Buffalo Materials Research Center

State University of New York at Buffalo

License R-77
Docket 50-57

Technical Specifications

Amendment #27

(D&D Operations)

Appendix A

2/3/2011

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Control Blade: A neutron absorbing blade with negative reactivity worth.

Experimental Facility: An experimental facility is any structure or device associated with the reactor that is intended to guide, orient, position, manipulate, or otherwise facilitate a multiplicity of experiments of similar character.

Permanent Experimental Facility: Those experimental facilities that would require considerable effort and planning to remove or alter such as the thermal column.

Potentially Radioactive Liquid Effluents: Those liquid effluents from the facility including from sinks, sumps, floor drains, etc., which have a reasonable potential to contain radioactivity at a level in excess of 0.01% of the effluent limit prescribed by 10 CFR 20.

Reportable Occurrence: A reportable occurrence is any of the conditions described in Section 12.1 of these specifications.

2.0 Possession Only Limits

2.1 Authorized Activities

1) The BMRC facility has no fuel and is authorized to perform the activities specified by the Decommissioning Plan.

2.2 Fuel Quantity Limit

1) No fuel is present on site and the facility is not authorized to accept or use any reactor fuel.

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3.0 Plant Instrumentation Systems

3.1 Reactor Tank Instrumentation

Applicability This specification applies to ensure the integrity of the primary piping system.

Specification 3.1.1 (suction valve interlock) shall not apply if the reactor tank water primary circulation pump is permanently disabled or electrically disconnected.

Specifications The following plant instrumentation systems shall be maintained.

1) Primary pump suction valve interlock.

Basis

1) Specification 3.1.1 (Suction Valve Closed) disables the primary pump so that it may not be started while the core outlet isolation valve is closed. Starting the pump with this valve closed could damage the N-16 delay tank.

3.2 Radiation Effluent Monitor Requirements

Applicability These specifications apply to permanently mounted radiation monitoring equipment in the building air exhaust system.

Objective The objective of these specifications is to set a minimum level of performance for the effluent radiation monitoring system.

Specifications

1) Effluents from the containment building, exhausted through the Building Exhaust System (containment roof), will be monitored for particulate radioactivity by the Building Particulate Monitor whenever the exhaust fan is operating and:
    i. Activities are being conducted within the containment building that may potentially create airborne particulate activity in excess of 10% of the release concentration limit established by 10 CFR 20 when averaged over a 24 hour period, or:

ii. Activities described in the DP are being performed which may be expected to release radioactive particulates.

2) If operation of the monitor is required, the output of the monitors shall be recorded on a strip chart, a data logger, or equivalent, or logged manually at intervals of not more than every 30 minutes

3) The set point for the Building Particulate Monitor shall be specified in writing by the Operating Committee.

Basis

1) Operation of the Building Gas and Building Particulate Monitors ensures that any substantive releases of particulate radioactivity will be detected.

2) Specification 3.2.3 will ensure that the alarm set point is clearly stated, cannot be changed without management review, and can be maintained at the lowest possible level commensurate with facility conditions and operational requirements.

3.3. Radiation Area Monitor Requirements

1) The radiation area monitors are no longer required.

4.0 Engineered Safety Systems

Applicability These specifications apply to the facility containment vessel and ventilation systems.

Objectives The objective of these specifications is to control potential releases of airborne radioactivity from the facility.

Specifications Operations which may cause release of airborne particulate activity through the Building Exhaust System in excess of levels described in Section 3.2 shall be performed with the following restrictions:

1) The Truck door is closed along with the personnel access doors to containment.

2) The Building Air exhaust fan located within the Control Deck fan room is operating.

3) The air pressure within the reactor containment is negative relative to the outside air pressure.

Basis

1) Specification 4.0.1 ensures that containment penetrations other than the ventilation ducts are closed, preventing the unmonitored and uncontrolled release of airborne radioactivity.

2) Specification 4.0.2 ensures that fan is operating to maintain the containment at negative pressure.

3) Specification 4.0.3. Ensures that all containment leakage is inward.

5.0 Reactor Tank Water Conditions

Applicability This specification was required to limit the corrosion of fuel and is no longer required.

6.0 Airborne Effluents

Applicability These specifications apply to the levels of particulate radioactivity discharged to the environment through the building air exhaust system.

Objective The objective of these specifications is to ensure that persons outside of the facility are not exposed to concentrations of airborne radioactivity in excess of the limits established by 10 CFR 20.

Specifications

6.1 Building Air Effluent Radiation Limit

1) The concentration of radioactivity in the Building Air Exhaust, at the point of release (containment roof), shall not exceed the effluent limit established in 10 CFR 20, when averaged over the calendar year.

Basis Specification 6.1 ensures that the concentration of radioactivity in the air which exits through the containment roof is below the NRC limit.

7.0 Liquid Effluents

Applicability These Specifications apply to liquid radioactive effluents to the Sanitary Sewer System.

Objectives The Objectives of these specifications are:

1) To prevent unmonitored discharges of radioactivity to the Sanitary Sewer.
2) To ensure that discharges to the Sanitary Sewer are within the limits prescribed by 10 CFR 20.

Specifications

1) All potentially radioactive liquid effluents shall be collected and retained in a hold tank(s).
2) Before release to the Sanitary Sewer the contents of the tank(s) shall be mixed and a representative sample shall be drawn and analyzed for radioactive content.
3) The contents of the tank(s) shall not be released to the sanitary sewer unless the analysis demonstrates that the release shall be within the limits prescribed by 10 CFR 20.
4) For purposes of determination of the effluent discharge concentration in 7.0.3 above, the dilution by the most recently established sewage flow rate of the Winspear Avenue trunk may be incorporated.

8.0 Surveillance Requirements

Applicability These specifications apply to the surveillance requirements for the radiation monitoring systems and engineered safety systems.

Objective The objective of these specifications is to prescribe the minimum surveillance activities to protect the safety of the reactor staff and the public.

Specifications

8.2 Radiation Monitoring Systems

1) The Building Particulate Monitor shall be tested for operability on a monthly basis not to exceed five weeks.
2) The Building Particulate Monitor shall be calibrated quarterly, at intervals not to exceed four months. For the purpose of meeting this requirement, the monitor shall be calibrated by determination of response to appropriate reference sources.

Applicability:

The particulate monitor operability tests shall not be required if the monitor(s) are not in service, however the tests must be conducted if and when the monitors are placed back in service.

The particulate monitor calibration tests are not required if the monitor has been continuously taken out of service more than 30 days before the calibration is due, however the calibration must be conducted if and when the monitor is placed back in service.

8.3 Engineered Safety Feature (Containment) Tests

The following items shall be tested quarterly at intervals not to exceed four months:

1) The Building Air ventilation isolation damper closes in less than 5 seconds in response to manual trip

2) The ventilation system can be configured to maintain a negative pressure in the building under normal conditions.

8.4 Other Instrumentation System Surveillance

The following additional system shall be calibrated or tested quarterly at intervals not to exceed four months:

1) Suction Valve Closed pump inhibit interlock.

This specification shall not apply if the primary circulation pump is permanently disabled or electrically disconnected.

9.0 Plant Design Features

9.1 Site Description

The site of the BMRC reactor is the South East corner of the South campus of the State University of New York at Buffalo.

The South campus lies in a triangle bounded by Bailey Avenue, running almost due north and south, Winspear Avenue, running roughly east and west, and Main St., running north of Winspear Avenue. The nearest buildings are Kapoor Hall (formerly Acheson Hall), Howe Building, the McKay Heating Plant, and Clark Gym. The Veterans Affairs Medical Center is situated approximately 2000 ft east of the BMRC. The nearest residential area is South of the reactor on the North Side of Winspear Avenue.

The reactor restricted access area consists of the containment building and the attached laboratory and office wing.

9.2 Containment Building

The containment building is a flat roofed, right circular cylinder, nominally 70 ft. in diameter and 52 ft. high. The containment is constructed of normal density reinforced concrete. The walls are nominally 2 ft. thick and the roof is 4 inches thick and supported by steel and concrete beams. The bottom floor is nominally 3.5 ft. thick and the entire building rests on bedrock. The total free volume of the building is approximately 186,000 cubic feet.

The building is equipped with two personnel entry doors and a truck door. These penetrations were previously fitted with gaskets that were normally inflate, but are no longer maintained since “containment” is no longer necessary. Drain lines which penetrate the containment wall are provided with 24 inch dip legs to maintain pressure seal.

9.3 Ventilation System

Under normal conditions, the containment building is ventilated by a single pass system. Conditioned air is supplied to the containment through a 30 inch diameter duct. A second 30 inch supply system can also be employed; however, it is not necessary under most conditions.

Air from the general (occupied) areas of the containment, and certain low activity fume hoods, is exhausted through a 36 inch duct which penetrates the containment roof (commonly referred to as the “Building Air” system). The Building Air exhaust system is HEPA filtered and includes a vortex control damper on the suction side which may be used to control the negative pressure in the containment building.

When the reactor was in operation air from the remaining fume hoods and reactor irradiation facilities was exhausted thru a “Stack Exhaust” system that exited containment thru the sub-basement and exhausted through a 167 foot high stack. This system has now been abandoned and all fans that fed air into this exhaust system have been disabled and/or disconnected from the duct. In addition a six (6) inch diameter “emergency bypass” exhaust duct equipped with HEPA and activated charcoal filters, used to be capable of maintaining the containment at a slightly negative pressure, under emergency conditions (such as the reactor design basis

accident). This duct also included a pressure relief valve to protect the containment from structural damage in the event of a major pressure excursion.

The two 30 inch supply ducts, and the 36 inch exhaust duct are equipped with “Pratt” hydraulic isolation dampers which can be manually triggered if high airborne radioactivity is detected. The damper in the former stack exhaust system is maintained in the closed position, and the duct has been blanked off. The 6 inch emergency exhaust duct has been capped outboard of the pressure relief valve, and the activated charcoal filter is no longer required.

When the isolation dampers are closed the building air exhaust and fans that feed into it shut down, as do the two 30 inch supply fans. This will place the containment in an approximately neutral pressure condition. As a consequence there will be minimal escape of contaminated air from the facility.

9.4 Reactor Tank

The reactor tank is constructed of concrete with an aluminum liner. It is nominally 29 feet deep and will hold approximately 13,700 gallons of shielding water. When the reactor was in operation, the cooling system also included an N-16 delay tank, a heat exchanger and circulating pump. The heat exchanger was permanently removed in 1994 and replaced with a pipe. The balance of the original cooling system can be used to circulate the shielding water. These components are no longer required nor do they provide any safety functions. They may be removed as long as blocking flanges are installed outboard of the isolation valves.

Two demineralizer systems were used to provide cleanup and makeup water. Both are abandoned in place awaiting D&D.

An emergency pool fill system is available for adding city water to the pool should this be desired, such as in the event of a gross leak in the tank. This system includes a manual valve at the top of the tank and an isolation valve in the BMRC sub-basement.

9.6 Control Blades

Gross reactivity control within the reactor core was provided by six control blades of which five were scramming and one was not. Each blade is composed of nominally 80% silver, 15% indium and 5% cadmium. The blades are 4.85 inches wide, by 0.18 inch thick, by 29 inches long and are plated with 0.003 inches of nickel.

The blade assemblies serve no purpose and may be disconnected from their drive units and stored in any convenient location within the pool or a shielded storage container.

10.0 Fuel Storage and Transfer

The facility possesses no fuel and this section is deleted.

11.0 Administration

11.1 Organizational Structure

1) The organizational structure shall be as illustrated in Figure I.
2) The Director of Environment, Health and Safety bears responsibility for administrative oversight of the BMRC D&D activities.
3) The BMRC Director bears direct safety responsibility for the Facility including all safety reviews, licensing, audits, training, surveillances, and operations.
4) The Radiation Safety Officer bears direct responsibility for all aspects of radiological safety at BMRC and is empowered to stop, or modify any activity for purposes of ensuring the radiological safety of the staff and the public.
5) The BMRC Operations Manager is responsible for all activities related to maintenance of plant systems, engineered safety systems, and the training and supervision operations staff.

11.2 Minimum Staffing Requirements

During D&D activities at BMRC, the University staff shall include at minimum:

1) The Director of Environment, Health and Safety
2) The BMRC Director
3) The BMRC Operations Manager
4) The Radiation Safety Officer

For purposes of meeting the requirements of 11.2:

1) A single individual may serve as the BMRC Director and Director of Environment, Health and Safety, or a single individual may serve as both BMRC Director and BMRC Operations Manager.
2) Staff members may perform collateral duties in other areas of the University or be part time employees.

11.5 Review Functions

11.5.1 Reactor Decommissioning Safety Committee

1) A Reactor Decommissioning Safety Committee (RDSC) shall exist for the purpose of reviewing matters related to the health and safety of the public and the staff, in accordance with the Constitution and Bylaws of the committee.
2) The RDSC shall report to the Associate Vice President for Facilities who shall appoint the members and Chair.
3) The RDSC shall include at least eight members including as ex-officio members the BMRC Operations Manager, BMRC Director, the Radiation Safety Officer, and the Director of Environment, Health and Safety. The BMRC Director and Operations Manager shall be non-voting members.
4) The RDSC shall meet at least twice per year.

5) A quorum of the RDSC shall consist of at least six members, and all questions before the Committee must be approved by a simple majority of the voting members present, but by not less than four voting members.

6) Minutes of all meetings will be maintained on file and distributed to all members.

7) The RDSC shall review and approve the following:

   A) The substantive aspects of short and long term action plans relative to the reactor decommissioning, reactor plant maintenance and monitoring, except for those which may be reviewed and approved by the Operating Committee.

   B) Reportable Occurrences related to health and safety, and corrective actions.

   C) Notices of Violation related to health and safety and corrective actions.

   D) Applications for amendment to NRC licenses.

   E) Changes in Procedures or facilities implemented in accordance with 10 CFR 50.59, in Post Audit, after Operating Committee approval.

11.5.2 Operating Committee

1) An Operating Committee shall exist as a sub-group of the RDSC.

2) The Operating Committee shall consist of the ex-officio members of the RDSC plus additional members appointed pursuant to the by-laws.

3) The Operating Committee shall meet as often as required and minutes shall be kept of all formal meetings.

4) The Operating Committee is authorized to act for the RDSC regarding routine occurrences, and approvals for which the safety implications are minor, are well understood, and are within the scope of past practice. This would include but not be limited to:

   A) Applications for license or Plan amendments such as to update names, equipment lists, procedures etc.

   B) Operating Procedures, Emergency Procedures, Health Physics Procedures, or Maintenance Procedures.

   C) Changes in procedures, equipment or facilities pursuant to 10 CFR 50.59.

   D) Audit Reports.

11.5.3 Audits and Reviews

1) An independent audit shall be conducted annually of BMRC decommissioning, maintenance, operations, and surveillance activities. The auditor(s) shall have appropriate experience and education. The audit may be broken into modules, using the same or separate auditors. A written report(s) shall be provided to the BMRC Director, and shall be reviewed by the Reactor Decommissioning Safety Committee. The audit shall include at minimum a review of:

   - Operational records for compliance with internal rules, procedures, policies, regulatory compliance, and license compliance.
   - Adequacy of Procedures.
   - Plant equipment Performance and surveillance requirements.
   - Records of release and discharges of radioactivity to the environment.

2) Radiation Safety and ALARA Review shall be conducted pursuant to 10 CFR 20 requirements.

12.0 Actions to Be Taken In the Event of a Reportable Occurrence

A reportable occurrence shall be any of the following:

1) An uncontrolled or unplanned release of radioactive materials from the restricted area of the facility which when averaged over any 24 hour period exceeds the applicable limits established by 10 CFR 20 or Technical Specifications, whichever is greater.
2) An uncontrolled or unplanned release of radioactive materials that result in concentrations of airborne radioactive materials within any portion of the restricted area which results in measured or calculated exposures to personnel in excess of 40 DAC-hours.
3) Declaration of an Emergency pursuant to the University All Hazards Emergency Plan.
4) An observed inadequacy in the implementation of administrative or procedural controls that caused or threatens to cause the existence or development of an immediately dangerous or otherwise significant unsafe condition in connection with the operation and decommissioning of the facility.

In the event of a reportable occurrence, as defined above, the following shall occur:

1) Immediate steps shall be taken to correct the situation and to mitigate the consequences of the occurrence.
2) The Operating Committee will investigate the occurrence and its causes, and will report its findings to the Reactor Decommissioning Safety Committee and to the Senior Vice President, and Associate Vice President for University Facilities.
3) A report shall be filed with the NRC which shall include an analysis of the causes of the occurrence, the effectiveness of corrective actions taken and recommendations of measures to be taken to prevent or reduce the probability or consequences of recurrence.

13.0 Written Procedures

13.1 Required Procedures

Written procedures will exist that define how and when various aspects of facility operations will be performed. These procedures may include “Operating Procedures”, “Emergency Procedures” and “Maintenance and Calibration Procedures.”

Written procedures shall at minimum address the following areas:

1) Use, surveillance, and maintenance of auxiliary systems.
2) Abnormal and emergency situations.
3) Required electrical and mechanical surveillance and maintenance.

4) Operation and calibration of fixed radiological monitors as required by this Technical Specification.

13.2 Approval, Review and Update

1) Operating Procedures and Maintenance and Calibration Procedures will be reviewed and updated as appropriate, but such review shall be no less frequent than once every two years.
2) Emergency Procedures shall be reviewed and updated in accordance with the BMRC Emergency Plan which is a module of the Universities All Hazards Plan.
3) All new or revised procedures shall be approved by the Operating Committee.

13.3 Temporary Deviation from Written Procedures

Temporary changes to written procedures that do not change the original intent may be made with the approval of a Sr. Reactor Operator, the Operations Manager, or the BMRC Director. All such changes shall be documented.

14.0 Record Keeping

14.1 Records Which Shall be Retained for Five Years

In addition to the requirements of applicable regulations, the following records and logs shall be maintained in a manner reasonably convenient for review, and retained for at least five years:

- Operation and Maintenance Logs and records
- Records and reports related to “reportable Occurrences” as defined by section 12.
- Logs and records which document the conduct of test, checks, and measurements in compliance with surveillance requirements established by Technical Specifications
- Facility radiation and contamination surveys
- Minutes of Operating Committee meetings
- Principal Maintenance records

14.2 Records Which Shall be Maintained for the Life of the Facility

The following records shall be maintained for the life of the facility:

- Records of radioactive materials discharged to the air or water (sewer)
- Radiation exposure records for all facility personnel
- Fuel inventories and transfer records
- Up-dated, corrected, and as-built facility drawings
- Minutes of Reactor Decommissioning safety Committee, (formerly the Nuclear Safety Committee) Meetings
- Off Site environmental radiation monitoring surveys

15.0 Reporting Requirements

15.1 Annual Technical Report

A report summarizing technical operations will be prepared for each calendar year. A copy of this report shall be submitted to the Director, Office of Nuclear Reactor Regulation, with a copy to the Regional Administrator (Region I) by March 31 of each year. The report shall include the following:

1) A brief narrative summary of changes in facility design or performance that relate to nuclear safety and results of surveillances tests and inspections.
2) Discussion of major maintenance operations performed during the period including the effects if any on nuclear safety and the reason for any corrective maintenance required.
3) A brief description of any changes in the facility to the extent that it changes a description of the facility in the Decommissioning Plan.
4) A brief review of changes, test and experiments made or conducted pursuant to 10 CFR 50.59 including a summary of the safety evaluation of each.
5) A summary of the nature and amount of radioactive effluents discharged or released to the environment.
6) A description of environmental radiological surveys conducted outside the facility.
7) A summary of radiation exposures received by facility personnel and visitors, including details of any unusual exposures.
8) A summary of the results of routine radiation and contamination surveys performed within the facility.
9) Any substantive changes in facility organization.
10) A discussion of major operations performed during the reporting period related to decontamination, dismantling or decommissioning of the facility.

15.2 Reportable Occurrence Reports

Notification shall be made within 24 hours by telephone or facsimile, to the NRC Operations Center and Region I, followed by a written report within 14 days to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, ATTN: Document Control Desk, with a copy the Regional Administrator of Region I, in the event of a reportable occurrence as defined by technical specification. The written report, and to the extent practicable, the initial notification, shall:

1) Describe, analyze, and evaluate safety implications.
2) Outline the measures taken to ensure that the cause of the condition is determined.
3) Indicate the corrective action taken to prevent repetition of the occurrence, including changes to procedures.
4) Evaluate the safety implications of the incident in light of the cumulative experience obtained from the report of previous failure and malfunction of similar systems and components.

15.3 Safety Event Reports

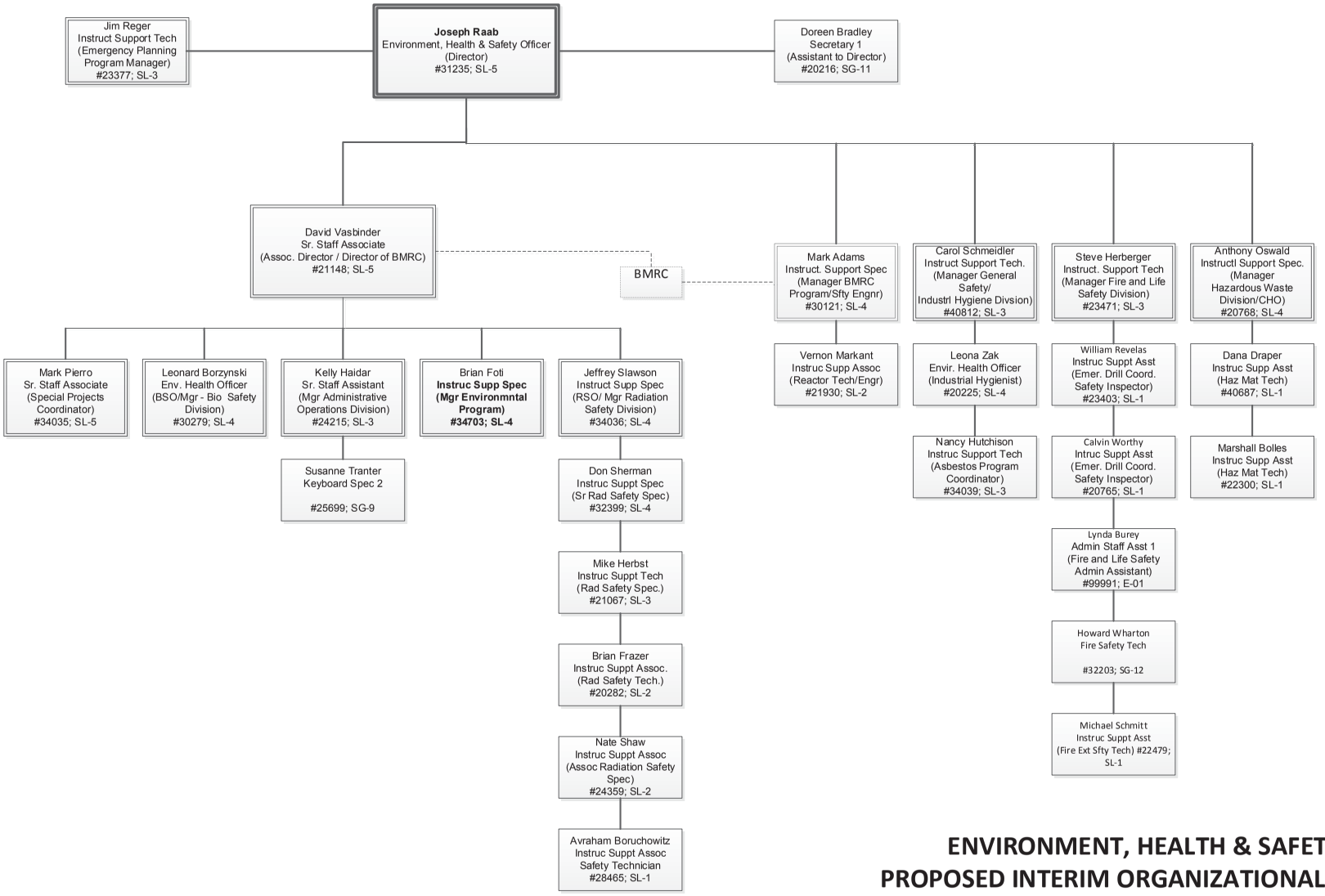
A written report shall be forwarded within 30 days to the U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, ATTN: Document Control Desk, with a copy the Regional Administrator of Region I, in the event of:

1) Discovery of any substantial errors in the basis for Technical Specifications.

2) Discovery of any substantial variance from performance specifications contained in the Technical Specifications.

15.4 Special Nuclear Materials Status Reports

Neither R-77 nor SNM-273 contains special nuclear materials. As such, reports are not needed and will not be filed



ENVIRONMENT, HEALTH & SAFETY
PROPOSED INTERIM ORGANIZATIONAL CHART
2/7/2012