Attachment 2

46. Section 5.4.4.1.3. pp. 5.4-12 thru 5.4-13

Provide the hourly meteorological data for the period from January 1, 1987 through December 31, 1996 that was collected from the H-area meteorological tower. Include the standard deviation of the horizontal wind direction fluctuations (sigma-theta), derived stability class, wind direction, wind speed and accumulated precipitation for each hour. Include a description of how stability classes are derived using sigma-a and sigma-theta.

Section 5.4.3.2.B.v of the SRP recommends that the applicant provide a scientifically correct and reasonable estimate of the consequences from analyzed accidents. Several radiological accident consequence models that NRC may use to verify the applicant's dose calculations require hourly measurements of meteorological data. Therefore, the NRC staff must have the actual hourly data, rather than statistical summaries, to verify the correctness and reasonableness of the applicant's estimates.

Response:

All downwind transport wind direction, wind speed, stability class, and sigma-theta data were extracted from two separate five-year data bases (1987 to 1991 and 1992 to 1996), which contain a complete sequential record of quality-assured SRS hourly meteorological data monitored on the H-Area meteorological tower.

All values of an empirical atmospheric turbulence intensity parameter that can be related to a Pasquill stability category are automatically derived by a microprocessor on the meteorological tower. Stability classes were based on the measured values of the standard deviation of fluctuation about the mean horizontal wind direction.

Stability categories A through G were assigned according to the range of magnitudes of sigma-theta as summarized in Table 1. Hourly precipitation data were obtained from records collected by the National Weather Service Office in Augusta, Georgia (Bush Field) and published by the National Climate Data Center (NCDC). All values of mixing height were calculated from data sets of twice daily mixing height supplied by NCDC. The daily values were determined by NCDC from a standard algorithm that used radiosonde ascents for Athens, Georgia (January 1987 through August 1994) and Atlanta, Georgia (September 1994 through December 1996), and concurrent surface data from Bush Field as input data.

The attached Meteorological Data File (on CD) contains ten files that contain hourly meteorological data used as input to the MELCOR Accident Consequence Code System (i.e., MACCS2). These files were extracted from the SRS database and contain a one-year data set for each of the years 1987 through 1996. The MACCS2 data sets consist of hourly-averaged values of plume transport sector (22.5-degree sector toward which the wind blows), wind speed (tenths of meters per second), Pasquill atmospheric stability category (1-7), and precipitation (hundredths of inches). In addition, the last line of each file gives seasonally-averaged values of morning and afternoon mixing height. Wind transport sectors in the MACCS2 files were assigned according to the transport direction ranges given in Table 2. The MACCS2 file format is described in Table 3.

The attached Meteorological Data File (on CD) contains ten files used as input into the ARCON96 computer code, one for each of the calendar years 1987 through 1996. Each file consists of a five-character station identifier (SRSOH), Julian day, hour (local time), wind direction (i.e., the direction the wind blows from) in degrees azimuth, wind speed in meters per second, and Pasquill stability classes (1-7 or A-G). All data were extracted from two separate five-year databases (1987 to 1991 and 1992 to 1996), which contain a complete sequential record of quality-assured hourly data. ARCON96 file format is described in Table 4.

The attached Meteorological Data File (on CD) contains eight files of hourly meteorological data used as input to the Environmental Protection Agency's Industrial Source Complex (ISC) atmospheric dispersion model. These files contain a one-year data set for each of the years 1989 through 1996. The ISC data sets consist of hourly values of transport direction (i.e., degrees toward which the wind blows), wind speed (meters per second), mixing height (meters), ambient temperature (degrees Kelvin), and Pasquill atmospheric stability category. The ISC file format is described in Table 5.

Action:

None

Table 1. Determination of Stability Class from Sigma-Theta Measurements

Sigma-theta* Range (degrees)	Pasquill Stability Category	Stability Identifier
Greater than 22.4	A	1
17.5-22.4	B	2
12.5-17.4	C	3
7.5-12.4	D	4
3.8-7.4	E	5
2.1-3.7	F	6
Less than 2.1	G	7

* Sigma-theta range assignments are based on criteria contained in ANSI/ANS-3.11 (2000).

Table 2. Determination of Downwind Transport Direction Sector*

Downwind Transport Direction Range (degrees)	Downwind Transport Sector	Sector Identifier
348.75-11.25	North	1
11.25-33.75	North-northeast	2
33.75-56.25	Northeast	3
56.25-78.75	East-northeast	4
78.75-101.25	East	5
101.25-123.75	East-southeast	6
123.75-146.25	Southeast	7
146.25-168.75	East-southeast	8
168.75-191.25	South	9
191.25-213.75	South-southwest	10
213.75-236.25	Southwest	11
236.25-258.75	West-southwest	12
258.75-281.25	West	13
281.25-303.75	West-northwest	14
303.75-326.25	Northwest	15
326.25-348.75	North-northwest	16

* downwind transport direction is the direction the wind is blowing toward.

Table 3. Format of the MACCS Meteorological Data Files

Column	Format	Description
2-4	I3	Julian day of the year
6-7	I2	Hour of the Day (GMT)
9-10	I2	Transport direction sector (direction wind blows toward)
11-13	I3	Wind speed (10ths of meters/sec)
14	I3	Stability Class (coded 1-7)
15-17	I3	Total precipitation (100ths of inches)

Table 4. Format of the ARCON96 Meteorological Data Files

Column	Format	Description
3-7	A5	Location identifier (SRSOH)
11-13	I3	Julian day of the year
14-15	I2	Hour of the Day (local time)
18-20	I3	Wind direction (degrees, direction from which the wind blows)
21-24	I4	Wind speed (nearest tenth of a reporting unit without the decimal, i.e., a wind speed of 5.3 m/s would be entered as 53)
26	I2	Stability class (coded 1 - 7)

Table 5. Format of the ISC Meteorological Data Files

Column	Format	Description
7-9	I3	Julian day of the year
11-12	I2	Hour of the Day (Greenwich Mean Time)
18-25	F8.0	Transport direction (degrees azimuth)
26-33	F8.2	Wind speed (meters/sec)
34-41	F8.0	Mixing height (meters)
42-49	F8.0	Temperature (Degrees Kelvin)
50-57	I8	Stability Class (coded 1-7)

Attachment 46
Additional Meteorological Data

Attached Meteorological Data File (on CD)