LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Cabot Ville Platte SO2 Characterization

Modeling Results

Air Planning

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1. Background

On June 2, 2010, EPA revised the primary ambient air quality standard for sulfur dioxide (SO2) by establishing a 1-hour standard at a level of 75 parts per billion (ppb). EPA also revoked the existing 24-hour and annual primary standards, but retained the 3-hour secondary standard. The form of the 1-hour standard is a 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations. Dispersion modeling can be used to demonstrate attainment of the 1-hour ambient air quality standard for SO2. The purpose of this document is to set forth procedures to be used Louisiana Department of Environmental Quality (LDEQ) in modeling efforts for attainment demonstration for SO2.

2. Area Background

2.1 Cabot Ville Platte

The Cabot Ville Platte facility is located in Evangeline Parish, Louisiana. Cabot is a carbon black facility. The population of Ville Platte is about 7,430. The area is mostly rural. SO2 emissions at the facility were 8,661.39 tons in 2014. The facility is currently under a consent decree that will dramatically reduce SO2 emissions in the future. Modeling for this area will only include emissions from the Ville Platte facility as Cabot is the major emitter in the area. Total emissions of SO2 in Evangeline Parish were 8,665.73 tons in 2014 of which 99.95% came from Cabot.

3. Model Selection

3.1 AERMOD

For area designations under the 1-hour SO2 primary NAAQS, AERMOD should be used unless use of an alternative model can be justified (Section 3.2, Appendix W). LDEQ will be using the most current version AERMOD for this demonstration.

AERMOD is appropriate because SO2 concentrations result from direct emissions from combustion sources so that concentrations are highest relatively close to sources and are much lower at greater distances due to dispersion. Given the source-oriented nature of this pollutant (see, e.g., 75 FR at 35570), dispersion

models are considered appropriate by EPA to predict the near-field concentrations of this pollutant.

The AERMOD modeling system includes several components. The regulatory components are:
AERMOD: the dispersion model (Version Date 15181)
AERMAP: the terrain processor for AERMOD (Version Date 11103)
AERMET: the meteorological data processor for AERMOD (Version Date 14134)
and non-regulatory components are:
BPIPPRIME: the building input processor (Version Date 04112)
AERMINUTE: the preprocessor to AERMET (Version Date 14237)
AERSURFACE: the surface characteristics processor for AERMET (Version Date 13016)
AERSCREEN: a recently released screening version of AERMOD (Version Date 14147)
For regulatory applications, the regulatory default option should be set which requires the use of terrain elevation data and stack-tip downwash, and assumes a 4-hour half-life for SO2 in urban areas.

3.2 Model Control Options

The regulatory default options were used in the model and as the area is rural, the urban option was not used. The modeling includes terrain elevation data, routine processing of averages when missing data or calm meteorological data occurs and stack-tip downwash calculations for the facility.

4. Modeling Domain

4.1 Sources Modeled

When considering other sources to include in the modeling, Appendix W states in Section 8.2.3.b that all sources expected to cause a significant concentration gradient in the vicinity of the source of interest should be explicitly modeled and that the number of such sources is expected to be small except in unusual cases. Other sources in the area, i.e. those not causing significant concentration gradients in the vicinity of the source of interest, should be included in the

modeling via monitored background concentrations. There were no major sources of SO2 surrounding Cabot Ville Platte. Through analysis of emissions data within 20 km of Cabot, it was decided to only model Cabot emissions. The remaining sources in the 20km radius in the area were captured by background concentrations. A map of the 20 km radius is included in Appendix A.

4.2 Receptor Grid

The domain is centered on the Cabot facility and extends 10km in each direction to result in a 20 km grid.

Receptors were placed at 100m spacing along the fenceline. Receptors were also placed with 100 m spacing extending 2km from the fence line of the facilities; spacing will be 500 m from 2-5km; and 1000 m interval from 5 to 10 km.

5. Emissions Inputs

Consistent with the SO2 modeling guidance and regulatory modeling for other programs (Appendix W, Section 8.1), dispersion modeling was based on the use of actual hourly emissions. Intermittent sources were omitted, such as emergency equipment operated less than 100 hours and other small sources.

The spreadsheet with the building and fenceline receptors and emission inventory of sources and their emissions will be made available upon request.

6. Meteorological data

3 years of meteorological data from the Lake Charles Airport were used for both surface and upper air. The years used were 2013-2015.

AERMINUTE and AERMET, were used for processing 1-minute wind data. Use of the 1-minute wind data addresses many of the issues with excess calm and missing data hours. The 1-minute data was processed for use in regulatory modeling.

7. Background concentrations

A Tier 1, 3-year design value of 19 ppb, which is based on the three-year average of the 99th percentile daily 1 hour maximum from the Baton Rouge monitor was used.

This was a very conservative value as the Baton Rouge monitor is influenced by a larger industry footprint than exists near the Cabot facility.

8. Model Outputs and Results

The modeling results indicate a maximum design value of 277.6µg/m^3 at UTM coordinate X 571696.32 meters and Y 3402478.74 meters. Contour plots are included in Appendix B.

LDEQ will make available electronic copies of all modeling files, including model input files, output files, met data with appropriate documentation, , and building downwash files.

9. References

LDEQ, 2006, Air Quality Modeling Procedures, August 2006

USEPA, 2005, Appendix W to Part 51 - Guideline on Air Quality Models, November 9, 2005

US EPA, 2010, Guidance Concerning the Implementation of the 1-hour SO2 NAAQS for the Prevention of Significant Deterioration Program, August 23, 2010

US EPA 2011, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard, March 1, 2011

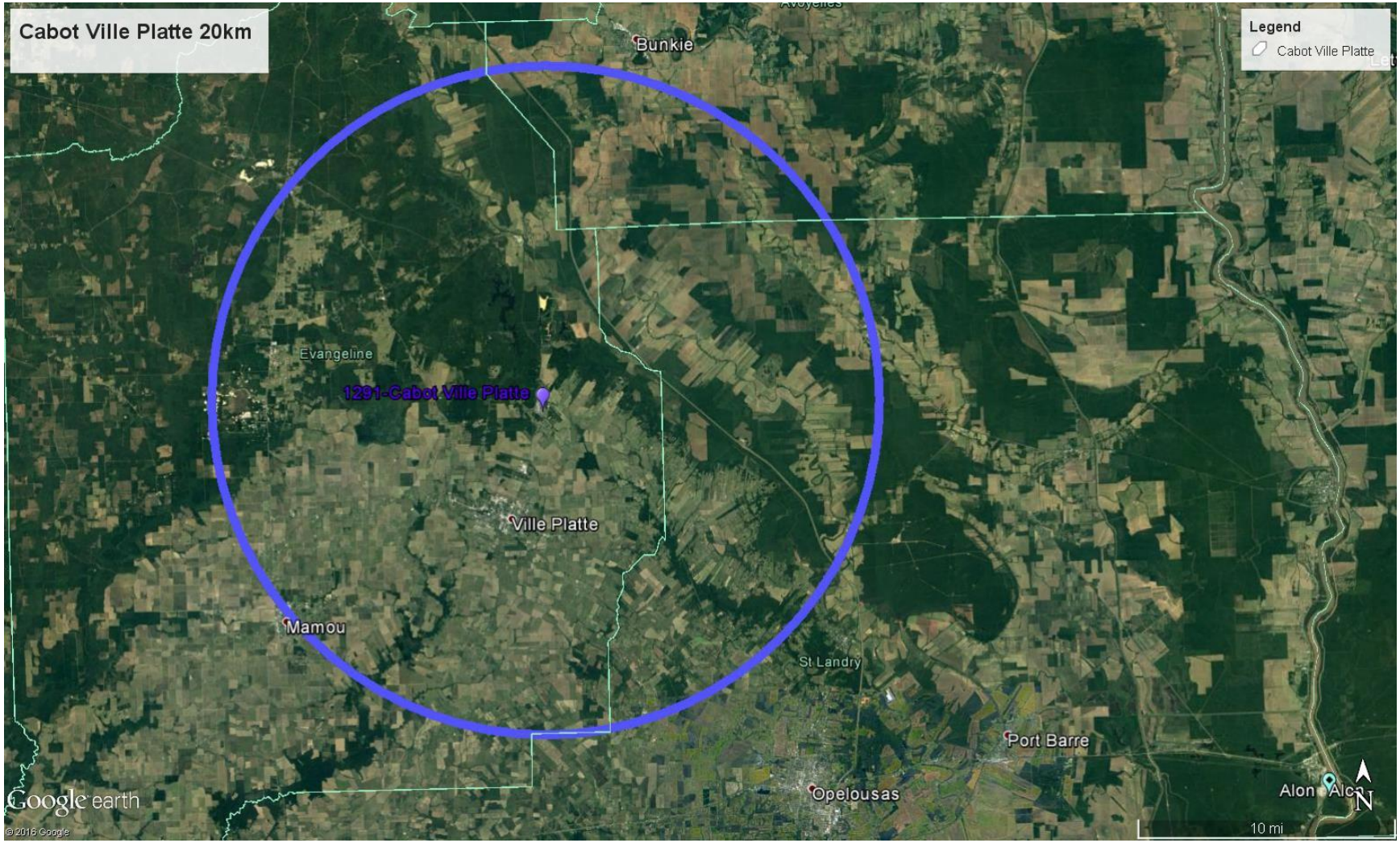
USEPA, 2011, Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards, March 24, 2011

USEPA, 2014, Guidance for 1-Hour SO2 Nonattainment Area SIP Submissions, April 24, 2014

Appendix A

Fig. 1. Facility Plot

Fig. 2. 20 km Surrounding Cabot Ville Platte



Appendix B

Fig. 3 Modeling Results Contour

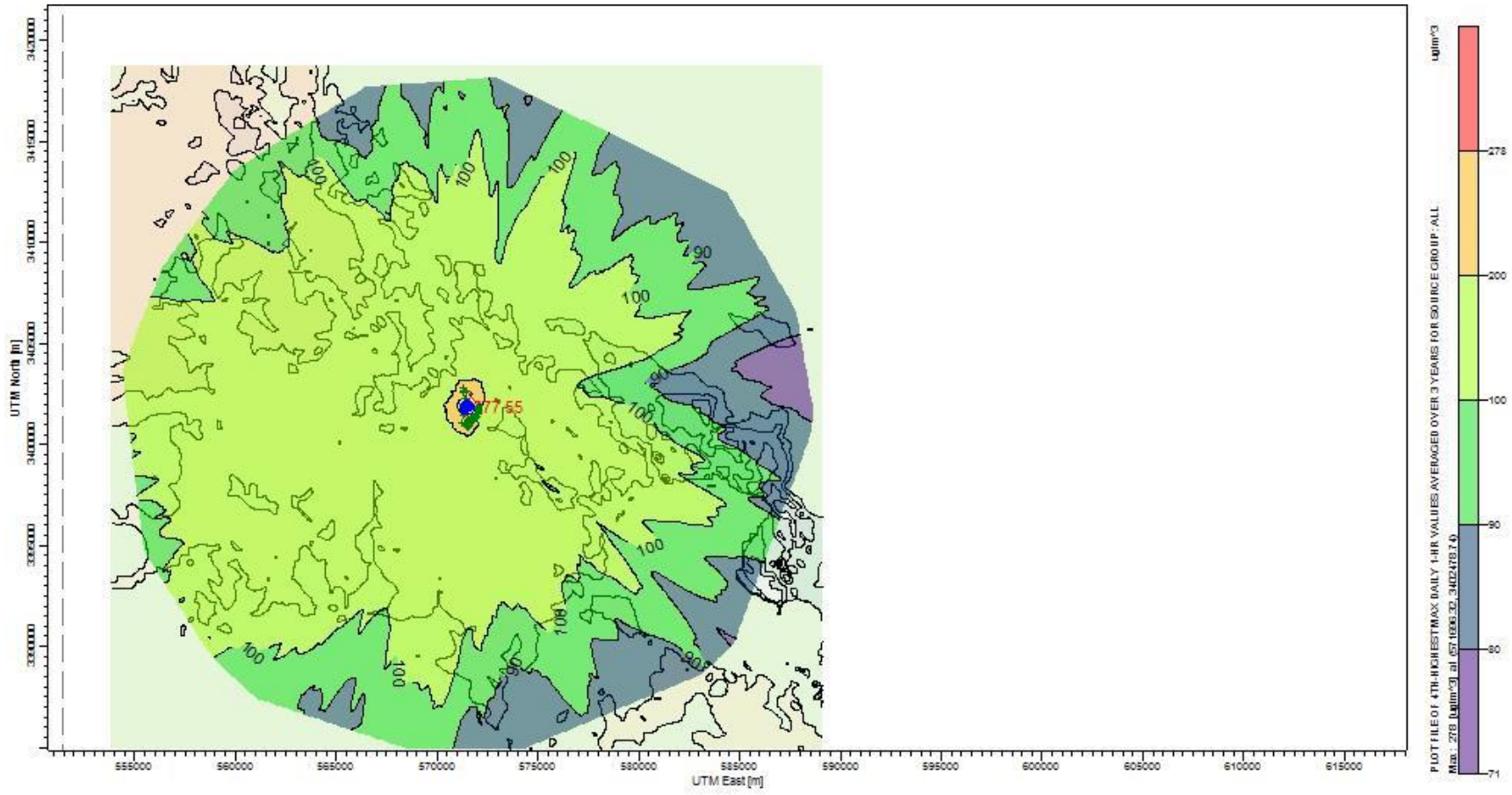


Fig. 4 Near-Field Impact Contour