

Millstone Station Meteorological Monitoring Program Manual

R. Brad Harvey

Duke Engineering & Services

Gary W. Johnson

John Leavitt

Millstone Station

Introduction

Millstone Station began implementing a new administrative program in 1999 that reorganized the existing station administrative processes and programs into a set of Program Manuals. These Program Manuals are intended to document the regulatory requirements, licensing commitments, and management expectations for each administrative program as well as identify the procedures and processes used to implement and fulfill the various program requirements. One of the first Program Manuals implemented under this new administrative program involved the Millstone Station onsite Meteorological Monitoring Program. The intent of this paper is to describe the implementation of the Millstone Station Meteorological Monitoring Program Manual.

Objective

The Millstone Station Meteorological Monitoring Program Manual is intended to identify the various elements of the Millstone's Meteorological Monitoring Program and provide objectives and minimum requirements for implementing procedures and guidelines to ensure that the program is controlled and conducted in accordance with applicable regulatory requirements, licensing commitments, Northeast Utilities' Environmental Policies, and the ISO 14001 Standards for Environmental Management Systems.

The objectives of the Meteorological Monitoring Program are defined in the Program Manual as follows:

- Support station operating needs for onsite meteorological information,
- Ensure that sufficient meteorological data are available for estimating potential radioactive doses to the public as a result of either routine or accidental releases of radioactive materials to the environment, and
- Maintain the station's licensing basis.

Scope

The following aspects of the Meteorological Monitoring Program are covered by the Program Manual:

- Instrumentation configuration and performance requirements,
- Instrumentation calibration and maintenance requirements,
- Data compilation, display, reporting, and archiving requirements,

- Instrument shelter requirements, and
- Tower FAA lighting requirements.

The Program Manual is applicable to all personnel within the Northeast Utilities organization (both onsite and offsite) who provide support activities for the Meteorological Monitoring Program.

Program Overview

Functional descriptions of the Meteorological Monitoring Program's major systems (which include a 450-ft primary tower and a 33-ft backup mast) are provided. These functional descriptions describe the location, measurements taken, and data recording and display for each system. A schematic of the meteorological data link configuration showing the location of all data readouts is also provided.

Responsibilities

The responsibilities of the various Northeast Utilities organizations that implement the Meteorological Monitoring Program are identified. Twelve different individuals and/or organizations that provide support to the monitoring program are listed, including the following:

- Environmental Services Group, Millstone: provides end-to-end sponsorship and programmatic management of the monitoring program.
- Environmental Services Group, Berlin: collects, edits, validates, stores, and summarizes the resulting database.
- Design Engineering Group: manages design modifications.
- Process Computers Group: develops software for interfacing with the plant process computers, including data processing and display for the control rooms.
- Technical Services Group: maintains data recording hardware.
- Operations Group: performs daily channel checks/calibrations required by Technical Specifications.
- Instrumentation & Control Group: manages the calibration and maintenance of the instrumentation.
- Nuclear Oversight Group: develops and implements routine audits and surveillances to assess the adequacy of the monitoring program, including compliance activities, procedures, and program documentation.

Source Documents

A list of source (or reference) documents that contains the requirements that should be addressed to ensure the objectives of the Meteorological Monitoring Program are met is provided. This list of source documents includes the regulations, commitments, and management policies and expectations required to be satisfied by the implementation of the monitoring program. Included in this list are NRC appraisal and inspection reports, licensing event reports, and NRC and licensee letters that were applicable to the Meteorological Monitoring Program.

This list of source documents also includes industry guidelines. Although these guidelines are not considered to be requirements, they are included in the Program Manual because they are perceived to be providing a significant improvement or enhancement to the program's implementation.

A synopsis of the list of source documents is shown in Figure 1.

Key Elements

A list of over 250 program requirements (or key elements) was identified from the source documents listed in Figure 1. Each of these program requirements was classified as an administrative, design, maintenance, reporting, or surveillance requirement. An example list of these key elements is provided in Figure 2.

A database was then compiled documenting the procedures and processes that implement each requirement. The intent of this database was to document how every program requirement identified in Program Manual was implemented. The station corrective action program was employed whenever it was determined that a requirement was not being implemented.

The development of basis documents for all station procedures was also implemented as part of an upgrade of station administrative processes and programs. These basis documents included references to specific Program Manual elements whenever a procedure was being used to implement a Program Manual requirement. This was intended to prevent subsequent procedure updates from unintentionally deleting a Program Manual requirement.

Results

The resulting Program Manual and accompanying database took approximately 6 staff months to complete. This effort included an extensive key word search of the station's licensing database (incoming and outgoing letters to the NRC, appraisal and inspection item closeouts, licensing event reports, etc.) to identify the station's licensing basis. This effort also included reviewing existing plant procedures as well as initiating new procedures and revising existing procedures as necessary to ensure all identified requirements were being implemented. Maintaining the Program Manual and the accompanying database current to reflect such items as changes in the licensing basis (e.g., moving TS items into the TRM) and procedure revisions represents an ongoing effort.

Some of the corrective actions that resulted from implementing the Program Manual included the following:

- Ensuring calibration procedures exist for all primary tower and backup mast channels
- Enhancing existing calibration procedures (e.g., include all channel readouts in system calibrations, test wind direction sensors for starting threshold, etc).
- Developing procedures for routine (weekly) inspections of the primary tower and backup mast instrumentation as required by the FSAR.
- Ensuring all procedures related to meteorological monitoring received station management approval in accordance with TS requirements.
- Updating the FSAR to reflect the meteorological monitoring program's as-built configuration and actual maintenance activities.
- Controlling vegetation growth in the vicinity of both the primary tower and backup mast.

- Documenting the applicable aircraft warning marking and lighting requirements for the 450-ft primary tower.

Conclusion

The implementation of the Millstone Station Meteorological Program Manual is an effective way to ensure that all regulatory commitments and licensing basis for the Millstone Monitoring Program have been identified and are being met. The accompanying database that cross-references the procedures and processes that implement each requirement provides documentation as to how each requirement is being implemented.

FIGURE 1

Source Documents for the Millstone Meteorological Monitoring Program Requirements

1.0 Regulatory Requirements

1.1 Code of Federal Regulations (CFR)

- 10 CFR 50.36a, Technical Specifications on Effluents from Nuclear Power Reactors
- 10 CFR 50.47, Emergency Plans
- 10 CFR 50 Appendix E, Emergency Planning and Preparedness for Production and Utilization Facilities
- 14C FR 77, Aeronautics and Space – Objects Affecting Navigable Airspace

2.0 Licensing Commitments

2.1 Technical Specifications (TS)¹

- TS 3.3.3.4, Limiting Conditions for Operation – Meteorological Instrumentation
- TS 4.3.3.4, Surveillance Requirements – Meteorological Instrumentation
- TS 5.8, Design Features – Meteorological Tower Location
- TS 6.8, Administrative Controls – Procedures
- TS 6.10, Administrative Controls – Record Retention

2.2 Final Safety Analysis Report (FSAR)

- Section 2.3.3, On-Site Meteorological Measurements Program

2.3 Emergency Plan (Eplan)

- Section 7.15, Meteorological Data Acquisition

2.4 NRC Regulatory Guides (RG)²

- RG 1.23, Onsite Meteorological Programs
- RG 1.97, Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident.

2.5 Radiological Effluent Monitoring and Offsite Dose Calculation Manual (REMDCM)

- Section F.2, Annual Radiological Effluent Report

2.6 Responses to Appraisal and Inspection Open Items

2.7 Licensing Event Reports

2.8 Letters

3.0 Management Commitments

¹ Depending on the standard set of Technical Specifications which was in place when the plant was licensed, each licensee may or may not have a set of Technical Specifications related to their meteorological monitoring program. Those licensees with such Technical Specifications now have the option to move these requirements into a licensee control program such as a Technical Requirements Manual (TRM).

² Each licensee may or may not have made explicit commitments to one or more of the Regulatory Guides listed here or may have taken exception with one or more of the requirements listed in these guides as part of their licensing basis.

**FIGURE 1
(Continued)**

4.0 Miscellaneous³

4.1 NUREG-0800, Standard Review Plan (SRP)

- Section 2.3.3, Onsite Meteorological Measurements Programs

4.2 NRC Inspection Manual Procedures (IP)

- Procedure 82207, Dose Calculation and Assessment

4.3 IE Information Notices

- No. 84-91, Quality Control Problems of Meteorological Measurements Programs

4.4 ANSI/ANS Standards

- ANSI/ANS-2/5-1984, American National Standard for Determining Meteorological Information at Nuclear Power Sites⁴

4.5 FAA Advisory Circulars⁵

- AC 70/7460-1J, Obstruction Marking and Lighting

³ These items are industry guidelines that are not considered to be requirements; however, their incorporation into the Program Manual is perceived to be providing a significant improvement or enhancement to the program's implementation.

⁴ ANSI/ANS-2.5-1984 was recently superseded by ANSI/ANS-3.11-2000, Determining Meteorological Information at Nuclear Facilities.

⁵ FAA lighting and marking requirements are generally applicable for towers extending more than 200 ft above ground level.

FIGURE 2

Example Key Elements for the Millstone Meteorological Monitoring Program Requirements

1.0 Administrative Elements

1.1 Procedural

- Procedures for meteorological monitoring shall be established, implemented, and maintained (TS 6.8).

1.2 Record Retention

- Records of surveillance activities, inspections, and calibrations required by Technical Specifications shall be retained for at least five years (TS 6.10).
- A set of raw analog or digital data shall be maintained for 5 years; reduced data shall be retained for the life of the plant (ANSI/ANS-2.5-1984).

1.3 Data Reduction

- Basic reduced data shall be hourly averaged (ANSI/ANS-2.5-1984).

1.4 Emergency Plan Implementation

- There should be letters of agreement with the NWS or any other service that can provide 24-hr backup information (IP 82207).

1.5 Miscellaneous

- Ground cover and tree growth in the vicinity of the meteorological measurement system should be controlled to avoid obstruction to air movement (IE 84-91).

2.0 Design Elements

2.1 General

- Each approved (tower) construction notice issued by the FAA contains a statement on how the structure should be marked and lighted in accordance with FAA Advisory Circular AC 70/7460-1 (14 CFR 77).

2.2 Measurement Locations and Elevations

- Heat reflection characteristics of the surface underlying the meteorological tower (grass, soil, gravel, paving, etc) should have minimal localized influences on measurements (SPR).
- Instrumentation should be provided that is capable of measuring wind direction, wind speed, and ambient air temperature at a minimum of two levels on at least one tower or mast (RG 1.23).

2.3 Instrumentation

- The following primary tower channels shall be operable at all times: WS033, WS142, WS374, WD033, WD142, WD374, DT142, DT374 (TS 3.3.3.4)
- Anemometer starting speed < 1 mph (RG 1.23)
- Mounting booms for all sensors should be oriented normal to the prevailing wind at the site (SPR)
- Instrumentation should be oriented into the prevailing wind direction (ANSI/ANS-2.5-1984).

FIGURE 2
(Continued)

2.4 Data Recording, Processing, and Display

- The method of display in the control room may be dial, digital, CRT, or strip chart recorder indication (RG 1.97).
- Data available in the control room, TSC, and EOF shall include a time history (analog or digital printout) (ANSI/ANS-2.5-1984).
- The previous 12 hours of 15-minute average meteorological data should be available for recall (IP 82207).

3.0 Reporting Elements

3.1 Annual

- An annual summary of the primary tower hourly meteorological data shall be either submitted with the Annual Radioactive Effluent Report or be retained and provided to the NRC upon request (REMODCM).

3.2 As Needed

- With one or more primary tower channels required by TS 3.3.3.4 inoperable for more than 7 days, prepare and submit a Special Report to the NRC within the next 10 days outlining the cause of the malfunction and the plans for restoring the channel(s) to operable status (TS 3.3.3.4).
- Any failure or malfunction of the primary tower's top aircraft warning light or any flashing obstruction light that lasts more than 30 minutes should be reported immediately to the nearest flight service station (AC 70/7460-1J).

4.0 Surveillance Elements

4.1 Checks and Inspections

- It is extremely important to visually inspect the primary tower's obstruction lighting at least once every 24 hours (AC 70/7460-1J).
- Each primary tower instrumentation channel required by TS 3.3.3.4 shall be demonstrated operable by the performance of a daily channel check (TS 4.3.3.4).

4.2 Calibration, Maintenance, and Repairs

- Each primary tower instrumentation channel required by TS 3.3.3.4 shall be demonstrated operable by the performance of a semiannual channel calibration (TS 4.3.3.4).