

APPENDIX I

EPD GUIDELINE FOR CONDUCTING A CLASS II AREA VISIBILITY ANALYSIS

A list of potentially sensitive visible plume receptors, along with their distance and their azimuth to the source, should be tabulated in the Modeling Protocol submitted to GA EPD for each applicable permitting project. Such a tabulation should include all airports and airstrips, state parks, & state historic sites located within 50 km of the project source. Potentially sensitive receptors located beyond the largest significant impact distance due to PM10 24-hr avg or NO_x annual average project emissions modeling are eliminated from further analysis on that basis.

The appropriate background visual range (VISCREEN user's guide, page 26) should be referenced in the modeling protocol. If the background visual range is not considered to be uniform over the area of distribution of project-specific sensitive receptors, the background visual range for each receptor should be listed with the receptor distance and azimuth tabulation in the modeling protocol. The Ambient Ratio Method should not be used to adjust the emission rate of NO₂ in the analysis of visible plume impacts with VISCREEN. The VISCREEN model contains an adjustment to approximate NO₂ from potential NO_x emissions.

Level I (VISCREEN) Modeling – Identify the Distance Beyond Which Sensitive Receptors Are Predicted to be Un-affected by Facility Emissions

1. Set observer distance = shortest distance between sensitive receptor and on-site sources. Run VISCREEN under F, 1 m/s conditions and Level I defaults using **facility-wide PTE emission rates** associated with the project.

The only criteria required for most coastal Georgia projects are those “within the sensitive receptor [Class I Area]” with a SKY background.

2. Repeat for each sensitive receptor until the Visible Plume (NOT Class I) Screening Threshold Criteria (STC) are met, OR until the distance exceeds 50 km

without meeting the STC. The distance beyond which the facility plume passes the screening criteria = D_{vis} (must be < 50 km), is the distance beyond which only un-affected sensitive receptors are located. Such unaffected receptors beyond this distance require no further analysis, though they should be identified in the Class II Modeled Air Quality Assessment (along with the azimuth and distance to the facility) as among the set of sensitive receptors within 50 km of the facility. Report such identified receptors (those in excess of D_{vis} , but within 50 km of the source) as passing Level 1.

Level II (VISCREEN) Modeling – Refining Visible Plume Impacts of sources unable to pass Level I by analysis of persistence of worst-case meteorological conditions and wind directions.

1. If using pre-processed meteorological data (ISCST3-compatible, containing wind flow vectors), identify the azimuth of the wind flow vector from the facility to each sensitive receptor. If processing raw meteorological data, identify the azimuth of the wind direction upwind of the facility that would cause the plume to be directed toward the sensitive receptor (wind flow vector + 180°).
2. For each sensitive receptor's associated 22.5° wide sector and model met data year, determine the worst-case meteorological conditions which occur in the 5-year modeled data set (as the least dispersive condition with a 1% cumulative frequency of occurrence, in accordance with the VISCREEN Model Tutorial). This worst-case 1% cumulative frequency of occurrence (WC1%CF) will be determined from each modeled year of data by 22.5° wind direction sector and by 6-hour time block of each day, and will be ranked in sequence by the increasing value of the product of the Pasquill-Gifford stability-specific σ_z times the wind speed of the condition under evaluation (see VISCREEN model tutorial available on the epa.gov/scram001 website).

NOTE: Conditions requiring more than 12 hours of travel time from the facility to the receptor, calculated on the basis of mid-class wind speeds, are exempted from contributing to the WC1%CF i.e., for 1 m/s winds, 0.5 m/s is the mid-class speed. $3600 \text{ s/hr} * 0.0005 \text{ km/s} * 12\text{hrs} = 21.6 \text{ km}$. Thus for receptors in excess of 21.6 km from the source, there is no need to evaluate visible impacts under 1 m/s wind speed conditions. Some sensitive receptors may pass under stability class F, 2 m/s conditions on this basis (revised Level I analysis), without involving an analysis of the WC1%CF.

3. Run Level II VISCREEN modeling for each sensitive receptor with the sector-appropriate pre-determined worst-case annual cumulative frequency of occurrence meteorological condition using Level I defaults and facility-wide PTE emission rates associated with the project. Sensitive receptors which pass this manner of Level II analysis should be tabulated with the worst-case meteorological conditions under which no visible plume impacts were predicted.
4. Other Level II alternative techniques may also be implemented, such as adjustment of the emissions data, ambient ozone datum, and discussions of infeasible alignments of light source, emission source and sensitive receptor (See Level III Analysis, below).

Level III Analysis – Refined analysis of Potential Visible Plume Impacts.

1. Run PLUVUE II with facility-wide, worst-case stack parameters, PTE emission rates associated with the project and worst-case meteorological conditions (OR F, 1 m/s) [Due to the complexity of the PLUVUEII model and the lack of sufficient guidance for such studies, a PLUVUE modeling protocol should be submitted to GA EPD prior to conducting such an assessment and is subject to EPD approval], AND/OR,

2. Analyze the important geometric relationships between, for instance, the azimuth from the setting or rising sun and the plume azimuth from facility to observer, as presented in the ‘Results’ output file of the Level II (VISCREEN) model. NOTE: In the instance of sensitive receptors located in excess of 1-hour travel time (at mid-wind speed class velocities) from the facility, it is not required to include night-time (E and F) stabilities in sunset analyses, since EPA allows nighttime stabilities to persist for no more than one hour prior to sunset. Plumes may be established overnight under these stabilities, so a sunrise analysis including E & F stabilities is required of this level of assessment.

Evaluation should continue for each plume/sensitive receptor, until ALL worst-case plume/sensitive receptor sets can be expected to meet the screening threshold criteria for visible plume impairment.

Note: All VISCREEN modeling should be conducted with facility-wide PTE emission rates associated with the project. If the “plume” is indicated to be visible by Level III modeling, GA EPD approval may be sought to assess selected sources by source grouping (those of substantial difference in plume centerline height, for instance).

Ultimately, there may be circumstances and sensitive receptors which are found to potentially form plume blight. These situations should be discussed with GA EPD Data and Modeling Unit to ascertain whether the area, intensity, frequency, or duration of such occurrences are critical.