILY EMISSION ESTIMATES

| On-Site Air Emissions Sources Associated with Operation Phase | Average Daily 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 | 0 | 0 | | | | |
| Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers | 13 | 13 | | | | |
| Stationary source emissions from Proposed GLE Facility from auxiliary diesel generator unit exhaust stacks ^a | 0.54 | 0.54 | 10.0 | 1.24 | 0.50 | 4.2 |
| Mobile source emissions from on-site transfer vehicles (OSTVs) used for transfer of cylinders to and from the outdoor cylinder storage pads | 0.64 | 0.62 | 3.12 | 0.00 | 0.20 | 4.13 |
| Mobile source emissions from diesel engine truck used to transfer product cylinders to on-site Fuel Manufacturing Operations (FMO) facility ^b | 0.0006 | 0.0006 | 0.0154 | 0.00006 | 0.0013 | 0.0037 |
| Mobile source emissions from on-site 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 on-site diesel engine truck traffic associated with Operation Phase activities | 0.04 | 0.04 | 0.60 | 0.003 | 0.07 | 0.16 |
| TOTAL | 13.9 | 13.9 | 14.5 | 1.3 | 1.7 | 34.9 |

a. 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.

b. Emissions occur one day per week. Diesel engine truck used for transfer of product cylinders to on-site Fuel Manufacturing Operations (FMO) facility one day per week.

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Operation Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Daily Emissions (lb/day) | | | | | |
|--|----------------------------------|-------------------|-----------------|-----------------|------|-------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.36 | 0.35 | 4.37 | 0.10 | 5.9 | 161.1 |
| Mobile source emissions from diesel engine truck traffic a | 2.20 | 2.14 | 36.78 | 0.21 | 4.52 | 9.47 |
| TOTAL | 2.57 | 2.49 | 41.2 | 0.31 | 10.4 | 170.6 |

AVERAGE ANNUAL EMISSION ESTIMATES

| On-Site Air Emissions Sources Associated with Operation Phase | 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 | 0 | 0 | | | | |

| | | | | | | |
|---|------|------|------|-------|------|------|
| Stationary source emissions from Proposed GLE Facility mechanical draft cooling towers | 2.30 | 2.30 | | | | |
| 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 on-site 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 for transfer of product cylinders to on-site Fuel Manufacturing Operations (FMO) facility | ~ 0 | ~ 0 | ~ 0 | ~ 0 | ~ 0 | ~ 0 |
| Mobile source emissions from on-site 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 on-site diesel engine truck traffic associated with Operation Phase activities | 0.01 | 0.01 | 0.11 | 0.001 | 0.01 | 0.03 |
| TOTAL | 2.5 | 2.5 | 2.0 | 0.15 | 0.3 | 6.1 |

| Off-Site Air Emissions from Motor Vehicle Traffic Associated with Operation Phase traveling on roadways to and from the Proposed GLE Facility Site | Average Annual Emissions (ton/yr) | | | | | |
|--|-----------------------------------|-------------------|-----------------|-----------------|-----|------|
| | PM ₁₀ | PM _{2.5} | NO _x | SO ₂ | VOC | CO |
| Mobile source emissions from gasoline engine automobile traffic | 0.07 | 0.06 | 0.8 | 0.02 | 1.1 | 29.4 |
| Mobile source emissions from diesel engine truck traffic | 0.40 | 0.39 | 6.7 | 0.04 | 0.8 | 1.7 |
| TOTAL | 0.47 | 0.45 | 7.5 | 0.06 | 1.9 | 31.1 |

| Proposed GLE Facility Phase | Air Emission Source | Fuel Type | Fuel Consumption Rate | Annual Fuel Consumption (gal) | Emission Factor (lb/gal of fuel) | | | | | | |
|-----------------------------|--|-------------|-----------------------|-------------------------------|----------------------------------|-----------------|------------------|-----------------|-----------------|------------------|--------|
| | | | | | CO ₂ | CH ₄ | N ₂ O | CO ₂ | CH ₄ | N ₂ O | |
| Early Construction | Off-road construction equipment | Diesel fuel | 3,135,024 | 0.065 | 203,777 | 22.36 | 0.0013 | 0.0006 | 2,278 | 0.1 | 0.1 |
| | Automobiles | Gasoline | 564,290 | 24.1 | 23,415 | 19.41 | 0.03 | 0.42 | 22 | 0.318 | 4.98 |
| | Diesel trucks | Diesel fuel | 547,484 | 7.2 | 76,039 | 22.36 | 0.004 | 0.06 | 850 | 1.70 | 2.30 |
| | Total | | | | | | | | | 3,355 | |
| Building Construction | Off-road construction equipment | Diesel fuel | 1,733,252 | 0.065 | 112,661 | 22.36 | 0.0013 | 0.001 | 1,259 | 0.072 | |
| | Automobiles | Gasoline | 5,370,542 | 24.1 | 222,844 | 19.41 | 0.03 | 0.42 | 2,162 | 3.027 | 47.5 |
| | Diesel trucks | Diesel fuel | 5,210,595 | 7.2 | 723,694 | 22.36 | 0.004 | 0.06 | 8,090 | 1.618 | 21.84 |
| | Total | | | | | | | | | 11,511 | 4.7 |
| Final Construction/Startup | Auxiliary diesel generator units | Diesel fuel | | | | | | | 10 | 0.006 | 0.001 |
| | On-site transfer vehicles used for cylinder transfer | Diesel fuel | 96,908 | 7.2 | 13,459 | 22.36 | 0.0013 | 0.0006 | 150 | 0.0 | 0.0 |
| | On-site diesel truck used for cylinder transfer | Diesel fuel | 208 | 7.2 | 29 | 22.36 | 0.0013 | 0.0006 | 0.3 | 0.005 | 0.0001 |
| | Automobiles | Gasoline | 5,962,970 | 24.1 | 247,426 | 19.41 | 0.03 | 0.42 | 2,401 | 3.361 | 52.58 |
| | Diesel trucks | Diesel fuel | 5,785,378 | 7.2 | 803,525 | 22.36 | 0.004 | 0.06 | 8,982 | 1.796 | 24.25 |
| | Total | | | | | | | | | 11,544 | 5.2 |
| Operation | Auxiliary diesel generator units | Diesel fuel | | | | | | | 10 | 0.006 | 0.001 |
| | On-site transfer vehicles used for cylinder transfer | Diesel fuel | 96,908 | 0.065 | 6,299 | 22.36 | 0.0013 | 0.0006 | 70 | 0.00 | 0.0 |
| | On-site diesel truck used for cylinder transfer | Diesel fuel | 208 | 7.2 | 29 | 22.36 | 0.004 | 0.06 | 0.3 | 0.0047 | 0.0001 |
| | Automobiles | Gasoline | 2,810,449 | 24.1 | 116,616 | 19.41 | 0.03 | 0.42 | 1,131 | 1.584 | 24.78 |
| | Diesel trucks | Diesel fuel | 2,726,747 | 7.2 | 378,715 | 22.36 | 0.004 | 0.06 | 4,233 | 0.847 | 11.43 |
| | Total | | | | | | | | | 5,446 | 2.4 |