

# NRC INSPECTION MANUAL

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## INSPECTION PROCEDURE 88060

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### DETECTION AND MONITORING

PROGRAM APPLICABILITY: 2603

#### 88060-01 INSPECTION OBJECTIVES

01.01 To determine whether the licensee has a detection and monitoring (D&M) program in place that adequately identifies the facility's D&M needs.

01.02 To determine whether the licensee's rationale for determining D&M needs is justified.

01.03 To determine whether the licensee has installed D&M devices that adequately address the facility's D&M needs.

01.04 To determine whether the licensee has established a maintenance and inspection program for the D&M devices to ensure that the devices are in good working condition.

01.05 To verify that the operators and others who depend on them understand the function of detectors and monitors, and use them for safely performing their job tasks.

#### 88060-02 INSPECTION REQUIREMENTS

02.01 Review the licensee's D&M program to ensure that the licensee's approach to determining the facility's detection, measurement, and monitoring needs adequately address identified chemical hazards that could affect operations with Special Nuclear Material (SNM).

02.02 Review the licensee's list of D&M devices to ensure that chemical hazards within NRC's purview are being adequately monitored.

02.03 Review the licensee's D&M program to ensure that the detectors and monitors are being used and maintained properly.

02.04 Review the licensee's D&M program to determine whether the licensee has a mechanism in place to update the facility's D&M program through the incorporation of management-approved

recommendations coming out of the Hazard Identification and Assessment (HIA) effort pertaining to D&M.

General Guidance

The inspection should be directed at assessing the sufficiency of the D&M program in addressing identified chemical hazards that can affect operations with SNM at the facility.

Specific Guidance

Specific guidance is provided for each of the inspection requirements listed in Section 88060-02, to help the inspector determine whether the licensee's program for D&M is adequate.

03.01 The licensee's approach to determining its D&M needs should be based on the chemical hazards identified at the facility. As a minimum, the following should be available:

- a. A list of hazardous materials the facility used to developed its D&M program. The list should include the following materials commonly found at fuel cycle facilities: UF<sub>6</sub>, HF, NH<sub>3</sub>, H<sub>2</sub>, F<sub>2</sub>, NO<sub>x</sub>, C<sub>3</sub>H<sub>8</sub> (propane), fines, Zircalloy, and others, as applicable. This list should be consistent with the HIA effort's determination of needs. If not, then plant management should provide sound reasons for refuting any of the HIA study's recommendations pertaining to D&M for chemical hazards at the facility.
- b. Identification of locations, at the facility, that need D&M systems, along with the materials to be measured and the concentrations of concern. This should include locations where independent, backup, or redundant detectors and/ or monitors might be necessary to ensure reliability.
- c. Fixed detectors and monitors for all the hazardous chemicals for which a need has been shown. In addition, the facility might have portable monitors and detectors available for personnel to use for protection, as required.
- d. Rationale for determining which locations require stationary devices and which need portable devices.
- e. Rationale for determining when alarms are required and when automatic active mitigation devices (e.g., water curtains, deluge, foam, etc.) are required.
- f. Rationale for determining when interlocks (or automatic action triggers without operator intervention) are needed, for detectors and monitors for extremely hazardous substances (e.g., for HF release because of failure of the scrubber system in a UF<sub>6</sub> conversion unit, or because of catastrophic failure of a UF<sub>6</sub> cylinder, resulting in formation of HF by reaction of UF<sub>6</sub> with atmospheric moisture).
- g. Rationale for choice of set points for alarms, interlocks, etc. (e.g., based on Emergency Response Planning Guidelines

(ERPG<sup>1</sup>) or Immediately Dangerous to Life and Health (IDLH<sup>2</sup>) type release quantities for the prevention of offsite incidents, with a safety factor included. Alarms should be set at lower values than interlocks.

03.02 The licensee should have a list of all detectors and monitors installed at the facility. As a minimum, the following should be addressed:

- a. The location of the D&M devices should be available (e.g., marked up on a plot plan). Information on the location should include elevation of the detectors and monitors. This is to facilitate the early detection of releases and identification of appropriate response actions.
- b. The list of installed detectors and monitors, and their locations should be in agreement with the D&M needs identified.
- c. The rationale for the number and location (including elevation) of environmental detectors and monitors should include wind direction, nature of release, potential population affected, etc.

03.03 The facility should have a D&M program that ensures that regular maintenance and inspection is provided to the installed detectors and monitors. Training should be provided to ensure the safe operation of detectors and monitors. As a minimum the following features should be addressed:

- a. Reliability requirement for detectors and monitors should be stated, and the maintenance and inspection program for the detectors and monitors should be sufficient to meet the reliability requirement.
- b. Maintenance and inspection procedures should be available for all the detectors and monitors onsite. Calibration of detectors and monitors should be based on US National Institute of Science and Technology (NIST) reference measurements wherever possible. For calibrations, refer to Inspection Procedure 88025, "Maintenance and Surveillance Testing."
- c. A program to describe the periodic recalibration of D&M equipment. This program should also address the frequency of calibration and the replacement or repair of equipment that is found to be out of a specified calibration range.

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<sup>1</sup>ERPGs developed by the American Industrial Hygiene Association (AIHA) for a range of airborne concentrations (e.g., ERPG-3 concentrations are those that may lead to irreversible health effects in the affected population). These are calculated using average meteorology and a meteorological dispersion model appropriate for the material being released and the release conditions.

<sup>2</sup>IDLH - this is defined as the maximum level to which a healthy individual can be exposed to a chemical for 30 minutes without irreversible health effects or impairing symptoms.

- d. Adequate training, including specialized training for specialized devices such as HF analyzers, toxic and flammable gas detectors, on-line analyzers, etc., should be provided to maintenance personnel responsible for maintaining and inspecting detectors and monitors.
- e. Training on operating procedures should include detectors and monitors. Logsheets should be provided for operators to check readings on detectors and monitors during their rounds.
- f. Operators should be trained on the function and intent of detectors and monitors.
- g. Emergency responders should be trained on the function and intent of detectors and monitors.
- h. Supervisory and management staff should be trained on the function and intent of detectors and monitors.
- i. If a detector or monitor trips, the facility should have appropriate planned action to rectify or deal with the problem. One of the two following actions will have to be taken: a) if the trip is a false alarm, then the detector will have to be fixed; or b) if the trip is real, then the plant condition that triggered the trip should be fixed. Critical detectors and monitors should have backups or an evaluated level of redundancy.

03.04 The facility should have in place a mechanism for ensuring that recommendations pertaining to D&M (from inspection programs such as HIA, Incident Investigation, and Audit programs) are incorporated into the D&M program. As a minimum the following should be addressed in updating the facility's D&M program:

- a. A tracking system to ensure that each recommendation is addressed on a timely basis. The inspector should cross-check with the features of the tracking system identified in the Hazard Identification and Assessment (HIA) element.
- b. Findings from Incident Investigations or Audit programs, that highlight deficiencies in the D&M program, should be addressed in a timely manner, to ensure that chemical hazards at the facility are covered sufficiently. The inspector should cross-check with the Incident Investigation and Audit elements.

#### 88060-04 RESOURCE ESTIMATE

An inspection performed using this inspection procedure is estimated to require 8 hours of inspector resources. This estimate is only for the direct inspection effort and does not include preparation for and documentation of the inspection.

#### 88060-05 REFERENCES

NRC Inspection Manual, *Inspection Procedure 88025, Maintenance and Surveillance Testing*, Latest revision.

Kletz, T.A., *What Went Wrong*, Gulf Publishing, Houston, 1985, Chapter 14, pp. 161 - 170.

Sutton, I.S., *Process Reliability and Risk Management*, Van Nostrand, New York, 1992, Chapter 7, pp. 185 - 213.

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