

Notes on the HF project 1-14-2013

By Mike Williams

Objective: To estimate and compare short-term concentrations of HF associated with emissions from the Intel's Rio Rancho facility to the Texas Commission on Environmental Quality (TCEQ) short-term Environmental Screening Level (ESL) for Hydrogen Fluoride (HF). The screening level was developed by the TCEQ based on studies by Lund in 1999 (see http://www.tceq.state.tx.us/assets/public/implementation/tox/dsd/final/october09/hydrogen_fluoride.pdf). The study involved exposures of 25 healthy, male volunteers to three levels of HF for an hour period. The lowest level was divided by a factor of 30 to adjust for the small sample size and the selected population, which was healthy males aged between 20 and 50. The screening level is used as a planning tool to decide if further studies or different options are required for a new facility. If modeled levels are below the screening level no further studies or options need to be used. The TCEQ ESL was one of the standards that was suggested by Kowalski of ATSDR when we asked what he thought would be appropriate for this work.

Approach: There are three phases to the project: (1) prepare the data and run the model for the simplest set of circumstances with the most readily available data, (2) examine the concentrations at the receptors (points at which concentrations are calculated) and revise the receptor locations to adequately define the highest concentrations, and (3) examine the data on HF emissions and revise the emission estimates to cover reasonably plausible emissions scenarios and rerun the AERMOD model. The AERMOD model is an EPA

recommended model used routinely in air quality estimation for impacts of industrial sources. It is most appropriate for the air quality problems near industrial sources, where reactions of pollutants with those from other sources are less important; it would not be used to address secondary pollutants that are not emitted by sources, but are instead produced by reactions in the atmosphere.

There are five steps in the first phase:

- (1) prepare meteorological inputs for the AERMOD model,
- (2) prepare receptor grids for the AERMOD model,
- (3) prepare the emission source characteristics inputs for the AERMOD model (in this case I mean the source location, stack gas velocity, stack diameter, stack height and stack gas temperature for each emission source rather than the HF emission rate) ,
- (4) choose the appropriate emission levels for each stack,
- (5) run the AERMOD model and report the 20 highest 1 hour averaged concentrations.

For step (1), I will use the meteorological data from the tower at the Intel facility, and upper air sounding data from the Albuquerque Sunport to prepare meteorological inputs for the years 2010, 2011, and 2012 for the AERMOD air dispersion model. In step 3, I will use information from the most recent permit applications to prepare inputs describing the source characteristics of the scrubber stacks. In step 4, I will use the median emissions from the measured emissions from Intel scrubbers that approximate the scrubbers now in operation to estimate median emissions and the standard deviations of the emissions.

In the second phase I will examine the spatial variation of the concentrations to see that nearby receptors closely approach the concentrations of the highest receptors. If there are significant variations in the concentrations at receptors nearest to the receptor with the highest concentration, I will reduce the spacing between receptors and rerun the AERMOD model.

In the third phase I will examine the standard deviations of measured scrubber emissions to see if the emissions can be expected to be significantly higher than the median emissions. If higher emissions are likely, I will plan techniques for estimating plausible combinations of scrubber emission levels that can be used to describe circumstances that would be likely (higher than 50% probability) to produce the highest concentrations in a ten year period with meteorology represented by the years 2010 through 2012. The plan and rationale for the approach will be presented to the CEWG before the third phase is begun.

Once the highest plausible concentrations (one-hour average) have been estimated, they will be compared to the TCEQ ESL (22 parts per billion) expressed in micrograms per cubic meter at the altitude of the Intel site. (see http://www.tceq.state.tx.us/assets/public/implementation/tox/dsd/final/october09/hydrogen_fluoride.pdf). At the altitude of Intel and a temperature of 20 degrees centigrade the equivalent of 22 parts per billion is about 15 micrograms per cubic meter. If the final estimate is above this value, we will consider what further measures or studies are

required. Should the estimated concentrations be less than this value, we will turn our attention to other problems.