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Radiography Facility - Building 239 Independent Validation Review

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Disclaimer

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Lawrence Livermore National Laboratory

Radiography Facility – Building 239 Independent Validation Review

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1. Introduction / Background

The purpose of this task was to perform an Independent Validation Review to evaluate the successful implementation and effectiveness of Safety Basis controls, including new and revised controls, to support the implementation of a new DSA/TSR for B239. This task addresses Milestone 2 of FY10 PEP 7.6.6. As the first IVR ever conducted on a LLNL nuclear facility, it was designated a pilot project.

The review follows the outline developed for Milestone 1 of the PEP, which is based on the DOE Draft *Guide for Performance of Independent Verification Review of Safety Basis Controls*. A formal Safety Basis procedure will be developed later, based on the lessons learned with this pilot project. Note, this review is termed a "Validation" in order to be consistent with the PEP definition and address issues historically raised about verification mechanisms at LLNL. Validation is intended to confirm that implementing mechanisms realistically establish the ability of TSR LCO, administrative control or safety management program to accomplish its intended safety function and that the controls are being implemented. This effort should not, however, be confused with a compliance assessment against all relevant DOE requirements and national standards. Nor is it used as a vehicle to question the derivation of controls already approved by LSO unless a given TSR statement simply cannot be implemented as stated.

2. Scope of the IVR

This IVR is considered to be an initial baseline review conducted immediately following the implementation of a new DSA/TSR. As a baseline review, the controls specifically described in the TSR for B239 are validated. The procedure to be developed will specify a graded approach, and future IVRs may be limited to only those controls that changed from this baseline with periodic reverifications.

This IVR includes the following Specific Administrative Controls:

- Facility Radioactive and Hazardous Material Limits
- High Explosives Limit
- Criticality Safety Evaluations
- Facility Allowable Forms
- Waste Drum Requirements
- Combustible Loading Limit

This IVR includes the following Safety Management Programs:

- Radiation Protection
- Criticality Safety
- Unreviewed Safety Question Process
- Configuration Management
- Fire Protection
- Emergency Preparedness
- Maintenance
- Quality Assurance
- Occurrence Reporting
- Accountability, Control, and Handling of Materials
- Hazardous Material Safety

The Safety Management Program review also includes a verification of the implementation of Procedures, Minimum Staffing, and Recordkeeping.

The extent of review of the Safety Management Programs determines whether the Programs are being implemented in B239 but does not perform a detailed review of each Program.

There are no Safety Limits, no Limiting Conditions for Operations, no Surveillance Requirements, no Safety Significant SSCs, and no Design Features to be reviewed.

3. IVR Preparations

The IVR team received direction from the Safety Basis Division Leader, who worked technical and administrative issues with the Facility Manager. The following comprised the B239 IVR Team:

- Tom Altenbach – Team Leader
- Howard Wong
- Jim Watson
- Ron Beaulieu

All team members have extensive facility safety experience, and no additional training was necessary to undertake this IVR. The Team was substantially independent of the development of the DSA/TSR, although some did perform in an institutional review capacity before the submittal of the completed documentation. In preparing for this IVR, all Team members reviewed the new B239 TSR.

4. Review Process

The IVR used a simple Criteria and Review Approach Document (CRAD) approach. The CRADs used are listed in the attached Form 1. Team meetings were held daily to facilitate communication and review progress. The status of the IVR was regularly communicated to the Facility Manager. Most of the review approaches were based on document review and interviews, with limited direct observation of activities.

5. Basis for Results Presentation

There is no institutional guidance specific to an IVR. Accordingly, a two-tier finding categorization is used in this pilot effort. The first tier consists of TSR Implementation Deficiencies. The second, less serious tier, consists of Deficiencies and Observations, the standard issues defined in LLNL institutional procedure PRO 0042 00, *Issues and Corrective Action Management* (June 1, 2009). Accordingly, all findings are identified by one of the following three terms:

A ***TSR Implementation Deficiency*** is defined as:
A condition, event, procedure, or practice that indicates a TSR, whether LCO, SAC, or safety management program, is not successfully implemented.

A ***Deficiency*** is defined as:
A condition, event, procedure, or operation that is not in compliance with the requirements of applicable federal, state, and/or local laws and regulations, the LLNS Contract, or the LLNL-specific implementing procedures/manuals.

An ***Observation*** is defined as:
A compliant condition, event, operation, or practice that warrants action tracking or is included for trending purposes to identify future potential areas for improvement.

6. Results

No TSR Implementation Deficiencies were identified. The IVR Team found that all relevant criteria in the Controls and Training areas were met. Two simple Deficiencies and four Observations were identified. Neither Deficiency rose to a level that would constitute a TSR Implementation Deficiency.

Table 1 below provides a list of Deficiencies and Observations. Details of the review are included in the attached Form 1. The Deficiencies and Observations are listed in the order that they appear in the Form 1 text. Other opportunities for improvement, some of which are

beyond the scope of the IVR, are noted in the Form 1 text to support continuous improvement in nuclear operations.

Table 1. List of Deficiencies and Observations

Controls Functional Area

General

1) **Observation:** The Facility Safety Plan (FSP) references should be updated to reflect the revised safety basis date of September 2008 and the correct title of the Superblock Work Control Manual (WCM).

Waste Drum Requirements

2) **Observation:** There should be a clarification as to what Department of Transportation specification is to be met.

Radiation Protection

3) **Deficiency**: The requirements of the Health Physics Discipline Action Plan for submitting the air filters for counting were not followed. This is not considered significant enough to fail the overall objectives of the Radiation Protection Program or the Controls Functional Area.

Emergency Preparedness

4) **Observation:** There should be a mechanism established that notifies those responsible for maintenance of the Emergency Preparedness Hazard Assessment whenever changes to the material at risk in a nuclear facility are authorized. This would allow for a summary determination as to whether a major change to emergency classification or response has potentially been created.

Quality Assurance

5) **Observation:** The expired FMP-0207 should be formally extended while the revision process continues.

Training Functional Area

6) **Deficiency:** At least one B239 worker in a significant position has not completed all necessary training. The minimum core personnel needed to declare implementation should be defined. The minimum training requirements for those personnel, including safety basis and relevant safety management program training, should be defined.

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B239 IVR Form 1

1/15/2010

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Table of Contents: B239 IVR Form 1

Functional Area:	Objective:	Date:	Objective Met:	
Controls	1	1/15/10	☒ Yes	☐ No

Objective 1

Verity that the TSR safety basis controls and requirements are incorporated in appropriate facility documents and work instructions.

Criterion: 1.1

Verify that facility implementation documentation identifies specific implementing procedures or program mechanisms for each control.

Review Approach: Obtain the final facility implementation documentation and review against the approved TSRs. Evaluate these results against those from Criteria 1.2, 1.3, and 1.5.

Criterion: 1.2

Validate that there is clear linkage from the TSR and its safety function to the SAC implementing procedures. Specifically, validate that the control and all relevant details necessary to understand its application are accurately cited in the implementing procedure.

Review Approach: Evaluate the content of the cited procedures. Are they complete and accurate? Do they leave any issues open to interpretation?

Where specific parameters such as time or quantities are cited, are there other governing procedures or forms that should cite the SAC as well? If so, they should be complete and accurate as well.

Where controls are only applicable at certain times or during certain operations, is that clearly specified and trackable during operations to the degree necessary?

Criterion: 1.3

Validate that changes to SAC procedures are controlled and only the current approved versions of SAC procedures are used.

Review Approach: Is there a defined mechanism for review and approval of procedure changes?

Does a spot check of the procedures available to operators in the facility find only the current versions cited in implementation?

Criterion: 1.4

Validate that any SAC procedures that require periodic performance of activities to support the SAC (e.g., measurements, combustible loading verification) have successful completion documented.

Review Approach: Sample documentation associated with performance of the implementing procedure for each SAC. Does the documentation demonstrate completion of the procedure accurately and on the frequency specified? Tour the facility to assure that actual facility conditions meet SAC requirements.

Criterion: 1.5

Validate that a documented implementing mechanism, institutional or facility-specific, exists for each TSR safety management program.

Review Approach: This is not a compliance review against all DOE requirements. This validation is intended to determine that cited programs exist with sufficient detail and definition to insure the cited capability is reliable and consistent. The expected outcome is identification of either a current facility-specific manual /procedure integrated into facility operations or an institutional capability with a current implementing interface with the facility.

Criterion: 1.6

Validate that there is clear specification of the key elements of each TSR safety management program in implementing procedures. Specifically, validate that the key element and all relevant details necessary to understand its application are accurately cited in the implementing procedure.

Review Approach: Evaluate the content of the cited procedures. Are they complete and accurate? Do they leave any issues open to interpretation?

Where specific parameter such as time or quantities are cited, are there other governing procedures or forms that should cite the SAC as well? If so, they should be complete and accurate as well.

Where controls are only applicable at certain times or during certain operations, is that clearly specified and trackable during operation to the degree necessary?

Documents and Records Reviewed

1. *Radiography Facility - Building 239 Documented Safety Analysis (DSA)*, September 2008.
2. *Radiography Facility - Building 239 Technical Safety Requirements (TSR)*, September 2008.
3. Letter, A. Williams to B. Goodwin, *Approval of the Annual Update of the Documented Safety Analysis and Technical Safety Requirements for the Building 239 Radiography Facility (TS:090061)*, September 11, 2009, COR-NSI-9/9/2009-132640.
4. *Implementation Guide for Developing Technical Safety Requirements*, DOE-G 423.1-1, October 24, 2001.
5. *Guide for Performance of Independent Verification Review of Safety Basis Controls,* DOE Draft Guide for Pilot Testing and Comment, 2009.
6. *Safety Basis Implementation Procedure for Hazard Category 2 and 3 Nuclear Facilities Revision 1,* LLNL Safety Basis Division Procedure AB-011, July 1, 2009.
7. *Radiography Facility – Building 239 Facility Safety Plan*, December 2009.
8. *Building 239 – Radiography Facility TSR Implementation Plan Revision1*, October 2009.
9. *B239 Implementation Verification Matrix of September 2008 DSA/ TSR,* December 10, 2009.
10. *Building 239 Flammable/Combustible Materials Control Procedure,* ECMS No: CMU07-000321 Rev. AB, Alternate No: ACP-B239-001, December 8, 2009.
11. Interdepartmental Memorandum RF09-003, J. Sloan to R. Rocha, *B239 DSA/TSR Annual Update Implementation*, December 10, 2009.
12. ES&H Manual Document 41.1, *LLNL Quality Assurance Program*, issued September 18, 2009.
13. *Weapons and Complex Integration, Nuclear Materials Technology Program*, *Quality Assurance Program*, NMTP-QAP-06-001, Revision 1, April 2008, ECMS No: NMU07-000003-Rev AB.
14. *Preparation, Review and Approval of NMTP Facilities Procedures*, ECMS No: CMU06-000089 Rev. AC, Alternate No: NMTP-FMP-0100, October 22, 2008.

15. *Tracking Procedures and Controlled Documents*, ECMS No: CMU06-000090 Rev. AB, Alternate No: NMTP-FMP-0101, January 17, 2007.

16. *ECMS Document Control Procedure*, ECMS No. CMU06-000010 Rev. AA, Alternate No: NMTP-FMP-0207, May 17, 2006. (This document is expired. It is being revised, but no extension memo has been processed yet.)

17. *Procurement/Acceptance Process for NMTP Superblock (Nuclear Materials Technology Program) Quality-Significant Orders*, ECMS No: CMU06-000099 Rev AB, Alternate No: NMTP-FMP-0500, May 15, 2008.

18. *Recordkeeping System for NMTP Facilities,* ECMS No: CMU07-000112, Rev AA, Alternate No: NMTP-FMP-0700, June 8, 2007.

19. *Calibration Program for NMTP Facilities Critical Measuring and Test Equipment,* ECMS NO: CMU06-000101 Rev. AB, Alternate No: NMTP-FMP-0701, September 24, 2009.

20. *NMTP Feedback and Improvement Plan, UCRL-AR-137587-REV-1. (This has been superseded by REV-2 from August 2007.)*

21. *Superblock Work Control Manual*, ECMS No: CMU08-000033 Rev AA, LLNL-AR-409585, December 2008.

22. *Facilities Responses and Events,* ECMS No: CMU06-000169 Re. AA, Alternate No: NMTP-FMP-0400, December 18, 2006.

23. *Occurrence Critiques,* ECMS No: CMU07-000058, Rev. AD, Alternate No: NMTP-FMP-0800, January 21, 2009.

24. *LLNL Implementation Procedure for Reporting Occurrences to DOE,* ES&H Manual Document 4.3, approved July 30, 2009.

25. *Events: Notification, Analysis, and Reporting,* ES&H Manual Document 4.5, approved January 5, 2009.

26. *Incident Analysis Manual,* ES&H Manual Document 4.6, minor revision November 4, 2008.

27. *Building 239 Technical Safety Requirement Violation*, Occurrence Report NA—LSO-LLNL-LLNL-2008-0071, February 20, 2009.

28. *Transportation Safety Document,* UCRL-MA-152462-REV-2, June 2007.

29. *49 CFR 178.350, Specification 7A; General Packaging, Type A, Department of Transportation, Washington DC.*

30. *Surveillance Requirement Procedure SRP-B239-4.2.1, Semiannually, Warning Lights Inspection Verifying Actuation by RAMS,* ECMS No: CMU08-000097 Rev. AA, Alternate No: SRP-B239-4.2.1, May 14, 2008.

31. *Surveillance Requirement Procedure SRP-B239-4.2.2, Annual, RAMS Test and Recalibration,* ECMS No: CMU08-000098 Rev. AA, Alternate No: SRP-B239-4.2.2, May 14, 2008.

32. *Maintenance Implementation Plan for Superblock Hazard Category 2 & 3 Nuclear Facilities,* ECMS No: CMU09-000021 Rev. AA, Alternate No: LLNL-AM-410362, August 29, 2008.

33. *Unreviewed Safety Question (USQ) Process*, ECMS No: CMU06-000100 Rev AF, Alternate No: NMTP-FMP-0600, October 19, 2009.

34. *Facility Safety Plans and Integration Work Sheets with Safety Plans,* ES&H Manual Document 3.3, May 20, 2008.

35. *OSP Development and Implementation Guide,* ECMS No: CMU07-000132, Rev AB, Alternate No: NMTP-FMP-0102, July 2, 2008.

36. *NMTP Nuclear Facility Configuration Management Plan,* ECMS No: NMU08-000015 AB, October 22, 2008

37. *Superblock Configuration Management Plan for VSS,* ECMS No: CMU06-000021 AB, October 9, 2009.

38. *Lawrence Livermore National Laboratory Emergency Plan January 2007*, UCRL-AM-227423, January 2007.

39. *Building 239 Facility-Specific Emergency Plan*, August 2006.

40. *Building 239 Facility-Specific Emergency Plan*, Draft, January 2010.

41. *Emergency Preparedness Hazards Assessment, Building 239 Radiography Facility*, Rev. 2, May 2007.

42. *EALS for Building 239*, July 24, 2007.

43. ES&H Manual Document 22.1, *Emergency Preparedness and Response*, issued May 2, 2009.

44. *Zone 9 Self-Help Plan*, November 8, 2006 and quarterly updates.

45. ES&H Manual Document 21.1, *Acquisition, Receipt, Transportation, and Tracking of Hazardous Materials*, issued March 4, 2009.

46. ES&H Manual Document 21.2, *Transportation Safety Manual Volume 1: Main Site – Site 200*, issued July 6, 2009.

47. ES&H Manual Document 22.5, *Fire*, issued December 27, 2007.

48. *Fire Hazards Analysis Building 239*, August 25, 2008.

49. *Discipline Action Plan Fire Protection*, Building 239 – 2009, Rev. 7.3, December 2008.

50. *4th Qtr 2009 239 Fuel Loading*, Excel spreadsheet, Michael L. Jones, December 2009.

51. ES&H Manual Document 10.2, *LLNL Health Hazard Communications Program*, issued December 10, 2007.

52. ES&H Manual Document 14.1, *LLNL Chemical Safety Management Program*, issued December 12, 2007.

53. *Industrial Hygiene Discipline Action Plan for Building 239*, 2009 Version.

54. Material Safety Data Sheet, DowthermA, October 1980.

55. Operational Safety Plan (OSP) S-003, *Transfer of Radioactive Material Among Superblock Facilities*, September 30, 2008.

56. MM-OG-172, *Checklist for Onsite Movement of Radioactive Material*.

57. ChemTrack web site. http://chemtrack.llnl.gov/chemtrack/index.html

58. *Weapon and Complex Integration Directorate B239 Training Manual*, ECMS No: CMU08-000167 Rev AB, November 2008.

59. B239 Operations Logbook.

60. ES&H Manual Document 51.3, *LLNL Unreviewed Safety Question (USQ) Process*, Rev. 8.

61. List of Superblock documents to which the USQ process is applicable, KLFsjb-1357 revision 0 (10/16/09).

62. *NMTP USQ Compliance List*, October 2009 (rev 12/16/09).

63. *2009 USQ Assessment Report in Preparation for CDNS Review*, April 22, 2009.

64. *List of Unreviewed Safety Question Determinations/Screenings for Bldg. 239* (printed on 12/16/09).

65. *B239 FSP/DSA/TSR Training Update* (12/16/09).

66. USQD , B239-09-050-D, rev. 0, *Baseline Evaluation of the Radiography Facility – B239 Criticality Control Review Document,* Revision 1 (CCR-B239-NCSD-2009-001).

67. USQS, B239-09-043-S, Rev 0, *Operating Procedures, Preparation of SNM for Transport from Bldg 239, SNM Pit Handling in Building 239, and Preparation for JTA Handling in Bldg 239.*

68. USQD, B239-09-027-D, Rev. 0, *Baseline Review of the ES&H Team 1 Health Physics Discipline Action Plan for Building 239*.

69. USQD- B239-08-058-D, Rev. 0, *Installation and Pre-Operational Testing of the Linatron M9A X-ray System in Room B11.*

70. NMTP AB Issues Meeting Minutes

- March 4, 2009
- March 11, 2009
- June 3, 2009
- June 24, 2009
- November 4, 2009
- December 9, 2009

71. CSAM-08-147 (11/18/08).

72. CSM 1347, Addendum 1 (11/18/08).

73. *Record of Independent Review* (for CSAM-08-147 and CSM 1347) signed by D. Heinrichs.

74. CSAM -09-126 (10/21/09).

75. CSM 1527 (7/17/08).

76. CSAM 09-020, Rev. 1 (6/12/09).

77. CSM 1548, Rev. 1 (6/12/09).

78. Criticality Safety Discipline Action Plan (DAP) (6/10/09).

79. ES&H Manual Document 20.3, *LLNL Radiological Safety Program for Radiation Generating Devices*, Revision 3.

80. *ES&H Team 1 Health Physics Discipline Action Plan for Building 239*, Revision 7.5 (5/27/09).

81. B239 Work Permits

    - 239-09-D-003 (closed)
    - 239-09-D-008 (closed)
    - 239-09-D-009 (closed)
    - 239-09-D-016 (closed)
    - 239-09-D-001 (open)
    - 239-09-D-004 (open)

82. SRP-B239-4.1.1/4.1.2/4.1.3, *Surveillance Requirement Procedure Semiannually, Inspection and Testing to Ensure Operability of the Interlock System – SR 4.1.1, Daisy Chain Key-Actuated Interlock System, SR 4.1.2, Interlock Switches and Gates, and SR 4.1.3, Emergency Shutdown Buttons*, Rev. AB.

83. Attachment 1 to SRP-B239-4.1.1/4.1.2/4.1.3, Rev AB, completed on 8/12/09.

84. Attachment 1 to SRP-B239-4.2.1, Rev. AA, completed on 8/11/09.

85. Attachment 1 to SRP-B239-4.2.2, Rev AA completed on 1/26/09.

86. System Design Description, *Building 239 System Design Description for the Daisy Chain Key-Actuated Interlock System* (draft).

87. Facility worker required reading documentation for ACP-B239-001, dated 12/9/2009.

88. *Nuclear Materials Technology Program Configuration Management Management Self-Assessment Report*, November 12, 2009.

89. *B239 Training Implementation Matrix (TIM),* December 2006, UCRL-AM-205022.

90. Letter, A. Williams to B. Goodwin, COR-OM-11/24/2008, *Approval of Training Implementation Matrices for B239 and B334*.

91. *B239 FSP/DSA/TSR Training Updates Sign-in Sheets*, December 9, 2009, December 16, 2009, and January 5, 2010.

Interviews Conducted

1. Jim Sloan, Facility Manager (and Minimum Staffing POC)
2. Annie Warner, Deputy Facility Manager
3. Glen Held, B239 Facility Safety Officer
4. Robert Lochner, FPOC
5. Randall Thompson, Alternate FPOC
6. Kjell Tengsdal, Lead Health Physicist for B239 (Radiation Protection POC)
7. John Pearson, Criticality Safety Lead for Superblock Facilities
8. Stephanie Bates, NMTP Deputy Authorization Basis Manager/Lead Safety Analyst for B239 (Unreviewed Safety Question POC)
9. Michael L. Jones, Fire Protection POC
10. Debbie LaPierre, Emergency Preparedness POC
11. Dwight Squire, NMTP Facilities Operations, Maintenance, and Engineering Manager
12. Mark McCuller, B239 System Engineer
13. Bob Swift, Quality Assurance POC
14. Donna Mailhot, NMTP Assurance Manager (Occurrence Reporting POC)
15. Kevin Mahoney, Material Control and Accounting POC
16. Jim Boyer, Hazardous Materials Safety POC
17. Lorenzo Wells, NMTP Training Manager
18. Don Kavanagh, NMTP Material Handler
19. Willie Mitchell, NMTP Trainer

Evolutions Performed and Observed

1. A Walk down of B239 was performed on December 15, 2009. It was lead by the Facility Manager and attended by all four members of the IVR Team. The Facility Safety Officer and Alternate FPOC were also available to answer questions at that time.
2. The *Radiography Facility DSA/TSR/FSP Supplemental Training Presentation,* December 16, 2009 was observed.

Discussion of Results

Specific Administrative Controls

(Note Criteria 1.5 and 1.6 are not applicable)

Facility Radioactive and Hazardous Material Limits

Documented evidence exists to confirm that the Facility Radioactive and Hazardous Material Limits concerning Pu-239 equivalent, highly enriched uranium, depleted uranium, lithium hydride, beryllium and beryllium oxide are effectively implemented.

Criterion 1.1

The Facility Radioactive and Hazardous Material Limits were implemented in the following document:

- Facility Safety Plan (see Table 3-2. Directive Action Specific Administrative Controls and Appendix F, Administrative Controls Checklist.)

Criterion 1.2

The control and all relevant details necessary to understand its application are accurately cited in the implementing procedure.

The control is applicable at all times and is administered prior to radioactive and hazardous material transfers into and out of Building 239.

Criterion 1.3

The Facility Safety Plan is controlled. The users of the procedure are responsible to use the current approved version of the procedure.

Criterion 1.4

The control is applicable at all times and is administered prior to radioactive and hazardous material transfers into Building 239. The results are recorded in the Facility Safety Plan, Appendix F, Administrative Controls Checklist.

High Explosives Limit

Documented evidence exists to confirm that the High Explosives Limit of 10 grams is effectively implemented.

Criterion 1.1

The High Explosives Limit was implemented in the following document:

- Facility Safety Plan (see Table 3-2. Directive Action Specific Administrative Controls and Appendix F, Administrative Controls Checklist.)

Criterion 1.2

The control and all relevant details necessary to understand its application are accurately cited in the implementing procedure.

The control is applicable at all times and is administered prior to high explosives transfers into Building 239.

Criterion 1.3

The Facility Safety Plan is controlled. The users of the procedure are responsible to use the current approved version of the procedure.

Criterion 1.4

The control is applicable at all times and is administered prior to high explosives transfers into Building 239. The results are recorded in the Facility Safety Plan, Appendix F, Administrative Controls Checklist.

Criticality Safety Evaluations

Criterion 1.1

The B239 Criticality Safety Program flows down from the following documents:

- LLNL ES&H Manual Document 20.6, *Criticality Safety*
- B239 DSA Chapter 6, *Prevention of Inadvertent Criticality*
- B239 TSR Table 5-2, *Directive Action Specific Administrative Controls*
- B239 Facility Safety Plan
- *Nuclear Criticality Safety Division Discipline Action Plan (DAP) for NMTP Facilities (Except RHWM)*, dated 6/10/09.

Criterion 1.2

The purpose of the Criticality Safety Program is to assure criticality safety through engineered and administrative controls for fissionable materials, procedures for packaging materials, review and approval process for operations/activities, and a formal training program. The B239 DSA/TSR specify the engineered and administrative controls needed for safe operations. The B239 FSP was found to accurately reflect the criticality safety controls specified in the DSA/TSR, including the TSR Specific Administrative Control that operations involving greater than 145 grams of fissionable materials be evaluated and documented in a criticality safety evaluation (Criticality Safety Memorandum).

The criticality safety evaluation process is initiated through provisions in Section 3.3.3.2 of the B239 FSP and through the B239 Criticality Safety Review and Approval form (Appendix E of the B239 FSP). If the proposed operation/activity is considered to be with "insignificant quantities of fissionable materials", the Facility Manager may approve the Review and Approval form. For operations/activities with "significant quantities of fissionable material", the Review and Approval form must be signed by a representative from the Nuclear Criticality Safety Division and the Facility Manager. Supporting the Review and Approval form are the Criticality Safety Administrative Memorandum (CSAM) and Criticality Safety Memorandum (CSM) documents. A sample of Review and Approval forms and the associated CSAM and CSM documents were reviewed. The documents were found to be sufficiently detailed, technically supported the conclusions, and clearly specified the required criticality safety controls needed for the proposed operation/activity. The threshold for completing a CSAM and CSM are low as evidenced by a CSAM and CSM which evaluated a radiography operation that was like a previous operation with the only change being that the item would be double bagged. This minor change in the process was evaluated in a new CSAM and CSM. The CSAM and CSM

documents are reviewed at a minimum by the Criticality Safety Division Leader and the review is documented on a Record of Independent Review form.

A new criticality safety document has been prepared to meet DOE O 420.1B, that is the Radiography Facility B239 Criticality Control Review Document (Rev. 1). This document is intended to provide "a documented analysis to support the linkage and selection of the criticality safety controls in the B239 DSA/TSR." This document also provides a checklist process to identify any future CSMs, which may create new controls, for evaluation of whether they should be added to the B239 TSR. This document has been submitted to NNSA/LSO for review and approval.

The criticality safety training as documented in LTRAIN for the Facility Manager, Deputy Facility Manager, Facility Safety Officer, and 2 radiographers was reviewed and all personnel were found to be current on the required criticality safety training.

Criterion 1.3

The Criticality Safety program implementing documents are the B239 FSP and Criticality Safety DAP. Both documents are controlled documents and current versions were available to B239 staff.

Criterion 1.4

The documents reviewed confirmed that the B239 Criticality Safety Program is being implemented and personnel were knowledgeable of the requirements.

Facility Allowable Forms

Documented evidence exists to confirm that the SAC on Allowable Forms of SNM in B239 is effectively implemented.

Criterion 1.1

The Facility Allowable Forms were implemented in the following document:

- Facility Safety Plan (see Table 3-2. Directive Action Specific Administrative Controls and Appendix F, Administrative Controls Checklist.)

Criterion 1.2

The control and all relevant details necessary to understand its application are accurately cited in the implementing procedure.

The control is applicable at all times and is administered prior to radioactive and hazardous material transfers into Building 239.

Criterion 1.3

The Facility Safety Plan is controlled. The users of the procedure are responsible to use the current approved version of the procedure.

Criterion 1.4

The control is applicable at all times and is administered prior to radioactive and hazardous material transfers into Building 239. The results are recorded in the Facility Safety Plan, Appendix F, Administrative Controls Checklist.

Waste Drum Requirements

Documented evidence exists to confirm that waste drums containing TRU waste are sealed containers that meet DOT specification.

Criterion 1.1

The implementing mechanism listed in the TSR Implementation Plan (Ref. 8) is the FSP (Ref. 7), in particular Section 3.4.1 *Waste Handling* which states:

> "Prior to transfer to Building 239, waste drums containing SNM shall be inspected for evidence of container damage or overpressurization and for compliance with DOT specification and applicable DOE requirements. Acceptance by the Building 239 Facility Manager, Facility Point of Contact, or designee of the appropriate Transportation Safety Document (TSD) paperwork satisfies this requirement. "

In addition, the FSP Appendix F contains the Administrative Controls Checklist that must be included in the work package for bringing any hazardous or radioactive materials identified in Table 3-2 in B239. In the checklist, the FPOC, Safety Officer, or Facility Manager must verify by initials that the activity does not result in violating the administrative control for waste drum requirements.

Criterion 1.2

There is clear linkage from the TSR and its safety function to the FSP that implements the SAC. However the relevant details necessary to understand its application, such as what "DOT specification" applies, are not provided. If a more general citation of multiple specifications is intended, revision of the TSR may be appropriate.

Since reliance is placed upon the "appropriate Transportation Safety Document paperwork" to implement this SAC, the Transportation Safety Document (TSD, Ref. 28) should also be considered an implementing document. From the TSD, it appears the DOT specification being referred to is 49 CFR 178.350, Specification 7A, General Packaging, Type A (Ref.29).

Criterion 1.3

The FSP is a controlled document in ECMS. It was updated as part of the B239 TSR implementation, and only the current version is in use.

Criterion 1.4

The control is applicable at all times and is administered prior to waste drum material transfers into Building 239. The results are recorded in the Facility Safety Plan, Appendix F, Administrative Controls Checklist. There are no SAC procedures that require periodic performance of activities to support the Waste Drum Requirements SAC.

Combustible Loading Limit

Documented evidence exists to confirm that the Combustible Loading Limit of 2 lb/ft^2 is effectively implemented.

Criterion 1.1

The Combustible Loading Limit was implemented in the following documents:

- ACP-B239-01
- Facility Safety Plan

Criterion 1.2

The control and all relevant details necessary to understand its application are accurately cited in the implementing procedure.

The control is applicable when SNM is present in Building 239 and is administered during periodic walkthroughs and prior to SNM transfers into Building 239 or when significant quantities of combustible materials are brought into Building 239.

Criterion 1.3

Procedures ACP-B239-01 and the Facility Safety Plan are controlled. The users of the procedures are responsible to use the current approved version of the procedure.

Criterion 1.4

The Fire Protection Engineer documents the results (i.e., successful completion of the SAC) via ACP-B239-01 using an Excel spreadsheet developed by the Fire Protection Engineer who maintains these records. The Fire Protection Engineer sends specific emails to the Facility Manager and others with a compliance notification. The results are also recorded in the *Facility Safety Plan, Appendix F, Administrative Controls Checklist*. Since the Checklist is prepared before SNM is brought into the Facility, it is not relevant to check off on the 4-ft radius separation between a plutonium component and combustible material. Documentation associated with performance of the implementation of this requirement is contained on specific work permits.

Safety Management Programs

(Note Criteria 1.2, 1.3, and 1.4 are not applicable.)

Radiation Protection

Criterion 1.1

The B239 Radiation Protection Program is principally defined and implemented through the following documents:

- B239 FSP
- B239 Health Physics Discipline Action Plan (DAP)
- LLNL ES&H Manual Documents 20.1, *Occupational Radiation Protection*, and 20.3, *LLNL Radiological Safety Program for Radiation Generating Devices*
- Superblock Work Control Manual

Criterion 1.5

The B239 TSR describes the key elements of the Radiation Protection Program and includes:

- ALARA principle
- Dosimetry program
- Radiation safety training
- Radiation-generating devices (RGDs) operated in compliance with the provisions of LLNL ES&H Manual Document 20.3, *LLNL Radiological Safety Program for Radiation Generating Devices*
- Monitoring system and procedures, specifically including access control
- RGD shielding and shield walls maintained in compliance with the provisions of Document 20.3 and assessment of any alterations.

These TSR key elements are implemented through the B239 FSP, Section 3.3.3.1, and through the B239 Health Physics DAP.

Criterion 1.6

The B239 FSP and Health Physics DAP were found to be consistent with the provisions in ES&H Manual Document 20.3. The Lead Health Physicist evaluates proposed operations/activities in B239 through the Work Permit review process. The Health Physicist formally reviews and approves the proposed operation/activity and documents this on the work permit form. The Health Physicist reviews the proposed activity for any unique or special circumstances requiring

specific controls, the expected dose rates from the activity, the need for any special surveys or monitoring, locations of CAMs, and evaluation of the need for personnel pre-job briefings. It is through this review process that controls are identified and specified. When fissionable materials are brought into B239 and after removal from the packaging, the container is swiped to assure that contamination is not present. Continuous air monitoring is required by the FSP when singly contained Special Nuclear Material is out of its shipping container and the RGD is not operating. These measures implement the ALARA principle.

The B239 ALARA and dosimetry program includes the review of external dosimetry data from the Hazards Control Department and notification of appropriate managers when a radiation dose to a worker in a Superblock facility is identified. This review is routinely performed approximately on a monthly basis. Several records of this review were observed and demonstrated a detailed review of the dose as compared to administrative limits.

Access to the radiography bays when preparing for radiographic operations is strictly controlled though the use of a passageway keyed-interlock system, physical sweeps of areas, PA announcements, warning lights, and radiation monitors. Emergency stop buttons are installed in various locations should personnel be present in hazardous locations with radiographic operations taking place or about to take place. Some of these provisions were previously identified to be safety significant features, but are now equipment important to safety that are being maintained and tested as was done previously. As equipment important to safety, these systems including the shield walls are covered under the USQ process and any proposed changes to these systems or associated procedures would require a USQ review to assure the facility safety basis is maintained.

Radiation survey records while the 9/5 MeV RGD was operating were reviewed and indicated very low levels of radiation in occupied areas outside the RGD high bays. These surveys include the initial survey performed on 1/29/09 and the semi-annual surveys performed in 7/9/09 and 12/3/09. Swipe survey results were observed in the STAR system for the latest operation in B239.

The results of the measurement of the air filter from the continuous air monitor (CAM) from the latest operation in B239 were requested. It was identified that the air filter had not been sent to the Radiation Measurements Lab (RML) for counting. This was not in accordance with the B239 Health Physics DAP (HP-16-N) which specifies that CAM air filters are to be submitted to the Radiation Measurements Lab using the STAR database. While not in accordance with the Health Physics DAP, the safety consequence of not submitting the air filters for counting is minimal in that the container for fissionable material being brought into B239 is swiped for

contamination after it is removed from its packaging. Also the passive nature of the nondestructive examination operations in B239 inherently does not pose a hazard of breaching the container enclosing the fissionable material. The process of counting the air filter with equipment in the RML able to detect lower levels of contamination than seen by the CAM may allow for monitoring of very levels of contamination in B239; however, the possibility of having contamination in B239 is very low. The low likelihood of contamination in B239 had been demonstrated in operational experience. Based on the above, there appears to be very low safety consequence of not submitting the air filter for counting. However, this is a deficiency for not following the requirements of the HP DAP in not submitting the air filters for counting, although the safety consequences appear minimal.

A sample of six recent Work Permits were reviewed and found to adequately document the safety reviews of proposed operations/activities done by the various ES&H Team safety disciplines including the Lead Health Physicist.

The key elements of the Radiation Protection Program have been demonstrated to be appropriately implemented in the B239 FSP and HP DAP and through a review of records and interviews implementation has been demonstrated.

Criticality Safety

Criterion 1.1

The B239 Criticality Safety Program is governed by LLNL ES&H Manual Document 20.6, *Criticality Safety*, and is implemented through the B239 FSP.

Criterion 1.5

As described above (Specific Administrative Controls section), the Criticality Safety Program is implemented through the B239 FSP and is initiated by the Criticality Safety Review and Approval form. This program is consistent with the LLNL ES&H Manual Document 20.6 and the DSA/TSR.

Criterion 1.6

As described in the Specific Administrative Controls section, the key elements of the Criticality Safety Program have been appropriately implemented into the B239 FSP and through a review of records and interviews implementation has been demonstrated.

Unreviewed Safety Question Process

Criterion 1.1

The USQ process is implemented through the LLNL ES&H Manual Document 51.3, *LLNL Unreviewed Safety Question (USQ) Procedure*, Revision 8. NMTP-FMP-0600 Revision AF describes the NMTP administrative procedure for performing the USQ process for NMTP Superblock facilities. The Superblock Work Control Manual (Ref. 21) describes the work permitting process.

Criterion 1.5

The "List of Superblock documents to which the USQ process is applicable" provides a listing of the various Superblock documents that are required to be under the USQ process and therefore must have a USQ evaluation performed against it and should enter the USQ process when changes to these documents are proposed. This list was approved by the NMTP Program Leader and the Safety Basis Division Leader.

The B239 DSA describes the key elements of the USQ Process to include:

- Permits facility management to make physical changes and procedural changes and conduct tests and experiments without prior DOE approval as long as they do not explicitly or implicitly affect the facility safety basis or result in a change to a TSR
- Ensures conditions (or potential conditions) outside the facility safety basis or TSRs are identified.

These key elements are implemented through ES&H Manual Document 51.3. For B239 operations/activities, the USQ process is initiated through the Work Permit process and through NMTP-FMP-0600 Revision AF for procedure changes. When an operation/activity is proposed to be performed in B239, a Work Permit form is prepared and a judgment made as to whether it will be processed through a USQ Categorical Exclusion or another USQ document.

A sample of six recent Work Permits was reviewed and found to document application of the USQ process for review of the proposed operation/activity. Four USQ documents (3 USQ Determinations and 1 USQ Screening) were reviewed and found to be performed acceptably. Review of the B239 USQ Determinations/Screening log reflected that baseline USQ evaluations were being performed for various documents (including Task Codes, ES&H Manual documents, ES&H Team Discipline Action Plans, NMTP Facilities Management Procedures, RHWM waste procedures, Criticality Safety Control Review documents, and operating procedures).

Formal assessment of the implementation of the USQ process in LLNL nuclear facilities was evident in the *2009 USQ Assessment Report in Preparation for CDNS Review* (April 22, 2009). This assessment focused on implementation of the USQ process in LLNL nuclear facilities including B239 and the review of a sample of USQ documents.

A review of USQ training was performed using LTRAIN data. The training records in LTRAIN for a sample of three USQ preparer/reviewer/approvers and five preparer/reviewers were reviewed and all found to be current in their USQ training. Their status was accurately reflected in the NMTP USQ Compliance List, October 2009 (printed on 12/16/09).

Criterion 1.6

The key elements of the Unreviewed Safety Questions process have been appropriately implemented into the B239 FSP and through a review of records and interviews implementation has been demonstrated.

Configuration Management

Criterion 1.1

The B239 DSA/TSR describes that the B239 Configuration Management Program is implemented through the following documents:

- LLNL Graded Approach to Configuration Management (UCRL-AR-123533)
- LLNL Configuration Management Standard (UCRL-AR-133351)
- Nuclear Facility Maintenance Implementation Plan for the NMTP Hazard Category 3 Facilities
- NMTP Category 3 Nuclear Facilities and Superblock Yard/Work Control Manual.

Criterion 1.5

The B239 DSA/TSR describes the key elements of the Configuration Management Program to include:

- Program Management
- Design requirements (including orientation of linatrons)
- Change Control
- Documentation Control
- Assessments

It was noted that the DSA/TSR references documents that are not the most current related to the Configuration Management Program. The most applicable documents that implement the Configuration Management Program for B239 are:

- NMTP Nuclear Facility Configuration Management Plan (October 2008)
- NMTP Superblock Work Control Manual (December 2008)
- NMTP Maintenance Implementation Plan for Superblock Hazard Category 2 & 3 Nuclear Facilities (August 2008)

The key elements of the Configuration Management Program are implemented through the following documents:

- Program Management - NMTP Nuclear Facility Configuration Management Plan (October 2008)
- Design Requirements - NMTP Nuclear Facility Configuration Management Plan (October 2008)

- Change Control - NMTP Superblock Work Control Manual (December 2008); NMTP Maintenance Implementation Plan for Superblock Hazard Category 2 & 3 Nuclear Facilities (August 2008); USQ Process (ES&H Manual Document 51.3 and NMTP-FMP-0600)
- Documentation Control - NMTP Nuclear Facility Configuration Management Plan (October 2008)
- Assessments - NMTP Nuclear Facility Configuration Management Plan (October 2008)

From a safety perspective, the principal goals of Configuration Management Program for safety systems are to assure that the systems' intended safety function is maintained and to ensure that the facility physical configuration is maintained consistent with documentation. This is done through the implementation of two processes: 1) the NMTP Work Control process which evaluates proposed changes to facility operations and activities and ensures consistent documentation; and 2) the USQ process which evaluates whether proposed changes to operations and activities remain within the facility safety basis. The review of recent B239 Work Permits confirmed that proposed changes were being appropriately controlled. Safety systems that were previously considered to be safety significant are now considered Equipment Important to Safety (Table 5-7 of the B239 DSA) and therefore any changes to these systems will continue to be reviewed through NMTP Work Control and USQ processes.

System drawings are maintained by the System Engineer and located in the facility. The Facility Engineering Manager indicated that draft essential drawings and a draft System Design Document are being prepared.

An assessment of the implementation of the NMTP Configuration Management Program was performed in November 2009. This demonstrates implementation of assessments.

Criterion 1.6

The key elements of the Configuration Management Program process have been appropriately implemented through several documents and through a review of records and interviews implementation has been demonstrated.

Fire Protection

Documented evidence exists to confirm that a fire protection program has been established, implemented, and maintained to minimize any threat to public health and welfare resulting from a fire, and to minimize undue hazards to site personnel from a fire.

Criterion 1.1

The Fire Protection Program was implemented in the following documents:

- *B239 Fire Protection DAP*
- Facility Safety Plan
- ACP-B239-01, *B239 Flammable/Combustible Materials Control Procedure*
- ES&H Manual, Doc. 22.5, *Fire*

Criterion 1.5

The Fire Protection Program is implemented by the documents listed above.

The Fire Protection Program key element, *Controls on the combustible loading in Building 239*, is implemented by the use of current procedure, ACP-B239-001, *B239 Flammable/Combustible Materials Control Procedure*, and by the Facility Safety Plan via the Fire Protection Engineer, Michael L. Jones. Procedure ACP-B239-001 document history lists in the Change Summary "Update procedure to include revised TSRs." The Fire Protection Engineer documents the results using an Excel spreadsheet and communicates the results via email to the Facility Manager and other B239 staff as appropriate. The combustible loading is less than the TSR limit.

The Fire Protection Program key element, *Routine fire protection assessments conducted to identify fire hazards*, is implemented by ACP-B239-01 and the *B239 Fire Protection DAP.*

> Note 1: The FHA was not cited as an implementing document in the B239 TSR Implementation Verification – September 2008 DSA/TSR. The FHA could be updated to reflect the current DOE directives in contract number DE-AC52-07NA27344, and the current safety basis dated September 2008. ES&H Manual Document 22.5, section 4.16, Fire Protection Assessment cites the FHA as a feeder document to the DSA. However, the FHA was not cited by the DSA.
>
> Note 2: FHA Section 14.1, Deficiencies, lists two items: 1. Lack of wet pipe, automatic sprinkler system, and 2. Lack of manual fire alarm pull stations at two exits. Each of these items is required by NFPA 101 – Life Safety Code. Item 2 is part of the fire

detection and alarm system, which is cited by the TSR via TSR section 5.4.3 referral to DSA Table 5-7, Equipment important to safety. DSA section 2.7.1.4, Fire Detection and Alarm System states the system consists of pull stations among other components, but the DSA does not document the deficiency regarding the pull stations.

FHA deficiencies should be tracked and have a resolution, even if that resolution is simply to note that the cost constraints of an engineered solution are prohibitive. The Facility Manager created two ITS entries for these deficiencies.

Criterion 1.6

The B239 fire Protection Program has two key elements.

ACP-B239-001, *B239 Flammable/Combustible Materials Control Procedure*, Scope provides a clear specification of the Fire Protection Program key element, *Controls on the combustible loading in Building 239*. The combustible loading limit is also a SAC. The ACP-B239-001 Scope provides a verbatim copy of the TSR SAC regarding combustible loading and an additional fuel loading control (not a TSR) and verification of the SAC, “Except for minimal quantities of combustible material associated with radiography of a plutonium component or item, the plutonium component or item shall be separated from combustible material by a 4-ft clear radius.”

ES&H Manual Document 22.5, section 4.16, Fire Protection Assessment cites the FHA as a feeder document to the DSA per the Documented Safety Analysis Program as described in Document 51.1, “Documented Safety Analysis Program Plan,” in the ES&H Manual. Document 51.1 states, “A key input is the Fire Hazard Analysis (FHA) required by DOE Order 420.1B, Facility Safety.” (p 7)

A review of the Facility Safety Plan (FSP) Table 3-2, lists all the TSR SACs verbatim including the Combustible Loading Limit and the 4-ft clear radius.

Note: The FSP references should be updated to reflect the revised safety basis date of September 2008 and the correct title of the Superblock Work Control Manual.

Emergency Preparedness

Documented evidence exists to confirm that an emergency preparedness program has been established, implemented, and maintained for B239.

Criterion 1.1

The Emergency Preparedness Program is implemented in the following documents:

- Facility Safety Plan
- Zone 9 Self-Help Plan
- ES&H Manual, Doc. 22.1, *Emergency Preparedness and Response*
- LLNL Emergency Plan

According to ES&H Manual, Doc. 22.1, "The Emergency Management Base Program at LLNL ("Base Program") is intended to ensure that each occupied facility has a fundamental emergency action plan (emergency reporting, evacuation, assembly, and accountability) and that residents participate in a basic drill of the plan annually." The Emergency Management "Hazardous Materials" Program at LLNL adds to the Base Program and is a formal emergency planning process based on the DOE requirements contained in DOE Order 151.1, "Comprehensive Emergency Management System.
Note: Doc 22.1 could be updated to reflect DOE Order 151.1C.

1) According to ES&H Manual, Doc. 22.1, facilities that have an EPHA shall have a facility-specific emergency plan. The EPHA for B239 was reviewed. The May 2007 EPHA references the 2004 FSP and the 2003 SAR/TSR and the MAR for HEU as 25 kg. The EPHA for B239 should be revised to reflect the current FSP and Safety Basis and the MAR for HEU as 50 kg. In general, there should be a mechanism established that notifies those responsible for maintenance of the Emergency Preparedness Hazard Assessment whenever changes to the material at risk in a nuclear facility are authorized. This would allow for a summary determination as to whether a major change to emergency classification or response has potentially been created.

Note, although the B239 facility-specific emergency plan was not cited for implementation of the TSR, it is out of date and in the revision process.

Criterion 1.5

The Emergency Preparedness Program SMP is implemented in the following documents.

- The B239 *FSP*
- The *Zone 9 Self-Help Plan*
- ES&H Manual Document 22.1, Emergency *Preparedness and Response*
- The *LLNL Emergency Plan*

The Alameda County Fire Department staffs LLNL Fire Station 20 located in Building 323 and has significant institutional capabilities including the Emergency Dispatch Center, which can deploy assets from the Protective Forces and Emergency Responders.

Criterion 1.6

The Emergency Preparedness Program has three key elements:

- LLNL Emergency Preparedness Plan (including shelter-in-place).
- A Zone 9 Self-Help Plan.
- Personnel response procedures for local worker evacuation in the event of a lithium hydride fire.

These key elements are respectively implemented by:

- the *LLNL Emergency Plan,*
- the *Zone 9 Self-Help Plan, and*
- the B239 *FSP.*

Maintenance

Criterion 1.1

The B239 Maintenance Program is implemented through the NMTP Maintenance Implementation Plan which implements the provisions of ES&H Manual Document 52.1, *LLNL Maintenance Management Program for Nonreactor Nuclear Facilities.*

Criterion 1.5

The B239 TSR describes that the B239 Maintenance Program ensures "effective measures are taken so that facility SSCs are capable of performing their intended function."

The B239 TSR describes that the B239 Maintenance Program is implemented through the *Nuclear Facility Maintenance Implementation Plan for NMTP Hazard Category 3 Facilities*. However, the current revision of this document is the *WCI, NMTP, Superblock Maintenance Implementation Plan for Superblock Hazard Category 2 & 3 Nuclear Facilities,* August 2008. The B239 FSP was noted to have the correct document referenced.

In the most recent DSA/TSR, previously considered safety significant systems, structures and components (SSCs) are no longer safety significant. These systems include the Daisy Chain Key-Actuated Interlock System, Interlock Switches and Gates, Emergency Shutdown Buttons, and the Radiation Area Monitors and associated warning lights. Testing continues to be performed at the previously established frequency and in accordance with the existing surveillance requirement procedures (i.e., SRP-B239-4.1.1/4.1.2/4.1.3, SRP-B239-4.2.1, and SRP-B239-4.2.2). These SRPs were reviewed and found to adequately test the operability of the associated SSCs consistent with the safety functions described in the draft System Design Description, Building 239 System Design Description for the Daisy Chain Key-Actuated Interlock System. A sample of recent tests of the Daisy Chain Key-Actuated Interlock System, Warning Light Inspection, and Radiation Area Monitor Test and Calibration were reviewed and found to complete and accurately completed.

The B239 FSP describes in Section 4.2.1 that the Monthly Summary Report (maintained by the Quality Assurance Office) contains the completion of scheduled maintenance, inspection, and testing activities. It was identified that this Summary Report is no longer being maintained for B239. Since surveillance/testing requirements will eventually be converted to PM documents, the need for the Summary Report is fairly low.

Discussions with the B239 System Engineer indicated that failures of the safety systems in B239 were rare. It was also indicated that safety system failures would usually result in the inability

of the RGDs to operate and therefore were in a fail-safe mode. A discussion with the NMTP Assurance Manager indicated that there were no Corrective Action Requests for B239 related to maintenance. A discussion with one of the radiographers that operates the B239 Linatrons indicates that there are no maintenance recommendations related to the safety aspects of the newest 9/5 MeV Linatron. In addition, a contract is in place with the vendor to perform any required maintenance.

Criterion 1.6

The key elements of the B239 Maintenance Program have been appropriately implemented, with continued testing of B239 safety systems and through a review of records and interviews implementation has been demonstrated.

Quality Assurance

Documented evidence exists to confirm that a Quality Assurance (QA) Program has been established, implemented, and maintained in accordance with 10 CFR 830 , Subpart A, *Quality Assurance Program.*

Criterion 1.1

Reference 9 lists the implementing documents for this TSR as:

- ES&H Manual Document 41.1 (Ref. 12);
- NMTP QA Program (Ref. 13);
- *Preparation, Review and Approval of NMTP Facilities Procedures,* FMP-0100 (Ref. 14);
- *Tracking Procedures and Controlled Documents,* FMP-0101 (Ref. 15 – Note this procedure expires on 1/17/10. It is being revised per Bob Swift.);
- *ECMS Document Control Procedure*, FMP-0207 (Ref. 16 – Note this procedure has expired. It is being revised but no extension memo has been processed yet. This document should be formally extended while the revision process continues.)
- *Procurement/Acceptance Process for NMTP Superblock (Nuclear Materials Technology Program) Quality-Significant Orders,* FMP-0500 (Ref. 17);
- *Recordkeeping System for NMTP Facilities,* FMP-0700 (Ref. 18);
- *Calibration Program for NMTP Facilities Critical Measuring and Test Equipment,* FMP-0701 (Ref. 19);
- WCM (*NMTP-DOC-001 MMTP Category 3 Nuclear Facilities and the Superblock Yard Work Control Manual* – This reference in the QAP has been superseded by the *Superblock Work Control Manual,* Ref 21.)

Criterion 1.5

The implementing mechanism is the NMTP Quality Assurance Program document (Reference 13). This document describes the Quality Assurance Program for the Nuclear Materials Technology Program nuclear facilities, including B239. It serves as the current implementing interface between the institutional capability and the facility. Included is a description of the plans and procedures necessary to comply with and implement quality assurance requirements within those facilities. It was written in accordance with the requirements flowed down from the *LLNL Quality Assurance Program (ES&H Manual Document 41.1)* and the *WCI Principal Directorate Quality Assurance (QA) Plan*. The NMTP QAP was developed to meet the requirements of DOE Order 414.1C and 10CFR830 *Nuclear Safety Management,* Subpart A, "Quality Assurance". Quality Assurance activities described in the QAP for NMTP facilities include management, performance and assessment.

Criterion 1.6

Key elements of the Program include a graded approach in the QA review of the following:

- Review of design and construction drawings;
  This element is assumed to be part of the design process that is described very generally in the NMTP QA Program (Reference 13), Section 8.2.8 *Criterion 6 – Design*. However, there is no specific mention of the review of drawings. The actual implementation occurs through the Change Control Process in the WCM, and is specifically called out on the work permit.

- Inspection and acceptance testing;
  This element is mentioned briefly in Reference 13, the *NMTP QAP*, *Section 8 – Inspection and Acceptance Testing*, however there is no specific description of how this element is performed, and there is no implementing document cited. The actual implementation is documented on the work permit.

- Document and records control;
  This element is described in Reference 13, the *NMTP QAP*, Section 8.1.4 *Documents and Records*. It is further described in Section 8.1.4.1, which cites the implementing procedure Reference 14, and in Section 8.1.4.2, which cites the implementing procedure Reference 15, and in Section 8.1.4.4, which cites the expired implementing procedure Reference 16, and in Section 8.1.4.6, which cites the implementing procedure Reference 18.

- Control of purchased items/services;
  This element is described in Reference 13, the *NMTP QAP*, Section 8.2.9 *Criterion 7 – Procurement*. It is further described in Section 8.2.9.1, which cites the implementing procedure Reference 17, and in Section 8.2.10.1, which cites the implementing procedure Reference 19.

- Management assessments.
  This element is described in Reference 13, the *NMTP QAP*, Section 8.3.1 *Criterion 9 – Management Assessment*. This Section cites a further description in the NMTP Feedback and Improvement Plan (Reference 20.) However, the obsolete REV-1 is cited. This was replaced by REV-2 in August 2007.

Occurrence Reporting

Documented evidence exists to confirm that a program has been established, implemented, and maintained for occurrence reporting of events and conditions that have safety, health, or environmental implications. This program is intended to ensure that both DOW and LLNL management are informed of all events that could (1) impact the health and safety of the public; (2) seriously impact the intended purpose of DOE facilities; (3) have a noticeable adverse effect on the environment, and (4) endanger the health and safety of the workers.

Criterion 1.1

Reference 9 lists the implementing documents for this TSR as:

- *Facilities Responses and Events,* FMP-0400 (Ref. 22 – Note this document would have expired, however memo SBK 09-173 extends the expiration date to 3/18/10.)
- *Occurrence Critiques,* FMP-0800 (Ref. 23)
- ES&H Manual Document 4.3 (Ref. 24)
- ES&H Manual Document 4.5 (Ref. 25)
- ES&H Manual Document 4.6 (Ref. 26)
- B239 FSP (Ref. 7)

In addition, a sample occurrence report (Ref. 27) was reviewed as evidence of the Program implementation.

Criterion 1.5

The primary implementing mechanism is *LLNL Implementation Procedure for Reporting Occurrences to DOE,* ES&H Manual Document 4.3 (Ref. 24). This document, along with the accompanying *Events: Notification, Analysis, and Reporting*, ES&H Manual Document 4.5 (Ref. 25) and *Incident Analysis Manual*, ES&H Manual Document 4.6 form a very strong and detailed institutional program for Occurrence Reporting. That program is administered for all of NMTP by a single point of contact, who provides a current implementing interface with B239. A sample of documented evidence of that implementation was reviewed in Ref. 27, which deals with a reported TSR violation in B239.

Criterion 1.6

Key elements of the Program include the following:

- Preservations of the scene;
  This element is mentioned briefly in Ref. 24, Section 3.2 *Preserve the Scene and Notify Management.* However, there are no instructions as to how this should be done. Further guidance is provided in Ref. 23, Section 6.2.3 *Preserve the Scene*.

- DOE and Management notification;
  This element is described in Ref. 24, Section 3.7 Oral Notification, and in Section 3.8 *"LLNL ORPS/NTS Reporting Form" – Initial Written Notification,* and in Section 3.9 *Occurrence Initial Notification Report – E-mail Copy,* and in Section 3.11 *Final Occurrence Report*.

- Incident and causal analysis;
  This element is described in Ref. 24, Section 3.10 *Occurrence Investigation and Causal Analysis.* Document 4.6 (Ref. 26), —*Incident Analysis Manual* in the ES&H Manual provides further guidance on investigations and causal analysis.

- Development of corrective actions;
  This element is described in Ref. 24, Section 3.12 *Corrective Actions*.

- Event or condition categorization.
  This element is described in Ref. 24, Section 3.5 *Discovery and Categorization*.

Accountability, Control, and Handling of Materials

Documented evidence exists to confirm that a program has been established, implemented, and maintained to identify and document movement, location and quantity of radioactive and hazardous materials within the facility.

Criterion 1.1

The Program for Accountability, Control, and Handling of Materials is implemented in the following documents:

- Industrial Hygiene DAP
- Facility Safety Plan
- OSP S-003 & MM-OG-172, Transfer of Radioactive Material Among Superblock Facilities
- ES&H Manual, Doc. 14.1, LLNL Chemical Safety Management Program
- B239 Operations Logbook

Criterion 1.5

The Program for Accountability, Control, and Handling of Materials is implemented including the procedures and controls listed below.

Fissionable, radioactive and hazardous materials identification, classification, verification and labeling, is implemented by ES&H Manual Document 21.1, *Acquisition, Receipt, Transportation, and Tracking of Hazardous Materials*. ES&H Manual Document 20.2, *LLNL Radiological Safety Program for Radioactive Materials*, implements the requirements on purchasing, accepting delivery, transporting, and labeling of radioactive materials.

Fissionable, radioactive and hazardous materials packaging, handling, shipping, receiving, and inventory, is implemented by ES&H Manual Document 21.1, *Acquisition, Receipt, Transportation, and Tracking of Hazardous Materials* and OSP S-003.

Fissionable, radioactive and hazardous materials certification and acceptance, is implemented by ES&H Manual Document 21.1, *Acquisition, Receipt, Transportation, and Tracking of Hazardous Materials*.

Items containing nonresident SNM (highly enriched uranium) shall be singly contained in a welded metal barrier or doubly contained with at least one barrier being a sealed, metal container is implemented by the FSP (p 3-13).

The total time in any given year that plutonium items (not including TRU waste) are present in Building 239 is limited to 576 hours (~24 days) is implemented by a logbook maintained in the B239 operations room and by the FSP (pp 3-6 and B-1).

Except for when squibs are an integral part of an item containing plutonium, high explosives and plutonium are not to be handled in the same area (within the same room) of the building is implemented by the FSP (p 3-21).

SNM items brought into the facility are to be surveyed for contamination is implemented by the FSP (p 3-13).

Items containing nonresident hazardous material are to be confined within a sealed barrier or handled using protective clothing to avoid unwanted reaction or exposure.

When loading and unloading radioactive or hazardous material, the vehicle ignition shall be turned off and the parking brake set is implemented by the FSP (p 3-13).

Prior to transfer to Building 239, waste drums containing SNM shall be inspected for evidence of container damage or overpressurization and for compliance with DOT specification and applicable DOE requirements. Acceptance by the Building 239 Facility Manager, Facility Point of contact, or designee of the appropriate Transportation Safety Document (TSD) paperwork satisfies this requirement.

Criterion 1.6

The TSR does not specify any key elements different from the procedures and controls listed and addressed in Criterion 1.5 above.

Hazardous Material Safety

Documented evidence exists to confirm that a hazardous material safety program has been established, implemented, and maintained to ensure that exposure of employees, subcontractors, visitors, and members of the general public to hazardous materials is controlled.

Criterion 1.1

The Hazardous Material Safety program is implemented by the following documents:

- Industrial Hygiene (aka the Chem/Bio) DAP
- Facility Safety Plan
- ES&H Manual, Doc. 10.2
- ChemTrack web site

Criterion 1.5

The Hazardous Material Safety program is implemented by the following documents:

- Industrial Hygiene (aka the Chem/Bio) DAP
- Facility Safety Plan
- ES&H Manual, Doc. 10.2
- ChemTrack web site
- The B239 Training Manual and
- LTRAIN

Criterion 1.6

The Hazardous Material Safety Program has three key elements.

- Material Safety Data Sheets (MSDSs).
- Personnel training and qualification.
- Chemical storage and waste disposal procedures.

The Hazardous Material Safety Program key element, MSDSs, is implemented via ES&H Manual, Doc. 10.2, Section 3 and the ChemTrack web site.

The H&S Team 1 member, Jim Boyer, provided a copy of DowTherm MSDS via email as an example. The DowTherm material was observed during the IVR facility walkthrough.

The Hazardous Material Safety Program key element, personnel training and qualification is implemented via the FSP, the B239 Training Manual and LTRAIN.

The Hazardous Material Safety Program key element, chemical storage and waste disposal procedures are implemented via the Industrial Hygiene DAP.

Procedures and Plans

Documented evidence exists to confirm that a program has been established to prepare procedures and plans that provide direction to ensure that the facility is operated within its design basis and supports safe operation of the facility.

Criterion 1.1

Reference 9 lists the implementing documents for this administrative control as:

- B239 FSP (Ref. 7)
- WCM (Ref. 21)
- QAP (Ref.13)
- CMP (Ref. 36 and 37)
- SRPs (Ref. 30 and 31)
- MIP (Ref. 32)
- FMP-0600 (*Unreviewed Safety Question (USQ) Process,* Ref. 33)
- ES&H Manual Document 3.3 (*Facility Safety Plans and Integration Work Sheets with Safety Plans,* Ref. 34)
- FMP-0102 (*OSP Development and Implementation Guide,* Ref. 35)

Criterion 1.5

B239 relies on generic Superblock documents as the implementing mechanism for the development of procedures and plans. In particular, the NMTP Quality Assurance Plan (Ref. 13) and the NMTP Nuclear Facility Configuration Management Plan (Ref. 36) provide the fundamental implementing mechanisms.

Criterion 1.6

There are no key elements for the Procedures and Plans administrative control.

Minimum Staffing

Documented evidence exists to confirm that a program has been established, implemented, and maintained for to assure at least a minimum shift complement of staff is always available. The generic Minimum support staffing requirements that appear as Table 5-1 in the TSR (Ref. 2) are repeated exactly in the FSP (Ref. 7) as Table 3-3. For specific operations, further staffing requirements beyond these minimums are often promulgated through the work control process, based on the hazards associated with the operation.

Criterion 1.1

The generic Minimum Support Staffing Requirements that appear as Table 5-1 in the TSR (Ref.2) are repeated exactly in the FSP (Ref. 7) as Table 3-3. No further flow-down of these requirements is needed.

Criterion 1.5

The Minimum Staffing Requirements are simple, and no documented implementing mechanism is needed beyond the citation in the FSP noted above. In the unlikely event that the Facility Manager or Designee is not onsite during working hours, it is the Facility Manager's responsibility to ensure that no operations with radioactive materials are authorized.

Criterion 1.6

There are no key elements for the Minimum Staffing Program.

Recordkeeping

Criterion 1.1

Recordkeeping is implemented through NMTP-FMP-0700, *Recordkeeping System for NMTP Facilities.*

Criterion 1.5

The key elements for Recordkeeping described in the B239 TSR are:

- Records and logs of operations
- Records and logs of principal maintenance activities, inspections, repairs, and replacement of principal equipment items related to: Safety Significant SSCs
- All reportable events/occurrences
- Records of surveillance activities, inspections, and calibrations required by TSRs
- Record of changes made to Surveillance Requirement Procedures
- Records and drawing changes reflecting facility design modifications made to systems and equipment described in the DSA
- Records of onsite radiation exposure for all individuals working in the facility
- Records of training and qualifications for Building 239 staff
- Records of USQ documents

NMTP-FMP-0700 describes the various recordkeeping systems that maintain the records related to the above key elements.

Through the review of the various elements of this IVR, records were reviewed and verified to exist, such as operations logbook, surveillance/testing records, Surveillance Requirement Procedure revision logs, Work Permits, monthly radiation dose summaries to appropriate management, training records in LTRAIN, and USQ documents. The IVR confirmed that appropriate records are being maintained and are readily retrievable.

Criterion 1.6

The key elements of the Recordkeeping program have been appropriately implemented into NMTP-FMP-0700 through a review of records and interviews implementation has been demonstrated.

Functional Area:	Objective:	Date:	Objective Met:	
Training	**2**	**1/15/10**	☒ **Yes**	☐ **No**

Objective 2

Verify that facility personnel have been trained on implemented TSR controls and requirements.

Criterion 2.1

Validate that the Training and Qualification program has established, documented, and implemented requirements for the facility manager, operations personnel and operations support (ES&H, criticality and safety basis) to be trained on the TSRs and any changes.

Review Approach: review facility-specific training manuals. Describe the aspects of the training program in place that establishes, documents, and implements safety basis-related training requirements. Validate that these requirements cover the relevant subject areas.

How is completion of this training recorded and verified? What controls are implemented to ensure only trained workers are permitted to conduct activities in the facility?

How are support service personnel screened for required safety basis training?

Criterion 2.2

Validate that training has been performed and documented to the latest revision of the B239 safety basis documents and implementing work instructions.

Review Approach: Review the training program records against personnel authorized to work in and support the facility.

Criterion 2.3

Verify that facility personnel responsible for implementing a SAC have been fully trained and qualified on SACs in general and specifically on the SAC being implemented.

Review Approach: Interview several operations and support service personnel on TSRs.

Documents and Records Reviewed

These are included in the listing for the Controls Functional Area.

Interviews Conducted

These are included in the listing for the Controls Functional Area.

Evolutions Performed and Observed

These are included in the listing for the Controls Functional Area.

Discussion of Results

Criterion 2.1

This criterion has been met. The Training and Qualification program has established, documented, and implemented requirements for the facility manager, operations personnel and operations support (ES&H, criticality and safety basis) to be trained on the TSRs and any changes.

Details of Review

B239 worker training and qualification requirements are prepared and maintained in accordance with the B239 TIM (Ref. 89 and 90) and the B239 Training Manual (Ref. 58). The training manual contains a matrix identifying training requirements for each worker position and class of visitor. This matrix has been translated into a checklist that must be completed for each individual before facility access and/or permission to work a task is granted. B239 has no positions requiring Certification per DOE 5480.20A requirements; if a certified fissile material handler is required for an operation the work is performed by one from B332 who has also completed the necessary B239 training.

NOTE: The checklist used for access/qualification, while derived from the training manual matrix and carefully reviewed and approved by management, is not itself a configuration-managed document. It may be worthwhile to place this under formal CM, perhaps by incorporating it into the B239 Training Manual.

Per the Training Manual (Ref. 58), the Training Manager is responsible for maintaining up to date training records for B239 personnel. Training requirements, both due and completion dates, are tracked in LTRAIN.

For the just implemented DSA/TSR annual update (Ref's. 1, 2 and 3), training materials specific to the update (Ref. 65) were reviewed against the updated DSA/TSRs and FSP (Ref. 7) and ACP-B239-001, (Ref. 10) to verify that changes promulgated in the update were appropriately covered in the materials. Every significant change in the amendment was properly reflected in the training materials (non-essential, e.g., editorial, changes were not covered in the training, other than the trainer noted in passing during the class that there were some).

The Facility Manager, Deputy Facility Manager, NMTP Training Manager and NMTP Trainer were interviewed. They all demonstrated an understanding of training requirements and the flow down of DSA/TSR requirements to the training.

Criterion 2.2

This criterion has been met. Training has been performed and documented to the latest revision of the B239 safety basis documents and implementing work instructions.

Details of Review

Training (using materials as discussed in criterion 2.1) completion is documented by class sign-in sheets (Ref. 91) and required reading completion signature sheets (Ref. 87). Core personnel received in-class training on December 9, 2009, and completed the required reading (ACP-B239-001) the same day. It was noted during this review that some of the core personnel had not attended the training; when questioned, the FM indicated that he was aware of the status and that the individuals would not be allowed to perform TSR related work in the facility until the training was completed. Non-core personnel, e.g., safety analysts and other support personnel, received in-class training on December 16, 2009. As these people do not perform day-to-day work in the facility, the ACP reading was not required. (Update – a third class session, comprising both core and non-core personnel, was held on January 5, 2010. The session included both in-class and ACP required reading.)

Interviews

In addition to the management interviews noted in criterion 2.1, interviews were held with selected workers (a material handler and an RGD operator). Both showed that they had a good understanding and retention of the training material. During the interviews, both were given hypothetical "off-normal" event scenarios related to TSRs (e.g., leaking/contaminated item, interlock failure, fire loading) and asked to discuss what their responses would be. In both cases they showed an understanding of the meaning and intent of the TSR. Also, the RGD operator "walked" the interviewer through a sweep and interlock system set routine, and the material handler "walked" the interviewer through the basics of material movement and interactions with the RGD operators. These activities as described were consistent with the TSRs.

Criterion 2.3

This criterion has been met. However, not all facility personnel responsible for implementing a SAC are current in training relevant for safety management program implementation (e.g., work control). This has potential implications for SAC implementation, but on balance personnel are aware of SAC requirements.

Details of Review

LTRAIN records were reviewed for three core B239 workers whose work relates to TSRs/SACs, each in a different role, for a reasonably representative cross-section of the facility workforce. Two of those reviewed have completed all necessary training and qualification requirements to

be qualified to properly implement SACs in general and specifically the SACs being implemented in this annual update. The third worker was missing three classes, SB3008, SB3205-P, and SB3205-W. SB3008 is a training requirements briefing, which may not be critical for TSR related work in the facility. SB3205-P and SB3205-W are for the NMTP work control manual, and are considered relevant as the facility work control process for SAC implementation relies on NMTP work control manual processes. All three personnel have, however, completed the recent training related to the DSA/TSR annual update described above.

In addition, there is no documentation defining all the core personnel for B239 and their safety basis-related training requirements. That makes it difficult to assess whether all core personnel are properly trained for TSR implementation.

FINDING of DEFICIENCY: At least one B239 worker in a significant position has not completed all necessary training. The minimum core personnel needed to declare implementation should be defined. The minimum training requirements for those personnel, including safety basis and relevant safety management program training, should be defined.