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RECIP.NAME RECIPIENT AFFILIATION
DENTON,H.R. Office of Nuclear Reactor Regulation, Director

SUBJECT: Forwards description of Class A radiation dose assessment model,per util 830415 ltr.Meteorological info & dose assessment sys Class A (ACRISO) program will be primary dose assessment model in emergency operations facility.

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September 27, 1983
AEP:NRC:0773B

Donald C. Cook Nuclear Plant Unit Nos. 1 and 2
Docket Nos. 50-315 and 50-316
License Nos. DPR-58 and DPR-74
RADIATION DOSE ASSESSMENT MODEL

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Mr. Denton:

This letter provides a description of our Class A dose assessment capability as referenced in our letter AEP:NRC:0773, dated April 15, 1983. In that letter we stated that we would provide you with a description of the upgraded dose assessment model.

Our intent is to use the Meteorological Information and Dose Assessment System (MIDAS) Class A model (ACRISO) program as the primary dose assessment model in the Emergency Operations Facility (EOF). We issued a contract to Pickard, Lowe and Garrick in November, 1982 to upgrade their ACRISO program to incorporate in-plant radiation monitor and accident default information. This upgrade was completed as of September 1, 1983. Attachment 1 to this letter is the description of the upgraded ACRISO dose assessment model.

This letter has been prepared following Corporate Procedures which incorporate a reasonable set of controls to insure its accuracy and completeness prior to signature by the undersigned.

Very truly yours,

M. P. Alexich
Vice President

MPA/edg
cc: John E. Dolan
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Attachment 1 to AEP:NRC:0773B
Description of D. C. Cook Class A
Radiation Dose Assessment Model

The Meteorological Information and Dose Assessment System (MIDAS) in use at the Cook Plant is designed to meet the requirements related to meteorological data collection, atmospheric dispersion and dose calculations for emergencies in NUREG-0737, Supplement 1 and NUREG-0654. MIDAS is a computer based system with near-real-time capabilities. The MIDAS Class A model (ACRISO) utilizes the last 15-minute averages of meteorological data collected from the site tower as input to a straight-line Gaussian plume dispersion model. Characteristics of the Cook Plant including release point information, accident scenarios, site boundary distances, terrain height and population data are stored in computer files for use in the calculations. Following is a description of the installed system and its capabilities.

HARDWARE

The Cook Plant meteorological tower is equipped with redundant instrumentation at two levels to collect wind speed, direction, temperature, delta temperature, dew point and precipitation data. Table 1 contains a list of all primary and secondary sensors. All parameters are collected on a Sperry-Univac V77-200 mini-computer located on site. This computer samples each parameter's data every 10 seconds then computes and stores 15-minute averages. The 10-second samples and 15-minute averages are processed through more than 50 quality checks to eliminate bad data and identify potential problems. The site computer (Data Recording Terminal [DRT]) stores the meteorological data for up to four hours at which time it is telephoned automatically by a central processing computer located at Digital Graphics, Inc. in Rockville, Maryland. The site DRT then transmits all 15-minute averages (usually 16 collected over four hours) back to the process computer. This data exchange occurs every

four hours 7 days a week. If due to communications problems or computer downtime the call cannot be completed, the site DRT can store data for up to about 4 days. The extra day(s) would then be transmitted back to the central computer during the first completed call.

Once the data are transmitted back to the central computer, they are available for use in dose calculations. In conjunction with the ACRISO program, the time of last meteorological data collection is checked versus the current time. If the meteorological data are more than 15 minutes old, the site DRT is automatically called and all meteorological data including the last 15-minute sample are transmitted back to the process computer for use in ACRISO. As a backup, if the site DRT is not available, meteorological data are available on strip charts. These data can be entered manually into the ACRISO program for use in dose calculations.

SOFTWARE AND MAN-MACHINE INTERFACE

MIDAS is menu-driven and can be configured to prompt only for mandatory information necessary to complete the assessment being made. Operators of the system are trained in problems which range from those that require only a few operator actions to those that enable the operator to complete a more thorough assessment after more detailed knowledge of actual conditions are known. The normal mode of operation relies on automatic interrogation of the meteorological tower readings, however, meteorological data can also be entered manually. Meteorological data for drill scenarios can be entered in data files for use during accident response simulations. This feature enables the operator to use the system in the same way that it would be used during an accident.

Several options are available for entering the radiological effluent source term. At the Cook Plant, these entries are made manually and include; (1) effluent monitor readings, (2) isotopic mix, (3) default release by accident type and (4) direct entry of release rate by

isotope. Default accident releases, both total curies and isotopic mix, are preset based on analyses similar to those found in the FSAR. If the plant release status is uncertain, the user can choose one of the accident types to best suit the situation (i.e., steamline break, tube rupture, LOCA, etc.). If, however, plant effluent monitor readings are available, they can be used directly and the isotopic mix would be based on the appropriate one of the ten accident types selected. Capability is provided for entry of recent effluent grab samples instead of using a preset isotopic mix.

The operator is prompted for time-of-trip, start of release and release duration which are used to determine the time-of-plume-arrival and projected doses for assessing recommended emergency actions in conformance with EPA's Protective Action Guides.

RESULTS

Relative concentrations, X/Q and four dose rate calculations are made including; (1) gamma (whole body), (2) beta (skin), (3) thyroid inhalation, and (4) thyroid via milk consumption. Calculations are performed to any operator selected distance up to 50 miles. All releases at the Cook Plant are considered to be ground level releases (although the capability for making elevated and "mixed mode" calculations is available in the system). Therefore, the highest doses will always occur at the site boundary. Both semi-infinite plume gamma and finite plume gamma dose calculations are available to the user. Each dose calculation run is followed by dose isopleths plotted on a site map using a Tektronix 4014 graphics CRT out to the specified distance. Printed information includes meteorological data used, peak values, Emergency Action Level (EAL) and doses at the site boundary and distances of 2, 5 and 10 miles. While the isopleths are being displayed, the operator can print dose rates at points-of-interest using the cursor on the terminal. This feature can be used to compare predictions with mobile monitoring team measurements.

After the dose isopleths are complete, the program plots and prints projected dose information. Integrated doses (assuming steady-state meteorological and source term conditions) for approximately 1 hour, 2 hours, 4 hours and 8 hours are plotted. Both gamma (whole body) and thyroid doses are provided in plotted form out to the maximum distance requested. The primary function of this feature is to determine appropriate protective actions per EPA's PAG's as a function of distance. Plume arrival times are indicated on the plot.

USE OF OTHER DATA SOURCES

When meteorological data are not available from the Cook meteorological tower, meteorological data can be manually entered. In addition to entering the most current data, forecast data from the National Weather Service or a forecast service for the site area can also be entered. If forecast data are available, plume trajectory analyses can be run which utilize a plume segment model to project doses and determine plume location in a changing wind field.

Table 1

Cook Plant Meteorological Equipment

Sensor Name	Range	Accuracy
Wind speed 50ft A*	0-100mph	0.15mph or 1% threshold 0.75mph
Wind speed 50ft B+	0-100mph	0.15mph or 1% threshold 0.75mph
Wind speed 150ft A	0-100mph	0.15mph or 1% threshold 0.75mph
Wind speed 150ft B	0-100mph	0.15mph or 1% threshold 0.75mph
Wind direction 50ft A*	0-540 degrees	±2° threshold 0.93mph
Wind direction 50ft B+	0-540 degrees	±2° threshold 0.93mph
Wind direction 150ft A	0-540 degrees	±2° threshold 0.93mph
Wind direction 150ft B	0-540 degrees	±2° threshold 0.93mph
Delta temperature 180-30ft A*	-10 to 10°C	±0.1°C
Delta temperature 180-30ft B+	-10 to 10°C	±0.1°C
Temperature 30ft A	-35 to 50°C	±0.1°C
Temperature 30ft B	-35 to 50°C	±0.1°C
Temperature 180ft A	-35 to 50°C	±0.1°C
Temperature 180ft B	-35 to 50°C	±0.1°C
Dew point temperature 30ft	-50 to 50°C	±0.5°C above 0°C
Precipitation (surface)	0 to 2.5 inches	1% to 1 in/hr, 4% to 2.95 in/hr

*Primary sensor in dose calculations

+Secondary sensor in dose calculations

COOK PLANT MIDAS SYSTEM CONFIGURATION