

METEOROLOGICAL DATA VALIDATION AND PROCESSING
FOR NUCLEAR POWER STATIONS

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1. INTRODUCTION

Duke Power Company, based in Charlotte, NC, operates and maintains meteorological data collection systems at its three Nuclear Power Stations (Catawba, McGuire, and Oconee) within the Carolinas. These meteorological systems are in compliance with the Nuclear Regulatory Commission (NRC) guidelines including data availability, accuracy, and 90% data recovery. The meteorological parameters measured at Duke stations include 10 meter and high level wind speed, wind direction, and air temperature. These are viewed as primary parameters. The high level is representative of the reactor unit's vent release height. Precipitation is measured as a secondary parameter. Dew point temperature data are also collected at the Catawba Nuclear Station, because it has cooling towers.

The meteorological data are collected for two purposes. First, real-time data are readily accessible for Emergency Preparedness via the station's process computers. These data are in the form of 15-minute running averages/totals (updated every 60 seconds). Second, validated data are retained in an hourly averaged Historical Database. The Historical Data are used for Offsite Gaseous Dose Calculations required by the NRC. An overview of the processes of data collection and validation used by Duke Power Company for Historical Data retention is provided below.

2. DATA VALIDATION AND PROCESSING

Meteorological information is transmitted via a multiplexed system, or hard-wired, from the field (tower-mounted) sensors to the Nuclear Power Station. The input signals are linked to strip chart recorders and the station process computer systems (OAC-Operator Aided Computer).

The OACs continuously monitor the meteorological input signals (once per five seconds) and temporarily store the data for calculation of 15-minute running averages/totals. The strip chart data are used as a backup to the computer data, while also providing a continuous visual trace.

The 15-minute averaged data are retained in the station OACs for 48 hours and transferred to a temporary storage computer (VAX) on a daily basis. This automatic process is initiated by the VAX computer after twelve o'clock midnight to transfer the 24 hours of data from the previous day. The Data Coordinator informs the Program Scientist of any problems with the meteorological data transfer.

The Data Coordinator retrieves a copy of the data from the temporary storage computer for validation and editing purposes. A data screening report is generated to flag suspect data readings based upon prevailing meteorological standards such as high and low limits, rates of change and comparisons between data points. Daily, the Program Scientist reviews the 15-minute averaged data and data screening reports for any problems. He/she is familiar with all servicing, repair, and calibration procedures for the meteorological monitoring equipment.

Weekly, the Program Scientist returns the validated data reports to the Data Coordinator. As required, the Data Coordinator edits the data on the temporary storage computer.

In the event of missing data or invalid readings, data from the strip charts are manually reduced. These manual data averages are recorded on coding forms for filing and are manually entered into the VAX computer to supplement the meteorological data file. All manually entered data are checked for errors. The data charts and coding forms are retained in document files for a minimum of five years.

The 15-minute data records are converted to hourly averages/totals on the VAX computer every three months. A minimum of one 15-minute average for an hour is acceptable as an hourly average. The data are once again reviewed by the Program Scientist and also by the Company Meteorologist for validity. Unusual data patterns or trends are sometimes more readily recognized in hourly averages.

The Data Coordinator then corrects any errors noted by the Program Scientist or Meteorologist. Once all corrections are verified, the hourly data values are transferred to the Company's mainframe computer (IBM system). From there, the hourly averaged data are archived to magnetic tape. This process occurs within 45 days from the end of each quarter. The data are accessible on the mainframe computer for use in modeling, dose assessment calculations, or other analyses.

If necessary, the archived data can be changed. Altering archived data requires that the data be un-archived, corrected, and re-archived. This process is rarely required due to the intense data review and validation process prior to data archiving. The Program Scientist and the Meteorologist must authorize any changes to the Historical Database. The Data Coordinator would then edit the archived data and document all changes.

3. SUMMARY

Meteorological data collection at a Nuclear Power Station is required for Emergency Preparedness and for the creation of a site specific Historical Database. This database is maintained for the life of the station. At Duke Power Company the station computers (OACs) are utilized for initial data collection. Fifteen-minute averaged data from the preceding 24-hour period are transferred from the OAC computer to the VAX computer after midnight. Data screening reports are generated to flag suspect data and are reviewed daily by the Program Scientist. Strip chart data are useful in the validation process. Database corrections are made weekly and once per quarter, before the hourly averaged data are computed. These hourly averages are again reviewed by the Program Scientist and Meteorologist. After final corrections are made, the data are transferred to the IBM mainframe computer for archiving onto magnetic tape.

REFERENCES

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