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AIR QUALITY DISPERSION MODELING ANALYSIS OF C8 EMISSIONS

DuPont Fayetteville, North Carolina Facility

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1. Introduction

The DuPont Fayetteville plant conducted air dispersion modeling of ammonium perfluorooctanoate (C8) emissions from its facility. The following sections describe the dispersion modeling methodology and the results of the analysis. All air quality impact analyses have been conducted in accordance with approved dispersion modeling techniques detailed in the U. S. EPA's "Guideline on Air Quality Models", which is codified as Appendix W to 40 CFR Part 51.

2. Emissions Inventory

The following is the stack information that was assembled in order to conduct the air quality modeling:

Location: 697638 meters E, 3857918 meters N
Stack height: 85 ft
Stack exit temperature: 70 deg F
Flow rate: 11,500 ACFM
Stack diameter: 1.58 ft
C8 emission rate: 0.00224 g/s = 156 lb/yr = 78 lb/yr PFOA
78 lb/yr PFOA acid fluoride

3. Meteorological Data

The nearest location that takes hourly meteorological observations is Pope Air Force Base in Fayetteville, NC. Meteorological observations at the airport are considered representative of the site and of conditions affecting transport and dispersion of stack emissions. Therefore, five years of hourly surface observations from the observation station at Pope Air Force Base were used in the refined air quality dispersion analysis.

Hourly meteorological data for the period 1995-1999 was used in this study. Concurrent twice-daily upper air data from the upper air observation station located in Greensboro, NC was used along with Pope surface temperatures to obtain hourly mixing depths.

4. Model Selection

The area surrounding the Fayetteville plant is primarily non-urban. The U. S. EPA procedures classify land use within 3 kilometers of the site by the Auer method. Review of U. S. Geological Survey (USGS) maps, aerial photographs, and site visits clearly indicated that the area is well over 50% non-urban. The terrain immediately surrounding the plant can be considered as gently rolling, with terrain elevations remaining below stack top.

With this in mind, we used the Industrial Source Complex Short Term Model (ISCST3) as the primary model to estimate long-term pollutant concentrations. ISCST3 is a steady-state Gaussian model recommended by the U.S. EPA, and is included in the "Guidelines on Air Quality Models" for modeling of pollutant emissions from industrial-type sources subject to significant building downwash. Refined ISCST3 modeling was conducted using five years

of sequential hourly meteorology from the observation facility located at Pope Air Force Base as described above.

5. Receptor Selection

A receptor grid with 100-meter spacing extending out to a minimum distance of 2 km from the plant property line was used. Receptors were also placed on the property line at 25 meter intervals. No receptors were placed inside the plant property line. The receptor grid can be seen in Figure 1. The model was run with the elevated terrain height option. Terrain elevations were imported from digital elevation map (DEM) files provided by the USGS.

A Cartesian receptor grid of this type is considerably more dense than recommended by the U.S. EPA in the Guidelines on Air Quality Models (U.S. EPA, 1998) for modeling a facility of this type.

6. Modeling Procedures

The most recent version of ISCST3 (version 00101) was used in the air quality dispersion modeling of all receptors. All model options were set to the U.S. EPA regulatory default version of ISCST3. The model was run in the rural mode since the land area in the immediate vicinity of the Fayetteville plant is more than 50% rural. Any effects of aerodynamic downwash caused by structures adjacent to the modeled stacks were included in the ISCST3 modeling analysis. Air quality dispersion modeling was conducted on an hour-by-hour basis using the five years of meteorological data described above. The C8 modeling results were summarized for the annual averaging period.

7. Results

The dispersion modeling results are presented in Table 1. As can be seen in the table, the maximum predicted annual average C8 concentration is 0.00141 ug/m^3. This concentration occurs at the Fayetteville plant property line. The results are presented graphically in Figure 2.

Table 1

Maximum Predicted C8 Concentrations

Year	Maximum Annual Prediction	Location
1995	0.00115 ug/m^3	696207E, 3856312N
1996	0.00140 ug/m^3	698376E, 3858634N
1997	0.00141 ug/m^3	698386E, 3858611N
1998	0.00120 ug/m^3	698376E, 3858634N
1999	0.00126 ug/m^3	698386E, 3858611N

Figure 1

Receptor Grid

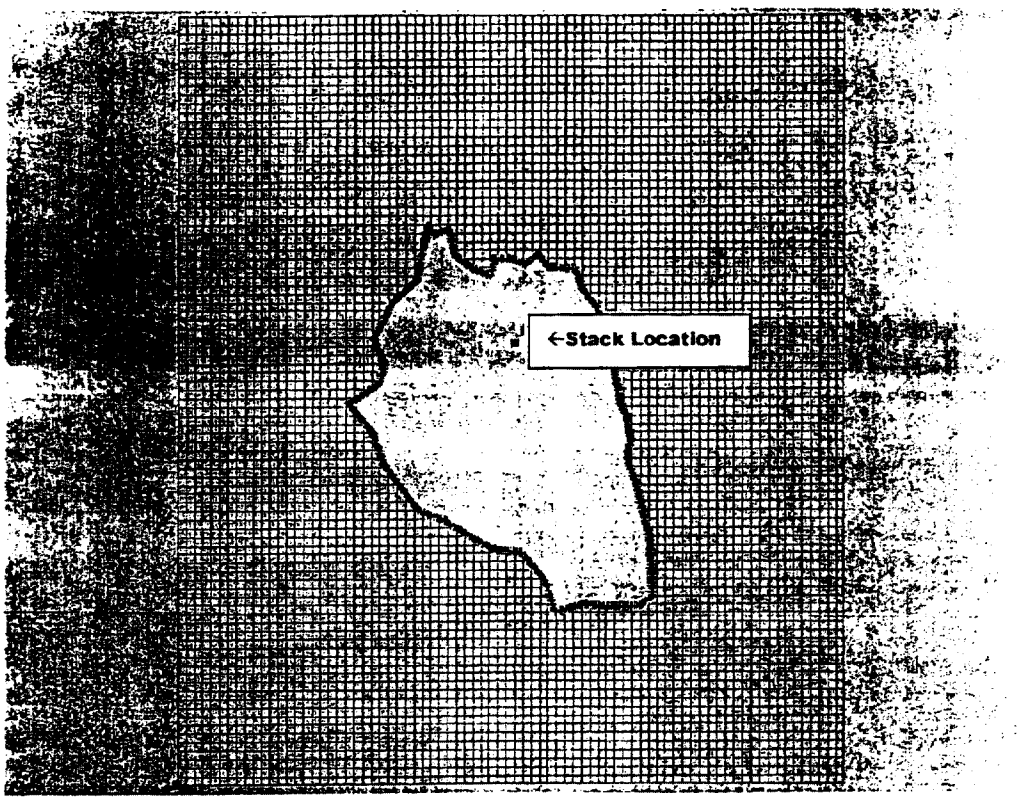
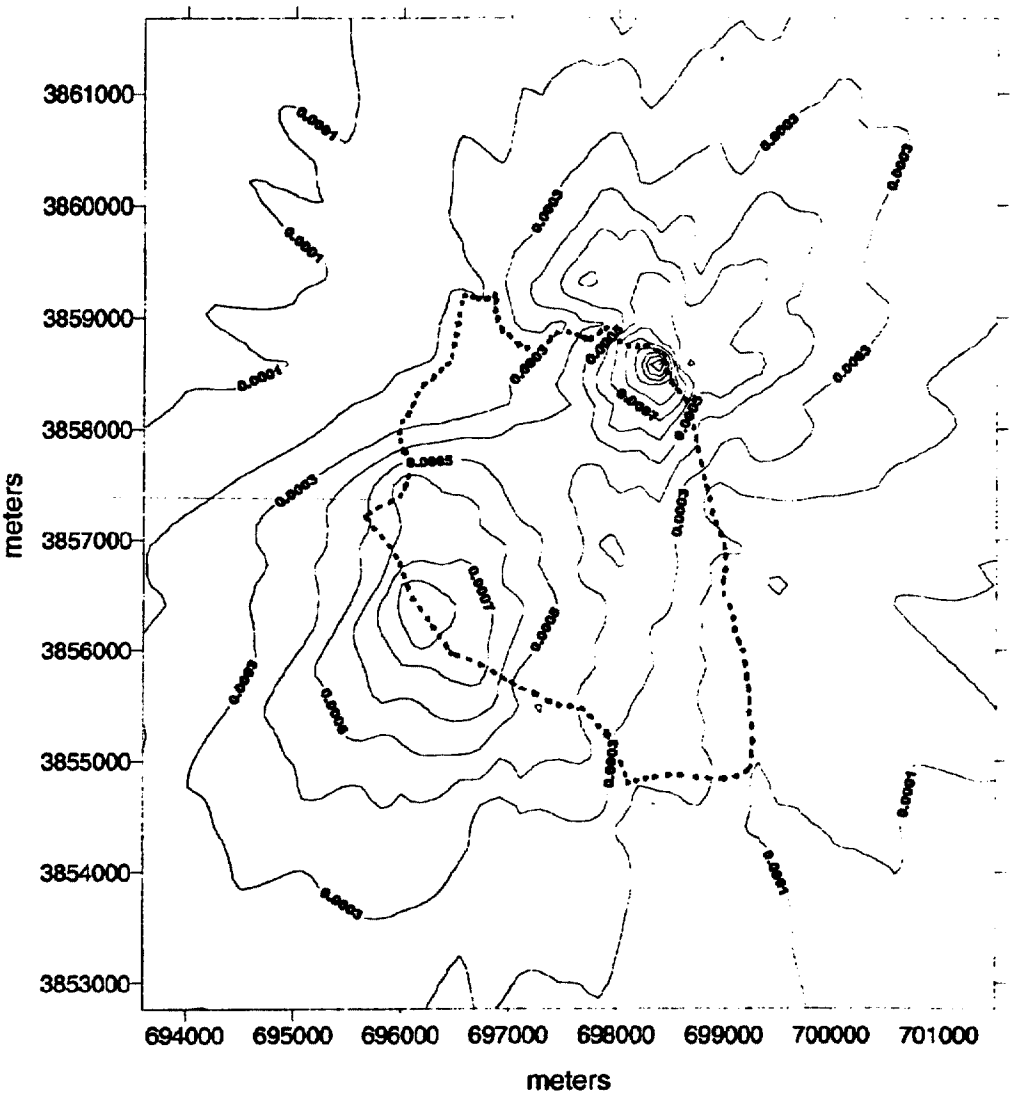


Figure 2

Fayetteville C8 - Annual Average
1997 Met Data



Contour Interval 0.0001 ug/m3

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