CASD/2026/TSR/R0

Chemical and Analytical Sciences Division

TECHNICAL SAFETY REQUIREMENTS FOR THE RADIOACTIVE MATERIALS ANALYTICAL LABORATORY BUILDING 2026

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DOE APPROVALS

TECHNICAL SAFETY REQUIREMENTS
FOR THE
RADIOACTIVE MATERIALS ANALYTICAL LABORATORY
BUILDING 2026

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CASD/2026/TSR/R0

ENERGY RESEARCH CONCURRENCES AND APPROVALS

TECHNICAL SAFETY REQUIREMENTS FOR THE RADIOACTIVE MATERIALS ANALYTICAL LABORATORY BUILDING 2026

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REVISION LOGS

TECHNICAL SAFETY REQUIREMENTS
FOR THE
RADIOACTIVE MATERIALS ANALYTICAL LABORATORY
BUILDING 2026

REVISION LOG ORNL/CASD/2026/TSR/R0		
REVISION	**DESCRIPTION**	**DATE APPROVED**
0	Initial issue	8/9/3000

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1 USE AND APPLICATION

The Radioactive Materials Analytical Laboratory (RMAL), Building 2026 , at Oak Ridge National Laboratory (ORNL) is operated by the Chemical & Analytical Sciences Division (CASD). The facility was designed for the characterization of highly radioactive alpha, beta and gamma emitting materials by various chemical and physical measurements. Present operations include general purpose analytical chemistry on radioactive material dissolution, dilution, separation and physical measurements.

These Technical Safety Requirements (TSRs) represent a commitment by Lockheed Martin Energy Research Corporation (Energy Research), the managing contractor, to the U. S. Department of Energy (DOE) regarding the safe operations of the RMAL. This document is prepared and formulated using guidelines from DOE Order 5480.22[1], *Technical Safety Requirements.*

1.1 Definitions

The defined terms in this list appear as "UPPER-CASE" type in this document.

Term	Definition
ADMINISTRATIVE CONTROL (S) (AC)	The provisions relating to organization, management, procedures, record keeping, assessments, and reporting necessary to ensure safe operation of the facility.
CALIBRATION	An adjustment of electronic, mechanical, pneumatic, or other sensing systems such that the output of the system corresponds, with acceptable range and accuracy, to known values of the parameter that the system measures or to known input signals when access to the primary component being calibrated is limited.
LCO (LIMITING CONDITION FOR OPERATION)	The lowest functional capability or performance level of safety-related structures, systems, components, and their support systems as required for normal, safe operation of the facility.
LCS (LIMITING CONTROL SETTING)	Response setting(s) for automatic alarm or protective devices related to those variables having significant safety functions in the facility.
MODE (S)	Any one of the facility conditions specified in Section 1.2.

Term	Definition
OPERABLE/OPERABILITY	A system, subsystem, train, component, or device shall be OPERABLE when it is capable of performing its specified function(s); and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication, or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified function(s) are also capable of performing their related support function(s).
PROGRAM (S)	In general, a TSR commitment is to develop, implement and maintain a PROGRAM that meets the intent of the requirements. Therefore, as long as the PROGRAM is functional and the intent of the PROGRAM is being met, the commitment to have a PROGRAM is met.
QUALIFIED PERSON	An individual that has successfully completed training, education, or experience and has been recognized and approved by management to perform the particular task(s) or to operate the system(s) in question.
RADIOLOGICAL WORK PERMIT (RWP)	A permit that identifies radiological conditions, establishes worker protection and monitoring requirements, and contains specific approval for radiological work activities.
SAFETY LIMIT (SL)	Limits on process variables associated with those physical barriers, generally passive, that are necessary for the intended facility function and that are found to be required to guard against the uncontrolled release of radioactivity or other hazardous materials.
SURVEILLANCE REQUIREMENT (SR)	Requirements relating to test, CALIBRATION, or INSPECTION to ensure that the necessary OPERABILITY of systems and components is maintained or that operations are within specified LCOs.
TSR VIOLATION	Failure to comply with an ADMINISTRATIVE CONTROL. *Note: Failure to comply with individual procedural requirements of the programs described in Section 5.3 will not be considered a TSR VIOLATION provided the non-compliances are not the result of widespread failure to establish and implement the programs (i.e., "programmatic breakdown") unless the failure is significant in that it poses a life-threatening or serious injury to personnel.*

1.2 Operational Modes

These MODES can be applied to individual areas with well defined boundaries such as individual hot cells, gloveboxes, and laboratories. Only the RMAL Facility Manager (or designated alternate) has the authority to specify/determine the MODE of operation. The facility is normally in an OPERATION MODE for all scheduled work days (Monday-Friday) and in STANDBY MODE during non-work hours (typically 5 p.m. to 7 a.m.).

MODE	Description
OPERATION	A mode in which the affected process area of the facility is performing intended mission activities (e.g. analysis and testing of samples/specimens that contain less than the Category 2 threshold quantities of radioactive material). Decontamination, maintenance and/or repair activities may be performed during this mode of operation.
STANDBY	Radioactive materials are present and limited to below category 2 threshold quantities. Activities involving radioactive materials may not be performed without a job specific RWP and/or approval by the Facility Manager following an evaluation of the area(s) affected by the STANDBY mode. The STANDBY mode is mostly used for maintenance activities where one or more of the containment systems, such as the exhaust side of the ventilation system, are temporarily taken out of service for repair or maintenance.

2 SAFETY LIMITS AND LIMITING CONTROL SETTINGS

2.1 Safety Limits

There are no Safety Limits (SLs) for this facility.

2.2 Limiting Control Settings

There are no Limiting Control Settings (LCSs) for this facility.

3/4 OPERATIONAL LIMITS AND SURVEILLANCE REQUIREMENTS

There are no LCSs, LCOs, or SRs, associated with the operation of the RMAL .

5 ADMINISTRATIVE CONTROLS

5.1 Organization and Oversight

5.1.1 Contractor Organization

Lines of authority, responsibility, and communication shall be established and defined for the highest Chemical & Analytical Sciences Division (CASD) management levels, through intermediate levels, to and including management positions involved in the daily operation of the RMAL facility. These relationships shall be documented in the form of organizational charts, job descriptions and responsibilities for key personnel positions, or in equivalent form of documentation. Personnel of other contractor organizations or other contractors (not assigned to the RMAL) performing work at the facility shall be under the control of personnel from the RMAL operating staff.

5.1.2 Contractor Responsibilities

The CASD shall be responsible for the overall safe operation and maintenance of the RMAL Facility. The RMAL facility manager and/or his designee shall be directly responsible for safe operations within the facility. Safe operation shall include, as necessary, review and approval of material transfers to/from the RMAL Facility, daily operation of the facility, ensuring staffing requirements are met, control of physical changes in the facility, and interface requirements with other support organizations and facilities to ensure availability of essential services.

5.1.3 Reviews and Audits

Unreviewed safety question determinations (USQD), SAR and TSR changes, proposed tests and experiments, and facility changes and modifications shall be reviewed by appropriate individuals of the RMAL, Building 2026, operating organization. All USQDs, SAR, and TSR changes shall be reviewed by individuals from a facility safety committee, group, or organization that is independent of the RMAL, Building 2026, operating organization. Changes to the operating practices that require changes to this TSR shall not be implemented prior to DOE approval of the associated changes in the TSR.

(**Note**: USQD screening forms are not included under this independent review.)

Periodic audits shall be conducted by the RMAL operating organization for compliance with the TSR. Periodic audits shall be conducted by individuals, committees, groups, and organizations independent of the RMAL operating organization for items such as SAR and TSR compliance, and other activities of facility safety significance. Management assessments or readiness assessments shall be performed as applicable for new facility operations outside the scope of current operation or significant facility modifications to safety related structures or systems.

5.2 Operations

5.2.1 Staffing Requirements

The minimum staffing requirement while the facility is in Operation MODE shall be one QUALIFIED PERSON on site. There is no minimum staff requirement while the facility is in Standby MODE. Support personnel, such as radiation protection personnel, fire protection personnel, or plant and equipment personnel, shall be contacted as necessary to support facility operations.

5.2.2 Facility Operating Procedures

Facility operating procedures, as identified by the facility manager, shall be established, implemented, and maintained to address normal and emergency operations.

5.2.3 Qualifications and Training of Personnel

The minimum qualifications for the RMAL , Building 2026 , supervisors/personnel shall be in accordance with DOE Order 5480.20A[2] (or successor), *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*. Personnel not qualified to perform a task will be supervised by qualified personnel.

5.2.4 Facility Radioactive Material Inventory Control

A program and/or procedures shall be established, implemented, and maintained to ensure that the total inventory of radioactive materials within building 2026 are maintained below the bounds established in Chapter 3 of the Building 2026 Safety Analysis Report.

The RMAL shall operate below the radioactive material inventory threshold for Category 2 nuclear facilities, as defined by DOE-STD-1027-92[3]. The radioactive material (including fissionable material) inventory control for the facility is based on the combinations of radioactive materials that are present. The sum of the ratios of the quantity of each radioactive nuclide to the corresponding Category 2 thresholds must not exceed one (1.0) as stated in the follow equation:

$$\sum_{i}^{n} \left[\frac{Isotope\ A_i}{Cat.\ 2\ Threshold\ for\ A_i} \right] < 1.0$$

Note: The inventory of radioactive material does not include surface contamination and trace levels (<0.1 mCi) of radionuclides typically present in analytical samples or radiochemical standards. The inventory of samples and standards are a minor contribution to the total inventory and are tracked by separate control systems to meet other programmatic requirements.

5.2.5 Facility Operating Records

In addition to the requirements of applicable regulations, and in no way substituting therefore, records and logs shall be prepared and retained for the RMAL, Building 2026, for at least the following items and retained as a minimum for the period of time specified in parentheses:

- Facility operating logs (1 year);
- Principal maintenance activities (1 year);
- Training records (2 year); and
- Unreviewed Safety Question Determinations (operating lifetime of facility);
- Occurrence reports applicable to the RMAL facility (1 year).

5.2.6 Reporting Requirements

In the event of a deviation from this TSR, actions shall be taken as specified in the RMAL Facility Work Smart Standards[4].

5.3 PROGRAMS

5.3.1 Radiation Protection Program

A radiation protection PROGRAM shall be established, implemented, and maintained that is based on 10 CFR 835 and has the following objectives:

- Radiation exposures are maintained as low as reasonably achievable (ALARA),
- Radiation exposures for occupational workers are limited, monitored, and recorded,
- Radioactive materials are identified,
- Entry control programs are established for areas where elevated radiation fields or elevated radioactive contamination may be present, and the areas are posted,
- Periodic radiation safety training is provided.

5.3.2 Quality Assurance (QA)

A graded QA PROGRAM shall be established, implemented, and maintained that is based on 10 CFR 830.120 and has the following objectives:

- Work is performed to established technical standards and administrative controls,
- Design changes are controlled commensurate with those controls applied to the original design,
- Personnel are trained and qualified to perform their assigned work,
- Procured items and services meet established requirements,
- Identified records are maintained,
- Periodic assessments of the QA program and its performance are conducted.

5.3.3 Criticality Protection Program

A criticality safety program shall be established, implemented, and maintained that includes the following objectives:

- The Nuclear Criticality Safety (NCS) of operations involving fissionable materials is addressed

and reviewed if there are fissionable nuclide quantities exceeding a threshold quantity,
- The need for NCS controls is identified and the controls are implemented when required,
- Operations involving fissionable materials are performed by trained personnel as specified in the applicable NCS Approval,
- NCS inspections/audits are performed,
- NCS infractions are reported and corrected.

5.3.4 Emergency Preparedness

An emergency preparedness PROGRAM shall be established, implemented, and maintained that includes the following objectives:

- Develop and maintain emergency planning, preparedness, response, mitigation, and recovery capabilities, as well as effective public and interagency communications,
- Respond to emergencies in an effective and timely manner to mitigate the consequences and bring the emergency situation under control.

5.3.5 Fire Protection

A Fire Protection PROGRAM shall be established, implemented, and maintained that includes the following objectives:

- Trained emergency fire fighting and emergency medical response crew on a 24-hour basis,
- Periodic inspection and testing of fire protection equipment,
- Periodic facility fire safety/prevention inspections,
- Periodic fire protection engineering facility assessments.

5.4 References

1. DOE Order 5480.22, *Technical Safety Requirements*, Change 2, U.S. Department of Energy, Washington, DC, January 23, 1996.

2. DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities*, U.S. Department of Energy, Washington, DC, November 15, 1994.

3. DOE-STD-1027-92, *Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.23, Nuclear Safety Analysis Reports*, U.S. Department of Energy, Washington, DC, Change Notice 1, September 1997.

4. Oak Ridge National Laboratory, *Final report: ORNL Necessary and Sufficient Process; Work Smart Standards for Environment, Safety and Health; Report of the Identification Team for the Radiochemical Research Facilities*, Lockheed Martin Energy Research Corp., August 19, 1997.

APPENDIX A

TECHNICAL SAFETY REQUIREMENTS BASES

There are no Safety Limits, Limiting Control Settings, Limiting Conditions for Operations, or Surveillance Requirements identified for the RMAL . Therefore there are no TSR bases. Design features of the facility are included in the SAR, therefore, no description of design feature are includes in this appendix.