

Ozone Data Processing

The ozone limiting method (OLM) was only applied to the cumulative modeling analyses for the multisource inventory (significant 1-hour NO₂ impacts were predicted for the facility based on the Ambient Ratio Method [ARM]). The hourly ozone file was meant to be included in the 1-hour cumulative modeling ZIP files CUMUL-NO2-1HR and CUMUL-NO2-1HR-START as shown in the README file, but was inadvertently not included. The missing o3fil.asc file is included in the attached ZIP files.

A complete description of the procedures used to fill in the missing ozone data was included on pages 6.2-2 through 6.2-4 of the PSD Permit Application, as follows:

A Tier 3 analysis was used to assess cumulative 1-hour NO₂ impacts due to the magnitude of modeled impacts for Plant 42 sources (i.e., the Lockheed-Martin and Northrup-Grumman multisource inventories). The Tier 3 analysis was based on the methodology described in the Modeling Protocol. The Tier 3 analysis calculated one-hour NO₂ concentrations for comparison with the NAAQS by using the ozone limiting method (OLM) for the cumulative impact analysis only. The OLM analysis used ambient hourly background ozone measured at the Lancaster monitoring station for the modeled years of 2010-2014. The Lancaster monitoring data has been shown above to be a conservative representation of the project site.

The ozone data were first processed to remove missing data. This was accomplished by interpolating ozone concentrations for periods with one to three missing hours (nightly calibrations usually result in 1-2 hours of missing data at the same time for all days). When substituting ozone concentrations from periods with up to 24 consecutive missing hours, the maximum ozone concentration from the hour before/after the missing period or the ozone concentrations from the same hour for the day before/after the missing period was used. The few remaining extended periods of missing data were replaced with the maximum ozone concentrations for the same hour for the four days before/after the missing hour.

There was extremely good ozone data recovery rates from the Lancaster monitoring site during the years modeled (2010-2014). There were 2,506 total hours of 1 or 2 consecutive missing hours that were interpolated, nearly all occurring each night around midnight due to USEPA-required daily zero/span/precision checks.

There were only 193 hours of missing data that occurred during consecutive hours for up to one day. These missing data represent 0.4% of the entire period. About three or four periods of 3-5 consecutive missing hours occurred each year, most likely due to site maintenance and QA activities. There were about four whole days of missing data (7/23/2011, 8/22-23/2012, 6/13-14/2013, and 12/14-15/2014), most likely due to instrument malfunctions/repairs. These missing data were replaced with the maximum value from the hour before/after the missing period or the same hour from the day before/after.

Finally, there was one extended period of 60 hours of consecutive missing data during 10/31-11/3/2014, representing 0.1% of the data period. These missing data were replaced with the maximum value from the same hour for the four days before or after the missing period.

Excluding the periods of 1-2 consecutive missing hours due most likely to USEPA-required site activities, missing data only totals 0.5% of the entire data period. The periods of missing data are flagged by "I", "R", and "M" flags, respectively, after each ozone reading in the hourly ozone input file read by AERMOD.

As noted above, the hourly ozone file itself flags all of the hours of corrected data ("I" for 1-2 hours of "I"nterpolated data, "R" for missing data up to 24 consecutive hours that were "R"eplaced with the maximum from the same hour for the day or the hour

before/after the missing period, and “M” for the one extended period of “Missing” data that was replaced with the maximum values from the same hour for the four days before/after the missing period).

The Lancaster 2010-2014 ozone data are processed with a series of FORTRAN programs:

- (1) O3WEC3c.FOR converts the raw data from ppm to ppb and adds hours missing in the original dataset (only hours with valid data are included in the raw data);
- (2) O3INT1.FOR fills in single missing hours by interpolation (“I”); and
- (3) O3INT2.FOR fills in two consecutive missing hours by interpolation (“I”).

The data are also processed in an EXCEL spreadsheet to:

- (4) Reformat the raw data from the agency into O3WEC3c.FOR format and to
- (5) Fill in the remaining missing data periods (“R” and “M”) as described above.

A ZIP file is included for the ozone data with the FORTRAN programs, input/output files, and EXCEL spreadsheet.

NO₂ Data Processing

Just as OLM was only used for the cumulative multi-source modeling analyses in the PSD Permit Application, so to was the 3-year average of the 3rd highest hourly background NO₂ value by season (in accordance with USEPA guidance documents). Before the 3-year average was computed, the NO₂ data were processed similar to the ozone data to remove missing data. This is described on page 6.2-4 of the PSD Permit Application, as follows:

Compliance with the 1-hour NAAQS for the cumulative modeling analyses also included using the 3rd highest seasonal NO₂ concentration for each hour from the Lancaster monitoring station, averaged over the three years, for determining the background NO₂ concentration, as outlined in USEPA guidance documents (March 1, 2011 USEPA memorandum “Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard”). The three year NO₂ background data was for the period of December 2010 through November 2013. This data period was used in order to keep seasonal periods consistent across years of data (December-February being contiguous). Also, calendar year 2014 was not used since there were a large number of extended periods of missing NO₂ data. Prior to calculating the seasonal background data by hour, missing periods of NO₂ data were replaced using similar procedures to those used for ozone.

The same programs and procedures were used for the Lancaster NO₂ data, except that an additional FORTRAN program O3MAX3Q2.FOR was required to calculate the 3rd highest concentration by season, which required additional tabs in the EXCEL spreadsheet for reformatting the data for input and then averaged for the three years. Also, Victorville NO₂ data were used to fill in an extended period of missing data in 2013 (8/28/2013 – 9/20/2013). A ZIP file is included for the NO₂ data with the additional FORTRAN program, input/output files (which were renamed before/after the runs from o3*. * to no2*. * to avoid confusion) and the EXCEL spreadsheet.