



FINAL REPORT
READINESS ASSESSMENT
for the
TRITIUM FACILITY MODERNIZATION
BUILDING 331

August 28, 2009



Approvals

(b)(6)

(b)(6)

(b)(6)

Operations

**Erik Brown, Engineering and Configuration
Management, Fire Protection**

(b)(6)

(b)(6)

**Safety Basis Management,
Radiological Control**

(b)(6)

Emergency Preparedness

(b)(6)

(b)(6)

Training

(b)(6)

Quality Assurance

(b)(6)

(b)(6)

Maintenance and Test



(b)(6)

**- Team Leader
Management and Organization, Radioactive
and Hazardous Materials Shipping, Transfer
and Receiving Program**

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Acronyms

ACP	Administrative Control Procedure
B331	Building 331, Tritium Facility
DAP	Discipline Action Plan
DOE	Department of Energy
DSA	Documented Safety Analysis
ECO	Engineering Change Order
EITS	Equipment Important to Safety
EPHA	Emergency Preparedness Hazards Assessment
ES&H	Environment, Safety, and Health
FHA	Fire Hazard Analysis
FSEP	Facility-Specific Emergency Plan
FSP	Facility Safety Plan
ISMS	Integrated Safety Management System
ITS	Issues Tracking System
LLNL	Lawrence Livermore National Laboratory
LLNS	Lawrence Livermore National Security, LLC
LSO	Livermore Site Office
MAD	Master Action Database
MSA	Management Self-Assessment
NIF	National Ignition Facility
NMTP	Nuclear Materials Technology Program
NNSA	National Nuclear Security Administration
OGCS	Off Gas Collection System
OSP	Operational Safety Plan
PEP	Project Execution Plan
POA	Plan of Action
PPE	Personal Protective Equipment
RA	Readiness Assessment
RI	Responsible Individual
RMA	Radioactive Materials Area
RPP	Radiation Protection Program
SNM	Special Nuclear Material
SRP	Surveillance Requirement Procedure
TFM	Tritium Facility Modernization
TPS	Tritium Process Station
TSR	Technical Safety Requirements
TSS	Tritium Science Station
USQ	Unreviewed Safety Question

Executive Summary

This report documents the results of the Contractor Readiness Assessment (RA) of the Building 331 (B331) Tritium Facility Modernization (TFM) project at the Lawrence Livermore National Laboratory (LLNL). The review was conducted from August 17 through August 24, 2009, in accordance with the approved B331 TFM Contractor RA Implementation Plan. Team members are identified in Attachment 1. An exit briefing of the results was provided to facility and Livermore Site Office personnel on August 26, 2009.

The TFM project adds new multi-gram tritium processing capability in B331 which is operated by Lawrence Livermore National Security, LLC (LLNS) for the National Nuclear Security Administration (NNSA) and the Department of Energy (DOE). Local NNSA oversight is provided by the Livermore Site Office (LSO). The B331 TFM project is part of the Nuclear Materials Technology Program (NMTP) and is under the LLNS Weapons and Complex Integration Principal Directorate.

The evaluation results are based on document reviews, interviews of personnel, facility and equipment walk downs, maintenance and test activities, and observed evolutions. The major evolution demonstrated during the RA consisted of a gas processing activity within TPS utilizing non-radioactive gases to simulate the fill of a National Ignition Facility target. In all situations the facility personnel were open and candid during interviews, and were helpful in supporting walk downs and observations. The team concluded that the workers demonstrated a good safety culture that will serve as a sound foundation for further improvements. Line management has accepted responsibility for safety.

NNSA has approved the revised Documented Safety Analysis (DSA) and Technical Safety Requirements (TSR) for B331, which includes the new TFM project scope. The RA evaluated the implementation of the controls established by these safety basis documents, including supporting documents such as the Facility Safety Plan (FSP), Operational Safety Plan (OSP), and implementing procedures (e.g., Surveillance Requirement Procedures, Administrative Control Procedures, etc.).

The implementation of the Integrated Safety Management System (ISMS) was evaluated through an assessment of select functional areas, such as radiological protection, quality assurance, and fire protection. Although some deficiencies were identified, ISMS is adequately implemented within the facility as evident by the implementation of the various safety

management programs and work control process.

The following five issues were judged by the RA Team to be prestart findings and are required to be properly resolved prior to startup of the TFM project as defined in the Plan of Action.

Finding SB-2-1 Tritium Room Monitors have not been installed within rooms 154 and 158.

Finding OP-2-1 The procedure for the annual glovebox inspection, SRP-B331-4.1.1/4.1.2, was not followed as written.

Finding ISM-2-2 NCRs associated with TPS need to be resolved and any dispositioned as "use-as-is" reviewed through the USQ process prior to startup activities.

The following six issues were judged by the RA Team to be findings that should be evaluated for resolution prior to startup. However, these findings may be resolved after startup upon issuance of an approved Corrective Action Plan.

Finding EN-1-1 The Engineering Change Order process is not well defined and could bypass the NMTP Work Control Manual.

Finding EP-1-1 The B331 Emergency Planning Hazards Assessment has not been updated as required by DOE O151.1C and FS&H Manual. Document

- Observation EN-1-4 As-built drawings for the fire suppression system have not been prepared.
- Observation EP-1-1 A facility drill program should be fully developed and implemented.
- Observation MG-3-1 The NMTP Assurance Manager is not currently fulfilling the requirements of Section 3.4 of NMTP-FMP-0400.
- Observation OP-2-1 The process used for establishing and setting the overpressure/underpressure bubblers on the TPS glovebox lacked formality.
- Observation OP-2-2 The most recent ECMS Document Expiration Report listed several

procedures that have expired and have not been reviewed/revised within the expected time frame.

- Observation OP-3-1 The body of the Startup Plan does not reference Attachment B where expectations and acceptance criteria for Startup Plan steps and

Introduction

Facility Description

The Tritium Facility (B331) is located within LLNL's Superblock, a 500-ft by 700-ft protected area in the south-central portion of the site. The building is nominally 300 ft long; the width at the south side of the building (office area) is 131 ft, and the width at the north side is 68.5 ft. The height of the building is nominally 14 ft, except at Rooms 1117 and 1121 where it is nominally

18 ft. The height of the new pre-engineered annex (R170) is 21 ft. There are two increments comprising the radioactive materials area (RMA) section of the building: Increment 1 and Increment 2. The tritium facility contains laboratories for performing experiments and processing and storage of tritium and other radioactive materials. In addition, there are storage areas, support areas and offices in B331. TFM operations will be performed in laboratories 157 and 154/158 and R170 in Increment 2. The Nuclear Materials Technology Program (NMTP) manages the facility under the auspices of the Principal Associate Director for Weapons and Complex Integration (WCI).

As described in the project execution plan (PEP) for the TFM project, the project will upgrade and modernize the tritium handling capabilities of B331, including structural, functional, and operational changes to the facility as described below:

- A. Remove and relocate existing tritium operations and equipment in laboratories 154, 157, and 158 and the adjacent corridor.
- B. Decontaminate and renovate the planned TFM laboratories (R154, R157, and R158) including the removal of contaminated parts and equipment such as gloveboxes, hoods, piping, pumps, and cable trays. Walls retained under the TFM project will be patched,

Background

A hydrogen isotope research and development capability is needed at LLNL to enable its programs to meet mission objectives in stockpile stewardship and energy research. The modernized capability will focus on the behavior, properties, and uses of hydrogen and its isotopes under a variety of extreme conditions ranging from cryogenic to high temperatures and pressures. The addition of this capability supports stockpile stewardship specifically by providing necessary infrastructure for high energy density physics, weapons effects and tritium/materials R&D, including aging effects on stockpile materials and components, tritium shipping and handling, and reimbursable work-for-others. More generally, it restores an important element of LLNL R&D capability in nuclear weapons science and enhances the lab's core competency in this vital area. The inertial confinement fusion research program at LLNL also requires the capability and other areas of research interest, such as hydride energy storage and tritium/environmental interactions will benefit from it.

LLNL has a wide range of needs involving advanced hydrogen isotope R&D, particularly those requiring tritium. No current capability exists at LLNL to work with multi-gram quantities of tritium and its compounds at elevated pressures and cryogenic-to-high temperatures. Planned and anticipated weapon physics, weapon effects, stockpile aging, fusion ignition, environmental and energy production studies will require the ability to work with these materials and conditions.

Assessment Results

The POA for the Contractor RA was developed by LLNS line management and approved by NNSA. The POA established the breadth of the Contractor RA. The Contractor RA Implementation Plan for performing the assessment was verified to appropriately address the defined scope of the RA and was approved by the Team Leader and Facility Manager in August 2009. This RA was conducted utilizing the objectives, criteria, and review approach provided in the Implementation Plan.

In accordance with the Implementation Plan four specific field activities were assessed during the RA. These activities included:

- Maintenance and test activities related to the functional test plan and surveillance requirements,
- the execution of a Specific Administrative Control for inventory control,
- a facility specific drill involving a tritium room monitor alarm and,
- an activity utilizing non radioactive gases to fill a hypothetical National Ignition Facility target.

The assessment results are provided in Attachment 2, *Assessment Forms*. These forms provide amplifying information and should be used to fully understand the evaluation results. While concerns may be raised within the assessment results, concerns which have not been identified as an issue (i.e., finding or observation) do not require further evaluation. Attachment 3, *Deficiency Forms*, summarizes the findings identified during the review. The following is a summary of the functional areas reviewed during the Contractor RA.

Emergency Preparedness

As a safety management program the B331 DSA and TSR include three key elements for emergency preparedness (EP): 1) LLNL Emergency Preparedness Plan including shelter in

place, 2) A Zone 8 Self-Help Plan, and 3) Personnel response procedures including local worker evacuation in the event of tritium release in the facility. Although the institutional emergency preparedness program was not within the scope of the RA, it was reviewed to understand the flow down of emergency preparedness requirements.

B331 is included within the NMTP emergency exercise program. As such, facility personnel participate in an annual drill to meet the applicable DOE requirements, specifically DOE Order 151.1C, *Comprehensive Emergency Management Systems*. However, for eight of the previous nine exercises/drills the only response required to be demonstrated by B331 personnel was to shelter in place. With revised operational scope and increased facility material at risk (MAR) B331 management has planned to increase primary involvement in future EP exercises/drills.

The ES&H Manual Document 22.1, *Emergency Preparedness and Response*, documents the LLNL Emergency Management System. Document 22.1 requires facilities that have modified conditions in the facility to have an updated Emergency Preparedness Hazards Assessment (EPA). In addition, ES&H Manual, Document 51.1, *Documented Safety Analysis Program Plan Revision 7* requires that the facility EPA be consistent with the data and assumptions shown in the approved DSA/TSR for B331. These two site requirements flow down from DOE Order

Overall B331 personnel were very knowledgeable, professional and cooperative. As a result, the dedication and hard work of B331 personnel have mitigated gaps and inconsistencies in the formal documented programs and processes which were encountered during the project.

The integration of project configuration management program and the Nuclear Facility configuration management program can be used as a lesson learned for future line item projects.

Based on the review conducted the RA team concluded that existing building 331 configuration management and engineering programs, processes and procedures are adequately implemented to support TFM and TPS operations.

Integrated Safety Management System

The implementation of ISMS was evaluated through an assessment of select safety management programs, such as radiological protection, fire protection, and quality assurance. Contract requirements have been formalized with DOE and flow down into institution-wide programs and procedures, such as the ES&H Manual has been validated by recent independent assessments. Although some deficiencies were identified, an effective ISMS is evident through the implementation of the various safety management programs and the facility's work planning and execution processes.

Radiological Protection Program

The radiological protection program was evaluated to determine if it has been effectively implemented to support TPS operations and the TFM conventional facilities. This evaluation was conducted through 1) a review of the FSP, TPS OSP, and HP Discipline Action Plan, 2) interviews of radiological support personnel, and 3) a facility walkdown, observation of TPS

to support operations of the TPS and TFM conventional facilities. Quality related processes and personnel are in place and personnel understand these processes.

Fire Protection Program

Fire protection requirements are contained within the ES&H Manual Document 22.5, *LLNL Fire Protection Program Manual*, and associated implementing procedures. The National Fire Protection Association codes and standards are the governing documents cited by ES&H 22.5 and the LLNL prime contract. The TFM Project and the TPS in particular has little impact on the fire protection program. The creation of two separate fire suppression and two separate fire alarm systems has the greatest fire protection program impact in that it doubles the maintenance activities for fire protection and fire alarm systems. Issues identified with regard to code compliance and or documentation do not affect the overall fire protection program implementation. Facility management is aware of the potential deviation issues with the increment fire barrier and increment fire barrier door which are discussed in greater detail in Attachment 1 and has stated that the TSR limiting condition for operation for this system could not be exited until the issues are resolved.

The B331 fire protection engineer (FPE) is well versed in the codes and is very knowledgeable with regard to the B331 fire protection, construction and operational conditions. The fire protection program as implemented through the Fire protection DAP, FPE review of Work Control/Change control packages, Surveillances, and System Engineer assessments provides confidence that the Fire Protection Program has been effectively implemented to support TPS operations and the TFM conventional facilities.

Radioactive and Hazardous Materials Shipping, Transfer, and Receiving Program

The RA team evaluated one specific attribute of the radioactive and hazardous materials shipping, transfer, and receiving program that is most applicable to the TFM project. This attribute requires product vessels, U-beds, and Pd-beds that hold over 5 g of tritium to be filled and stored at or below ambient pressure when outside of secondary confinement (e.g., tritium gloveboxes, UC-609). While the DSA identifies the radioactive and hazardous materials shipping, transfer, and receiving program as an administrative program, no discussion is provided in the DSA to better define the intent or bases for the program.

The FSP is used to implement the program and does accurately reflect the stated control as described in the TSRs. However, no additional implementation measures have been developed.

Since the control has been identified in the FSP and facility personnel demonstrated awareness of it, the RA team concluded that the control has been implemented.

Management and Organization

The RA Team assessed the B331 management and support structure as affected by the TFM project to determine if the functions, assignments, roles and responsibilities are clearly defined. The assessment also verified that line management understands and demonstrates responsibility for safety. Through interviews and the review of facility records, it was confirmed that a management structure is in place that clearly defines the functions, assignments, and roles and responsibilities for B331 and TFM management and support personnel. The FSP defines the individual responsibilities, accountabilities, and authorities for facility personnel. Interviews confirmed a common understanding of the organizational structure and roles.

In addition to facility-specific roles and responsibilities, the management and organization functional area included a review of the NMTP corrective action program as it relates to B331

with an emphasis on TFM. A well established assurance program is often a strong indicator of management's operational awareness and desire for continuous improvement. The corrective action process for B331 is a part of the larger NMTP assurance program. Based on the interview with the NMTP Assurance Manager and a review of the ITS, the process is mature and effective. Issues are either entered into ITS or the MAD database depending on the severity of the issue (e.g., Occurrence Reporting and Processing System reportable) or assessing affiliation (e.g., Chief, Defense Nuclear Safety). Data in the system is tracked and trended such that the various facility managers in NMTP receive periodic reports on the status of open issues as well as a rollup of identified issues based on the causal code, ISM code, or functional area.

Based on interviews with facility management and review of the prerequisites and MSA findings, all open items have been reviewed by facility management. The Facility Manager formally provided a declaration of readiness which identified six open pre-start findings/issues that are considered a manageable list of open items.

All findings from the MSA have been entered into the ITS database and have been categorized as either pre-start or post-start findings. The six open pre-start findings/issues have been included as part of the CAP for the MSA.

On a sample basis, the RA team independently validated the completion of prerequisites as well as the adequacy of closure for several MSA findings.

Based on the review conducted by the RA Team, NMTP has a mature and effective assessment program. B331 assessments have been effectively integrated into the NMTP program. A rigorous MSA was conducted prior to the RA and the identified issues have been adequately



The maintenance backlog for TPS and TFM conventional facility equipment and systems important to safe operations is acceptable for operation.

As noted during the MSA not all NCRs have been resolved and closed out. Some of these NCRs that remain open are associated with the installation and testing of the TPS glovebox (e.g. ASME Section VIII pressure test failed). The tritium room monitors for rooms 154 and 158 have not been installed. These EITS SSCs are required to be installed and calibrated prior to operations in those rooms. The facility is aware of this constraint and is working to have those monitors installed.

Maintenance and test programs are in place to confirm the condition and operability of safety-significant TPS SSCs. EITS and other equipment is ready to support safe TPS operations. The material condition of TPS and support equipment will support safe startup.

Operations

Elements of Conduct of Operations were evaluated to ensure that safety, formality, and discipline of operations are adequate and appropriate for TPS, OGCS and TFM conventional facilities operations. LLNL's Conduct of Operations requirements are established at the institutional level primarily through the ES&H Manual Document 3.5, *Conduct of Operations for LLNL Facilities*. NMTP has developed the *NMTP Conduct of Operations Manual* to provide NMTP's policy for the conduct of operations in NMTP facilities, including B331. The *NMTP Conduct of Operations Applicability Matrix* provides a cross walk from conduct of operations requirements to implementing documents. Management Plans, B331 Facility level documents, as well as specific operational, maintenance, surveillance and administrative control procedures are among the documents used to implement conduct of operations.

Four objectives were considered in evaluating conduct of operations:

1. Sufficient numbers of qualified personnel are identified and available to conduct and support safe operations of TPS and TFM conventional facilities;
2. Adequate and correct procedures are in place for operating the process systems and utility systems that include revisions for modifications that have been made to the facility;
3. An adequate startup program has been developed and includes plans for graded operations and testing after startup to simultaneously confirm operability of equipment, the viability of procedures, and the performance and knowledge of the operators. The startup plan identifies validation processes for equipment, procedures, and operators after startup of operations, including any required restrictions and additional oversight;
4. The formality and discipline of B331 operations, including support activities, is adequate to conduct work safely and programs are in place to maintain this formality and discipline.

To assess these objectives, documents were reviewed and interviews were conducted. In addition, a simulated demonstration of TPS operations and a drill of a simulated tritium release were observed to evaluate operational readiness of TPS, OGCS, and TFM conventional facilities.

Objective 1 – Staffing levels for safe operations of TPS, OGCS and TFM conventional facilities were reviewed. Minimum staffing levels of qualified personnel for facility and TPS operations are

specified. The number of personnel available is sufficient and the qualifications of these personnel are appropriate to support safe operations of TPS, OGCS and TFM conventional facilities.

Objective 2 – The procedures program provides technically accurate and usable procedures for operating the process and utility systems. The program ensures appropriate approvals, periodic reviews, and assurance that only current and accurate procedures are available for distribution and use by B331 personnel. Generally, operators, supervisors, and support personnel understand and follow procedure requirements.

Objective 3 – The TPS Startup Plan ensures a safe, controlled progression to unrestricted operation. Although there are weaknesses, the TPS Startup Plan meets the requirements of DOE-STD-3006-2000. The Startup Plan delineates plans for graded operations and testing after startup to confirm operability of equipment, the viability of procedures, and the performance and knowledge of the operators.

Objective 4 – The RA team identified weaknesses in some areas with respect to formality and discipline of operations. This included log keeping and shift turnover. Although there are weaknesses and opportunities for improvement, the formality and discipline of B331 operations, including support activities, is adequate to conduct work safely.

Safety Basis

A systematic evaluation of the facility's conformance to the NNSA Safety Evaluation Report (SER) and the associated Conditions of Approval was performed. This evaluation was conducted through 1) a review of the LSO SER, the DSA and TSR, the FSP, safety basis implementation matrix and other associated documents and 2) interviews of management personnel.

The evaluation was conducted to provide verification of the approval and implementation of facility safety documentation that 1) describes the facility including modifications made by the TFM project, 2) analyzes associated hazards, and 3) identifies that controls for TPS installed equipment and systems are adequate. The evaluation also verified that the USQ process has been implemented for B331 activities, and that safety and defense in depth SSCs are defined and a system to maintain control over their design and modification has been established. Based on the evaluation the RA team determined that the controls identified in the safety basis have been adequately captured in the facility programs and procedures and adequately implemented.

Training

The required components of the training program for the TPS were well established through the Tritium Facility Training Program with the start up of the TSS. This program is based on DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities* requirements as implemented by LLNL ES&H Manual documents 40.1, *LLNL Training Manual* and 50.1 *Personnel Selection, Qualification, and Training Requirements for LLNL Nuclear Facilities*. This assessment focused on the analysis, design, and development of training materials and exams for Tritium Facility DSA/TSR Annual Update and FSP Training. Also reviewed were the training and training records for Tritium Facility System Engineers and certifications for Tritium Handlers. Current operations and operations support personnel are qualified and sufficiently trained as required for TPS and TFM conventional facility as a Category 3 Nuclear Hazard Facility per DOE O 5480.20A.

Lessons Learned

The TFM RA was successfully executed as described in the Implementation Plan and POA. This can be largely attributed to rigorous planning by facility and project management and a well executed MSA. Summarized below are several lessons learned identified during the RA:

The development of a dedicated electronic "evidence" folder on the NMTP server for the execution of the RA is viewed as a best practice and a similar approach should be used for future readiness reviews.

In many cases, the prerequisites for the POA were similar to the criteria for the core requirements. As a result, the prerequisites were often broad and may not have been useful for facility management when preparing for startup.

Although the MSA was thorough and well executed, the use of two separate issue lists in the final report created unnecessary confusion.

During lengthy line item projects the readiness review schedule must not be encroached upon as a result of project delays and unforeseen circumstances. Adequate contingencies must be incorporated into project schedules and the project schedule updated frequently to prevent schedule creep into the readiness process.

Attachment 1 Team Members and Responsibilities

B331 TFM CONTRACTOR RA TEAM	
Team Leader	(b)(6)
Functional Areas	Team Members
Safety Basis Management (SB)	
Engineering Support and Configuration Management	

(b)(6)

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Attachment 2 Assessment Forms

Functional Area:	Objective:	Date:	Objective Met:	
Safety Basis Management	SB-1	08/21/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

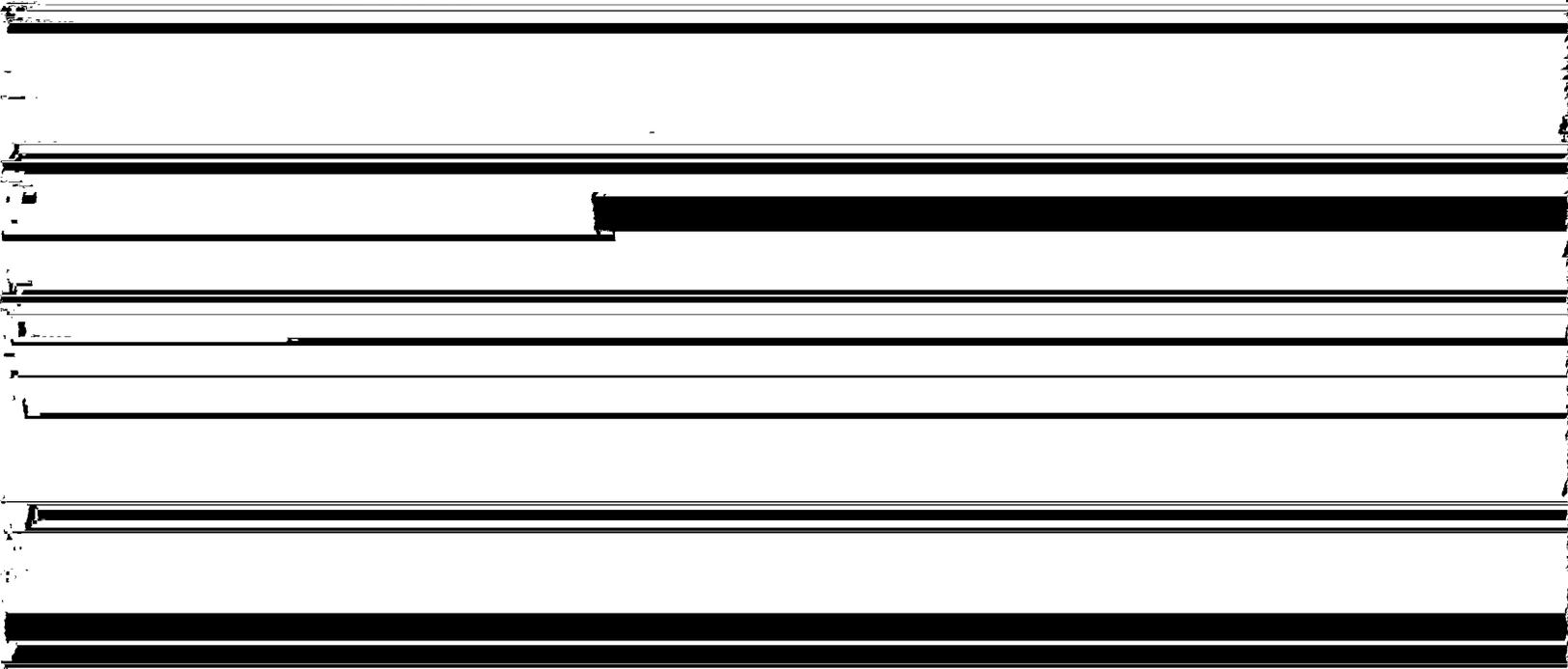
Objective

A systematic review of the facility's conformance to the NNSA Safety Evaluation Report and any associated conditions of approval has been performed. (CR 14)

Documents and Records Reviewed

- UCRL-AR-114203-06, Weapons and Complex Integration Tritium Facility—Building 331 Documented Safety Analyses, Chapters 1 thru 17, September 2008
- UCRL-AR-132403-06, Weapons and Complex Integration Tritium Facility—Building 331 Technical Safety Requirements, September 2008
- COR-NSI-3/23/2009-95757, Approval of the 2009 Annual Update of the Documented Safety Analysis and Technical Safety Requirements for the Building 331 Tritium Facility (TS: 090026)
- Safety Evaluation Report by the Livermore Site Office – National Nuclear Security Administration on the review of the Lawrence Livermore National Laboratory's September 2008 Annual Update to the Building 331 Documented Safety Analysis and Technical Safety Requirements, March 2009
- COR-NSI-11/14/2008-99038, Safety Basis Amendment Approval for Building 331 Tritium Facility Modernization (TS: 080102)
- Safety Evaluation Report by the Livermore Site Office – National Nuclear Security Administration on the review of the Lawrence Livermore National Laboratory's Safety Basis Amendment to Support Building 331 Tritium Facility Modernization Project, November 2008

FOR 0001-00 (M) ...



- Facility Manager
- Deputy Facility Manager

Evolutions Performed and Observed

- Walkdown of Tritium Facility Modernization project areas

Discussion of Results

resolution of LSO comments on the annual update to the tritium facility DSA and TSR (Reference 5¹)."

It is noted that the LSO review of the TFM Amendment overlapped to some extent with the LSO review of the Annual B331 DSA TSR Update, such that resolution of some issues in the TFM Amendment were carried over into the Annual B331 DSA TSR Update.

The RA review of the LSO accepted TFM Amendment, including RCR responses, established that LLNL had included all safety basis wording changes. However, RCR response #2 committed LLNL to address work outside of a glovebox (600 Ci) and inventory in the satellite

Functional Area:	Objective:	Date:	Objective Met:	
Safety Basis Management	SB-2	08/24/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Verification of approval and implementation of facility safety documentation that describes the facility including modifications made by the TFM project, analyzes associated hazards and identifies controls for TPS installed equipment and systems is adequate. The Unreviewed Safety Question (USQ) process is implemented for B331 activities. Safety and DID SSCs are defined and a system to maintain control over their design and modification is established. (CR 1, CR 7)

Documents and Records Reviewed

- UCRL-AR-114203-06, Weapons and Complex Integration Tritium Facility—Building 331 Documented Safety Analyses, Chapters 1 thru 17, September 2008
- UCRL-AR-132403-06, Weapons and Complex Integration Tritium Facility—Building 331 Technical Safety Requirements, September 2008
- COR-NSI-3/23/2009-95757, Approval of the 2009 Annual Update of the Documented Safety Analysis and Technical Safety Requirements for the Building 331 Tritium Facility (TS: 090026)

- SRP-B331-4.1.1/4.1.2, Surveillance Requirement Procedure SRP-B331-41.1/4.1.2, Tritium Gloveboxes, July 2009
- Management Self Assessment – Tritium Facility Modernization Building 331 Final Report, August 2009
- SDD-B331-002, System Design Description for the Tritium Process Station, July 2009
- USQD #B331-09-008-D, Baseline Evaluation of ES&H Document 20.2, LLNL Radiological Safety Program for Radioactive Materials, March 2009
- USQD #B331-09-070-D, Baseline Review of the Tritium Facility – Building 331 Facility Safety Plan, June 2009, July 2009
- USQD #B331-09-054-D, Baseline Review of the ES&H Team 1 Health Physics Discipline Action Plan for Tritium Facility, July 2009
- USQD #B331-09-062-D, Baseline Review of OSP 331.099, Tritium Process Station (TPS), June 2009
- USQD #B331-08-054-D, Baseline Evaluation of MOP-331-001, Annual Calibration Procedure for Femto-Tech Tritium Monitors, B331, October 2008
- USQD #B331-08-087-D, Install Ventilated Enclosure, Programmatic Equipment and Plumbing Connections for Tritium Process System in Room 157, Revision 1, July 2009
- USQD #B331-08-102-D, Connect TPS Glovebox, Mass Spectrometer and Associated Inlet System, and Cleanup Cart to Room Ventilation in Room 157 as part of Tritium Facility Modernization project, Revision 1, July 2009.

Interviews Conducted

- FPOC/POC
- Lead Safety Analyst
- Safety Analyst
- Facility Safety Officer
- Facility Manager
- Deputy Facility Manager
- TFM Project Manager
- Fire Protection Engineer
- B331 Tritium Glovebox Systems Engineer
- B331 Mechanical Engineer
- B331 Electrical Engineer

Evolutions Performed and Observed

Walkdown of Tritium Facility Modernization

Discussion of Results

Criterion 1 A program is in place to ensure that changes to B331 safety SSCs, operations, and procedures are entered into the USQ process if required.

NMTP-FMP-0600, establishes a program to ensure that changes to B331 safety SSCs, operations, and procedures are entered into the USQ process if required. Additionally, the Weapons and Complex Integration Directorate Nuclear Materials Technology Program Superblock Work Control Manual incorporates processes to ensure evaluation of entry into the USQ process.

Effectiveness of the program was verified through a sampling of USQs and baseline USQ reviews:

- USQD #B331-09-008-D, Baseline Evaluation of ES&H Document 20.2, LLNL Radiological Safety Program for Radioactive Materials, March 2009
- USQD #B331-09-070-D, Baseline Review of the Tritium Facility – Building 331 Facility Safety Plan, July 2009
- USQD #B331-09-054-D, Baseline Review of the ES&H Team 1 Health Physics Discipline Action Plan for Tritium Facility, July 2009
- USQD #B331-09-062-D, Baseline Review of OSP 331.099, Tritium Process Station (TPS), June 2009
- USQD #B331-08-054-D, Baseline Evaluation of MOP-331-001, Annual Calibration Procedure for Femto-Tech Tritium Monitors, B331, October 2008

During review of the USQ process, the Management Self Assessment team for the Tritium Facility Modernization (TFM) Building 331 identified the finding that some of the equipment external to the glovebox had not been included in the USQD. None of these missed items are safety significant. USQDs #B331-08-078-D, and #B331-08-102-D have been revised to include these items.

Criterion 2 Credited TPS and TFM conventional facility controls identified in the B331 safety basis are properly implemented, maintained, and managed.

A review was conducted of the B331 DSA and TSR implementation documentation to ensure that credited requirements and controls flow down to procedures and training. The DSA designates Tritium Room Monitors as Equipment Important to Safety (EITS). Tritium Room Monitors have not yet been installed within rooms 154 and 158 as required for tritium operations. Rooms 154 and 158 are within the TFM project scope and were included within the POA. Tritium Room Monitors must be installed and calibrated prior to tritium operations in rooms 154 and 158 (**Finding SB-2-1**). While facility management has identified the action to install the tritium room monitors, the RA team concluded the monitors must be installed prior to operations involving the TFM project.

During review of the USQ process, the MSA team identified a finding that the glovebox passive barrier safety significant designation was not derived from the DSA hazard analysis, but had instead been established at management's discretion. As such, there was no formal basis for the selection of glovebox components needed to maintain the barrier function. To resolve this issue, a white paper on the glovebox barrier had been developed. It was noted that successful completion of functional testing in accordance with industrial consensus standards provided sufficient confidence that the process piping and associated safety-significant process isolation

valves will perform their safety function to isolate the tritium gas. The white paper was accepted by LSO on August 20, 2009. With their acceptance, LSO specified that LLNL will need to document how operability will be verified in the future, or provide convincing evidence as to why it is not necessary to preserve the isolation function.

Criterion 3 The surveillance requirements for the safety significant gloveboxes have been adequately implemented.

The Building 331 DSA and TSR specify the following Surveillance Requirements (SRs) for Tritium Gloveboxes:

Surveillance	Frequency
SR 4.1.1 Each glovebox containing radioactive materials shall be visually inspected to ensure the integrity of the glovebox frames, windows, and ports is maintained.	ANNUALLY (during operations in the glovebox or at the start of operations if the glovebox has not been used for more than 12 months)
SR 4.1.2 Perform a differential rate-of-rise test to ensure the glovebox is capable of maintaining a differential pressure of -1 in. WG (± 0.5 in WG) for 5 minutes.	ANNUALLY (during operations in the glovebox or at the start of operations if the glovebox has not been used for more than 12 months)

These surveillance requirements have been implemented in Surveillance Requirement Procedure SRP-B331-4.1.1/4.1.2, Tritium Gloveboxes. Annual tests were completed and documented on August 14, 2009.

Issue(s)

Finding SB-2-1 (Pre) Tritium Room Monitors have not been installed within rooms 154 and 158.

Conclusion

Through personnel interviews, a review of USQ documentation, the DSA and TSR, and other associated documentation, it has been established that the USQ process is in place to ensure that changes to B331 safety SSCs, operations, and procedures are adequately reviewed if required. It has further been established that credited TPS and TFM conventional facility controls identified in the B331 safety basis are properly implemented, maintained, and managed, and that the surveillance requirements for the safety significant gloveboxes have been adequately implemented.

This objective has been met.



Functional Area: Engineering and Configuration Management	Objective: EN-1	Date: 08/23/09	Objective Met:	
			<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

p331 SSCs and procedures are consistent with safety basis document descriptions and

- CMU08-000056 Rev. AB (ACP-B331-003), B331 Combustible Loading Administrative Control Procedure, 7/17/09
- CMU08-000057 Rev. AC (ACP-B331-004), Combustible Loading Limit for Hydrogen Species, 6/17/09
- NMU08-000015 Rev AB, NMTP Nuclear Facility Configuration Management Plan, October 2008
- SDD-B331-002 Rev AA, System Design Description for the Tritium Process Station, 7/21/09
- PLZ2005-0331-0002EA through PLZ2005-0331-0036EA Conventional Facility Drawings
- PLS2007-0331-0003D through PLS2007-0331-0005D TFM project Fire suppression system structural drawings and details
- PLM2007-0331-0002D and PLM2007-0331-0003D TFM project Fire suppression system mechanical drawings and details
- SDD-B331-003-Draft, Building 331 System Design Description for the Increment Fire Barrier, June 30, 2009
- System Engineer Qualification Card Tritium Glovebox
- CMU07-000284 AD, Lawrence Livermore National Laboratory Defense Nuclear Facilities Vital Safety System List, June 2009, ECMS release date 07/16/2009
- CNU09-00052 Rev AA, NMTP.PD-03-045, NMTP SBK System Engineering Program Manual Revision 3, March 25, 2009
- Conventional Facility RFI and Special Facility Logs
- PFN 331-2006-003, RFI 27, 33, & 64, Line Item Request For Information
- WCI-CM.1, Weapons and Complex Integration Principal Directorate Configuration Management Plan, August 2008
- LLNL-AR-409585, CMU08-000033 Rev AA, Weapons and Complex Integration Directorate Nuclear Materials Technology Program Superblock Work Control Manual, December 2008
- DOE-STD-1073-93, Guide for Operational Configuration Management Program, November 1993
- DOE-STD-1073-2003, Configuration Management October 2003
- AB-B331-07-011, Seismic calculations for the Tritium Process Station Glovebox in R157, Building 331, 6/29/09
- AB-B331-07-018, Structural calculations for safety zone for Safety Significant Slabs in B331.
- AB-B331-09-004, Evaluation of the differential Seismic Anchor Movement [SAM] at the Tritium Process Station [TPS] in room 157 Building 331
- Letter from (b)(6) Subject - Design Configuration Change Control Process for Tritium Program High-Curie Workstations, dated 9/30/09

- TF08-018, NMTP Tritium Program Engineering Change Order (ECO) form
- Operational Safety Plan No. 331.099, Tritium Process Station (TPS)
- Tritium Facility Modernization Project Quality Assurance Program, Revision 0, May 23, 2006

Interviews Conducted

- NMTP Assurance Manager
- Configuration Management SME
- System Engineer SME
- Tritium Glovebox System Engineer
- Line Item Project Manager
- Area Manager for Labor Only Construction
- B331 Lead Safety Analyst
- B331 Safety Analyst
- RHWM Quality Assurance Implementation Coordinator

with regard to the operation, hazards and controls associated with both facility and TPS operations.

The B331 DSA states that the increment fire barrier safety function is that the "barrier wall prevents propagation of fire." The NEPA (NEPA 101) definition of a fire barrier is that it is a

"membrane designed and constructed with a specific fire resistance rating to limit the spread of fire and also resists the movement of smoke." A fire barrier by definition can only resist, not prevent, propagation of fire. The low combustible loading, the existence of both fire suppression and fire detection systems and the close proximity of the fire department all contribute to the conservative assurance that a fire will not propagate between increments. The ability of the increment fire barrier and Increment fire barrier door to prevent propagation of fire in conjunction with the additional defense in depth features is not in question, however, the terminology used in the safety basis is questionable. Terminology similar to "is expected to prevent the

was discussed with the process author. In this discussion specific examples were used to assure a clear understanding of the intent of the process. As intended by the Engineering Change Order process, changes that affected the glovebox boundary would require APL and Facility Manager approval and invoke the NMTP Work Control process for evaluation and execution of the change. It was stated that for purely program-affecting work that had no facility safety function and did not affect the glovebox boundary, one of the intents of the ECO process was that the replacement work could be done under existing processes such as the FSP or OSP without going through the NMTP Work Control process.

It was noted that the OSP and FSP do not specifically call out many potential maintenance activities that could be adequately cited according to the NMTP Superblock Work Control Manual. The B331 FSP describes in Section 4.3.3, Maintenance and QA of Programmatic Work, typical safety-related maintenance and quality assurance activities that should be considered for inclusion in an OSP. These activities include maintenance, testing, replacement, and calibration. It appears that the intent of this section was to identify that some maintenance and testing activities should be included in an OSP (which would be reviewed technically and also through the USQ process). This section of the B331 FSP does not allow replacement activity of the type discussed with the program personnel.

A review of Operational Safety Plan No. 331.099 and in particular Section 6, Maintenance, Equipment Inspections and Quality Assurance, showed that while specific activities such as the testing of interlocks, calibration of tritium monitors, and changing of glovebox gloves are described, there are no provisions for replacement or maintenance of specific categories of process-related equipment.

Therefore, it appears that one of the intents of the ECO process (to allow process-related changes to occur under the auspices of the B331 FSP or TPS OSP) is not actually covered under these documents. It is noted that the B331 FSP, Section 3.3.8, Facility Modifications, states, "facility and equipment modifications, and operations and programmatic work performed in the Tritium Facility is controlled and authorized by the Facility Manager in accordance with the work control manual." The NMTP Superblock Work Control Manual does not include provisions for the ECO process but does not preclude it either. Also, the Work Control Manual defines facility work as, "any combination of engineering, procurement, installation, assembly, disassembly, construction, demolition, or fabrication work for a new SSC or to maintain, alter, add to, decontaminate, decommission, or rehabilitate an existing SSC." The Work Control Manual describes the processes for conducting this work. It appears that the intended use of the ECO process is not consistent with the B331 FSP and the NMTP Work Control Manual unless the activity is explicitly identified within the OSP. **(Finding EN-1-1)**

The Line Item Project Configuration Management program utilized the RFI process to control changes during construction of the conventional facilities. The Line Item configuration management program attempted to integrate with the Superblock (SBK) CM program through the SBK Work Control/Change Control process, but not all RFIs were processed through the SBK WCM process which was substantially revised during the course of the project. Building 331 configuration management personnel were not always included in the RFI process. DOE-STD-1073, section 2.2.1.2 *Design and Construction Turnover*, states that to ensure effective turnover the operational CM program should, "provide review and approval format and content of final design basis and final design output documents and accept responsibility for their configuration management at turnover." A documented turnover strategy or agreement was not prepared. The integration of the TFM Line Item project CM program and the B331 Nuclear Facility CM program was weak. **(Observation EN-1-1)**

The NMTP Nuclear Facility Configuration Management Plan section 4.2 states that SBK is developing SDDs that will contain all of the "required information". Included in the required information listing is a configuration item number and a configuration management categorization. Neither a configuration item number nor a configuration management categorization was evident in either the SDD for TPS or the Building 331 SDD for the Increment Fire Barrier. **(Observation EN-1-2)**

Per DOE-STD-1073-2003 configuration management consists of 5 elements; Design Requirements, Work Control, Change Control, Document Control and Assessments. Building 331 operations include all elements of configuration management.

Element	331 implementation
Program	NMTP Configuration Management Plan
Design	SBK work control/change control program and Engineering Design Review process, QA program
Work Control	SBK work control/change control program
Change Control	SBK work control/change control program
Document Control	As-built drawings, calculations, QA documents and specifications
Assessments	NMTP self assessment program

The configuration management program, including the associated implementation schedule for DOE-STD-1073 and the current work control/change control process assures an adequate process for modifying the facility. The process is properly implemented.

The superblock work control/change control process is well understood by those managing the program. Discussions with work control/change control personnel revealed that processes and procedures used are not completely consistent with the SBK Work Control Manual (reference Superblock Work Control Manual Figure 2). It appears there is a heavy reliance on the judgment, experience and expertise of a core team of individuals to ensure work and changes are properly reviewed, approved and authorized. While the processes used are consistent, key decision points in the process appear to be reached by consensus rather than established criteria or guidelines.

The Programmable Logic Controller (PLC) controls over-temperature set points for the TPS beds as well as controlling some of the TPS glovebox boundary valves. The PLC software has been evaluated to be safety software (see **Finding ISM-2-3**). PLC software is controlled through paper change control, but there did not appear to be a formal process for implementing the approved change that included verification that correct software is being QA validated at installation. This is mitigated by the integration and close relationship between the software designer, writer, and operators. They ensure that updated software is properly approved and the correct software is installed.

The NMTP Nuclear Facility Configuration Management Plan does not appear to be integrated with or into the Superblock change control work control process, yet the SBK change control work control process is stated to be the implementing procedure in the configuration management plan. The SSCs that are configuration items is not consistently understood. Those items that are on the vital safety system (VSS) list have been stated as being the list of items

Functional Area:	Objective:	Date:	Objective Met:	
Emergency Preparedness	EP-1	08/21/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

The emergency preparedness program, including the conduct of periodic drills, has been

implemented at B331. Personnel demonstrate proficiency to appropriately respond to abnormal events. (CR-11)

Documents and Records Reviewed

- EMD-09-04-009, *Fire Hazards Analysis Building 331 Tritium Facility*, March 20, 2009
- UCRL-TM-231081, *Emergency Preparedness Hazards Assessment Revision 2 Building 331 Tritium Building*, May 2007
- CMU09-000057 Rev AA, May 2009 (UCRL-AR-135652-REV-2), *NMTP Zone 8 Self-Help Plan for Superblock*
- DOE Order 5480.20A, *Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities – Section 7.d(3)(b)*
- DOE Order 151.1C, *Comprehensive Emergency Management Systems*, November 2, 2005
- LLNL-TR-407992, *Tritium Science Station Readiness Assessment Final Report*, October 2008
- Emergency Response / Criticality Drill After Action Report, B332 / B331, FY2004
- SBK08-178, *Superblock (SBK) – B332, B331, B334, B335, and T3340 Emergency Drill AFTER ACTION REPORT*, July 10, 2008
- Pre-planning documentation for the SBK Criticality exercise conducted July, 2009 (Note: the After Action Report for this exercise is in draft and not yet approved and issued)
- FSP-B331-09, *Weapons and Complex Integration, Tritium Facility – Building 331, Facility Safety Plan*, June 2009
- *Conduct of Operations Applicability Matrices for the Nuclear Materials and Technology*

- UCRL-AM-214434 (ECMS no: CMU06-000030 Rev AC), *NMTP Conduct of Operations Manual*, Rev. 3, July 2008

Interviews Conducted

- NMTP SBK Training Manager
- NMTP SBK Training Specialist
- Superblock Emergency Preparedness Coordinator
- B331 Facility Manager
- B331 Deputy Facility Manager

Evolutions Performed and Observed

- Observed facility response drill conducted in B331 on Thursday, 8/20/09. The drill scope consisted of a simulated tritium leak experienced in the TPS glovebox as a result of the connection to the NIF target assembly failing during a fill operation.

Discussion of Results

Criterion 1 Potential off-normal, alarm, and emergency conditions have been identified for the TPS and OGCS systems, response procedures have been developed to address these conditions, and drills have been conducted. The response to potential off-normal, alarm, and emergency conditions for the TPS and OGCS systems may be addressed in the FSP, OSP, or other procedures as needed.

The emergency preparedness program has been implemented in the Superblock, which includes B331. However, due to the facility's mission and operations over the past several years the level of participation and challenge expected for B331 facility personnel and systems has been reduced. Based on interviews with facility management, this seems to have been acceptable due to B331's relative priority and risk potential compared with other NMTP missions. However, the facility is now in the process of transition from reduced mission activities to a more increased profile regarding material inventory and deliverable requirements. With the recent startup of TSS and anticipated startup of TPS, B331 operations will take a more prominent position in the overall mission of NMTP and, as such, is planning to increase demonstrated exercise and drill activities.

B331 facility management currently partitions responsibility of the emergency preparedness scope into two segments. Emergency preparedness activities, including required annual participation in exercises and drills related to facility EALs and site-wide participation in EOC and DOC activation, are coordinated and tracked by the Superblock Emergency Preparedness Coordinator. Facility response drills that challenge facility personnel and equipment response to abnormal events, conditions or accidents are currently developed by facility management in conjunction with the facility's training organization with the conduct of the drills coordinated directly by facility management.

Due to this current organizational alignment this Form 1 is sectioned similarly.

EMERGENCY PREPAREDNESS AND EXERCISE PROGRAM

The Emergency Preparedness program for NMTP is well developed and the required annual EP drills and exercises have been conducted for Superblock facilities. However, the focus in the past has primarily been on B332 due to its SNM inventory and supporting SSCs. Only one of

the past nine annual EP exercises/drills specifically focused on B331 operations. For the other eight EP exercises/drills, B331 personnel have only been required to shelter in place in B331.

No specific response requirements or objectives other than shelter in place have been demonstrated by B331 personnel related to that facility's operations for those eight evolutions. ES&H Manual, Document 22.1 states, "Each facility with an EPHA shall participate in an emergency response drill or exercise annually." In addition, "A facility specific drill schedule exists for facilities having an EPHA." Although it can be presented and documented that B331/TFM personnel have participated in the Annual EP Exercises, the more recent operations and modifications (e.g., TSS) associated with B331 were not challenged in the 7/09 EP drill nor does the current EP exercise/drill schedule include an evaluation of EP response for TPS operations. Interviews with facility personnel confirmed that the planning process for 2010 NMTP EP drills may include an exercise more focused on these new B331 operations. As the B331 facility continues along this strategy of greater inclusion into annual emergency response drills or exercises demonstrated performance can be better evaluated and improvements applied.

As part of the document review of the B331 EPHA the RA determined that several sections of information and data associated with the facility was either out of date or inconsistent with the facility's DSA/TSRs. Specifically the following issues were noted with the B331 EPHA:

- Section 1.0 references out of date DSA/TSR documentation (2003 vice 9/2008)
- Section 2.1 does not mention the mission associated with NIF targets
- Section 2.4 does not describe TSS or TPS operations or SSCs except in general terms as related to future missions
- Section 3.0 basis for screening and analysis is based on out of date DSA/TSR documentation (2003 vice 9/2008)
- Table 3-1 shows maximum quantity of Tritium in B331 as ≤ 30 gms (289,500 Ci) instead of < 35 gms as indicated in the current DSA
- Section 4.1.1 also shows the facility limit for tritium in B331 as 30 gms.
- Section 4.1.3 shows an inventory quantity of tritium in B331 based on 2/13/07 data. This more than likely will change appreciably upon authorization of B331 operations.
- Section 5.0 contains scenarios and analysis for various events involving tritium. This section needs to be reviewed and possibly updated given the new facility limits and missions.
- The event consequences Tables 6-1 and 6-2 may be impacted, as well, but analysis needs to be performed to assure alignment with current facility limits and operations.

It may be unlikely that emergency classes, protective actions and/or EALs will be impacted by the new processes currently in B331 (e.g., TSS) and planned (e.g., TPS), but that conclusion is uncertain since the EPHA has not been updated based on these new operations. DOE O151.1C states requirements for updating the facility's EPHA. These requirements flow down through ES&H Manual, Document 22.1, Section 2.4 as follows: "These assessments are reviewed at least every three years and revised as conditions change." In addition, ES&H Manual, Document 51.1, Section 4.4 states that a consistency review must be performed between the approved DSA/TSR and facility EPHA and updated, as necessary. It was determined by the RA

that the B331 EPHA requires updating. This has been documented as a post-start Finding (Finding EP-1-1) as described below.

FACILITY RESPONSE DRILL PROGRAM

Discussions were held with the B331 Facility Manager (FM) and Deputy FM that concluded that response drills to abnormal conditions (equipment / process related and personal injury) in the facility were in the initial stages of being formally established. This issue was raised during the TSS RA, but was not shown as a Finding or Observation; however, the following wording is in the TSS RA Final Report:

"Although the operators have been trained and clearly understand the proper responses, the operators would benefit from participation in future drills and exercises that are specific to B331 tritium operations. The evolution of the continuing training program should consider increasing the operator's involvement in similar drills."

In the time since the completion of the TSS RA, facility management has taken moderate steps to establish a strategy for implementing response drills. However, an adequate range and number of scenarios have not been fully developed nor performed in the facility. Four developed scenarios were reviewed with only one being applicable to TPS.

Following is an excerpt from DOE O5480.20A Section 7.d. (3) (b):

- Continuing training programs for certified operators and certified supervisors shall include, at a minimum, the following as related to job performance:
- Drills conducted in the facility or on a simulator to enable personnel and operating teams to maintain their ability to respond to abnormal or accident situations. Training drills conducted in the facility shall not lead to or have the potential for safety concerns.

The current Tritium Facility TIM indicates that this requirement has been met. Facility personnel

Issues

Finding EP-1-1 (Post)

The B331 Emergency Planning Hazards Assessment (EPHA) has not been updated as required by DOE O151.1C and ES&H Manual, Document 22.1 and Document 51.1.

Observation EP-1-1

A facility drill program should be fully developed and implemented.

Conclusion

As may be the case with several other SMPs implemented within NMTP, the Emergency Preparedness Program has established the core fundamentals that are required to assure that the essence and requirements of the SMP are in place. However, since the mission of NMTP, as it supports LLNL and the DOE complex, is changing in regard to specific activities conducted in B331 the focus of Emergency Preparedness exercises and drills developed and conducted by the personnel in that facility must also change to meet the needs of B331 and also satisfy expected requirements. B331 management must continue to focus on the drill program in order to grow and mature their EP SMP.

Although one Post-Start Finding and one Observation was identified, the demonstrated performance during the RA and future plans to correct the issues for this Functional Area are satisfactory to support startup of TFM.

This objective has been met.

Functional Area:	Objective:	Date:	Objective Met:	
Maintenance and Test	MT-1	08/19/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Programs are in place to confirm the condition and operability of structures, systems, and components required for B331 operations. Testing is performed after maintenance activities to confirm the effectiveness of the maintenance and the operability of safety SSCs and Equipment Important to Safety (EITS). The material condition of EITS and equipment associated with TPS will support the safe conduct of work. (CR 8)

Documents and Records Reviewed

- FSP-B331-09, Weapons and Complex Integration, *Tritium Facility – Building 331*, Facility Safety Plan, June 2009
- UCRL-AR-114203-06, Weapons and Complex Integration, Tritium Facility—Building 331, Documented Safety Analyses, September 2008
- UCRL-AR-132403-06, Weapons and Complex Integration, Tritium Facility—Building 331, Technical Safety Requirements, September 2008
- CMU09-000021, Maintenance Implementation Plan for Superblock Hazard Category 2 & 3 Tritium Facility, August 2009, Revision 1.0

- Nuclear Materials Technology Program (NMTP) Facilities Maintenance Program Manual, September 2006
- Tritium Process Station; Master Equipment List with Maintenance, Test, and Inspection; date August 10, 2009
- SDD-B331-002, System Design Description for the Tritium Process Station, Revision AA, July 2009
- TF09-010, Functional Testing Plan, Tritium Process Station, July 23, 2009, Revision 2
- CMU08-000178, Surveillance Requirement Procedure SRP-B331-4.1.1/4.1.2, Tritium Gloveboxes, Revision AB
- CMU09-000073, Surveillance Requirement Procedure SRP-B331-4.6.1/4.6.2, Annual

- TF09-013, Startup Plan – Tritium Process Station, Revision 1, August 7, 2009

Interviews Conducted

- Electrical Engineer
- Test Engineer
- TFM Project Engineer

Evolutions Performed and Observed

- Performance of SRP-B331-4.1.1/4.1.2, Tritium Glovebox Annual Visual Inspection and Annual Rate-of-Rise Test

Discussion of Results

Criterion 1 B331 programs for maintenance, inspection, testing, and calibration are effectively implemented to confirm and periodically reconfirm the condition and operability of TPS-related safety SSCs (safety-significant) identified in the safety basis.

The B331 Documented Safety Analysis (DSA) in Table 3-11 determined that there are no unmitigated public risk rankings of high or moderate; thus, no safety class SSCs were identified for public risk. Three SSCs are credited with reducing unmitigated worker risk from a high or moderate ranking to a low or negligible ranking; however, none are associated with the Tritium Processing Station (TPS).

At management's discretion, the increment fire barrier and TPS glovebox were designated safety significant. The implementation of the increment fire barrier is not within the scope of the Readiness Assessment.

The DSA safety function for the TPS glovebox is to provide a passive barrier to protect workers when processing 600 Ci or more of tritium. The TPS glovebox and a portion of the building floor are also designated as design features in the Technical Safety Requirements (TSR). The operability of these SSCs is verified by TSR Surveillance Requirement Procedure SRP-B331-4.1.1/4.1.2, Tritium Gloveboxes. The procedure was reviewed and found to be technically accurate, well-formatted for compliance, and consistent with TSR acceptance criteria. The performance of the annual visual inspection and rate-of-rise test (SRP-B331-4.1.1/4.1.2) was observed and no issues were identified. The surveillance requirement acceptance criteria were met.

The maintenance program is identified as an administrative control important to safety in the B331 TSR in section 5.4.7. The TSR requires that a maintenance program be established, implemented, and maintained in accordance with the NMTP Facility Maintenance Implementation Plan for the Hazard Category 3 Facilities to ensure effective measures are taken so that facility safety-significant SSCs are capable of performing their intended function. The key elements of the program identified in the TSR are:

- Periodic inspection/surveillance of systems
- Development, approval, and control of maintenance procedures
- Post-maintenance testing
- Master Equipment List (MEL)

It was determined that this TSR administrative control is satisfied for B331 through the Superblock Maintenance Implementation Plan for hazard category 2 & 3 nuclear facilities, the NMTP Maintenance Program Manual, and the B331 MEL. In addition, the B331 Facility Safety Plan provides additional work controls for craft personnel.

A comparison of the B331 DSA, the TPS System Design Description (SDD) listing of safety-significant SSCs, and the TPS MEL identified some discrepancies, as shown in the following table. Note that DSA Table 4-2 applies to all B331 tritium gloveboxes, not just the TPS.

DSA Table 4-2 (applies to all tritium gloveboxes)	TPS System Design Description	TPS MEL
Glovebox frame	Glovebox shell and frame	TPS Glovebox
Glovebox windows	Glovebox windows	
Glovebox glove ports	Glovebox glove ports	
Glovebox pass-through port	Glovebox pass-through port, PTC-1 (inner door)	Glovebox pass-through chamber (inner door)
Floor within 4 feet of anchor points	Glovebox structural anchorage to room floor and portions of the floor within 4 feet of the anchor points	(b)(2)High
Glovebox processing isolation valves (tritium transfer, compressed gas lines, vacuum; line connecting program manifolds and systems to cleanup cart or collection vessels)	Glovebox processing isolation valves (b)(2)High	
	Piping between isolation valve and glovebox shell	
Glovebox penetrations (e.g., instrument connections, gauges)	Glovebox penetration for tritium monito (b)(2)High	Pressure Transmitters (b)(2)High
	Glovebox penetration for pressure transmitter: (b)(2)High	
	Glovebox penetration for 1/8-in compressed air lines for pneumatic valves	
	Glovebox penetration for power cables for vacuum pumps, blowers, and heaters	

The TPS SDD expands on the information provided in the DSA Table 4-2 for all tritium gloveboxes and identifies the TPS glovebox components. Some issues noted:

1. The TPS MEL identifies only some of the safety-significant SSCs from the TPS SDD.
2. The MEL identifies the palladium storage beds as safety-significant. These are

The tritium room monitors for rooms 154, 158, and 170 have not been installed. These EITS SSCs are required to be installed and calibrated prior to operations in those rooms. The facility is aware of this constraint and is working to have those monitors installed.

The TPS Startup Plan provides the phased-approach to startup and the introduction of tritium and surrogates to qualify equipment and procedures. The four phases are initial tritium introduction at low concentration, process manifold and procedure exercises, detritiation system performance verification, and uranium bed full capacity storage test.

Criterion 4 Necessary maintenance procedures are prepared, validated and verified to reflect the current configuration of the TPS and OGCS systems and supporting equipment with due dates entered into a tracking system.

The TPS RA Implementation Plan identified several prerequisites to the start of the RA. The following prerequisites related to the maintenance and test objective were determined to be satisfactorily met:

- CR 8.1 – Maintenance procedures are approved for TPS and TFM conventional facility equipment, including inspection, test, and calibration procedures.
- CR 10.1 – TPS and TFM conventional facility plans and procedures, including the

Functional Area: Management and Organization	Objective: MG-1	Date: 08/24/09	Objective Met:	
			<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Line management has appropriately revised and effectively implemented the following safety management programs (SMPs) for TFM within B331. (CR-1)

- Radiation Protection (addressed by ISM-1)
- Unreviewed Safety Question (addressed by SB-2)
- Configuration Management (addressed by EN-1)
- Fire Protection (addressed by ISM-4)
- Maintenance (addressed by MT-1)
- Quality Assurance (addressed by ISM-2)
- Radioactive and Hazardous Materials Shipping, Transfer, and Receiving (addressed by ISM-3)
- Facility Staff Qualification and Training (addressed by TR-1 and TR-2)

Documents and Records Reviewed

- As described in the associated functional area evaluations (i.e., Form 1s)

Interviews Conducted

- As described in the associated functional area evaluations (i.e., Form 1s)

Evolutions Performed and Observed

- As described in the associated functional area evaluations (i.e., Form 1s)

Discussion of Results

Criterion 1 Safety management programs have been properly incorporated into TPS and TFM conventional facility operation for each applicable program to ensure safe accomplishment of work.

Based on the integrated results of the RA, the applicable safety management programs have been revised and implemented to support safe operations of TPS and the TFM conventional facilities. The stated programs are existing safety management programs or administrative programs which contribute to the safe operation of the facility. The majority of these programs required little change to adequately implement the new safety basis. In those cases, the RA ensured that the existing program was properly implemented.

Several of the evaluated programs were incorporated into a single functional area (i.e., ISM) to specifically evaluate the effective implementation of integrated safety management into facility operations. While the RA identified several findings related to specific ISM programs, the consolidation of the findings as a whole did not reveal commonalities which would indicate a systemic breakdown in the programs or how work is planned and executed safely. While the

objective for the quality assurance was not met, the identified issues do not represent a programmatic breakdown and closure of the pre-start findings will satisfy the stated objective as determined by the RA team.

Issue(s)

See applicable Form 1s for identified issues

Conclusion

This objective has been met.

- Facility Safety Officer
- ES&H Team Leader
- AB Analyst
- NMTP Assurance Manager

Evolutions Performed and Observed

- Abnormal event facility drill

Discussion of Results

Criterion 1 The B331 FSP is current and implemented and adequately defines NMTP and support organization functions, assignments, and responsibilities as they pertain to TPS and TFM conventional facility operations.

The FSP was revised in June 2009 to reflect the TFM project. The roles and responsibilities for NMTP and support organizations were not changed (i.e., programmatic changes were not necessary) as a result of the project. However, the FSP does properly reflect the addition of the TFM project within those programs and organizations. Since the roles and responsibilities were not significantly changed the RA focused its evaluation, primarily through interviews, on the existing programs as described in the FSP and the inclusion of those programs to the new scope of TFM.

The RA reviewed the findings from the MSA (e.g., MG-2-2) concerning outdated documentation which does not reflect recent organizational changes. While the RA team concurs with the findings of the MSA team, the RA Team did not find any issues at the facility level concerning the understanding or implementation of the current organizational roles and responsibilities. Nonetheless these documents, including Chapter 17 of the DSA, ought to be revised during the next revision cycle.

Through interviews, the RA confirmed that NMTP personnel and support organizations have properly implemented the FSP.

This criterion has been met.

Criterion 2 TFM conventional facility procedures clearly define functions, assignments, responsibilities, and reporting relationships specific to TFM conventional facility activities.

As discussed in greater detail in OP-1, the conventional facility procedures were reviewed and the applicable workers interviewed. In conjunction with the FSP, the conventional facility procedures adequately describe the functions, assignments, responsibilities, and reporting relationships.

This criterion has been met.

Criterion 3 Operations, operations support, and management personnel clearly understand functions, assignments, responsibilities, and reporting relationships.

The FSP is the primary document which implements the roles and responsibilities associated with the safety basis. As discussed in criterion 1, the FSP has been adequately revised and implemented. While several higher tier documents are outdated, the stated criterion is adequately implemented at the facility level.

This criterion has been met.

Criterion 4 TPS and TFM conventional facility operations, operations support, and management personnel demonstrate an awareness of public and worker safety, health, and environmental protection requirements.

Based on input from the functional areas for ISM and OP, documentation reviews, and interviews, the RA Team determined that programmatic, facility, and support personnel adequately understand and demonstrated the appropriate level of awareness for public and worker safety, health, and environmental requirements. As expected each group did not have the same level of awareness for each category of public, worker, and the environment, however the implementation was commensurate with the respective roles and responsibilities.

This criterion has been met.

Issue(s)

None

Conclusion

The TFM project has not significantly changed the pre-existing roles and responsibilities for NMTP or support personnel. However, the project did require the extension of the existing roles and responsibilities to TFM. Based on interviews, document reviews, and input from additional functional areas no significant issues were identified.

This objective has been met.

Functional Area:	Objective:	Date:	Objective Met:	
Management and Organization	MG-3	08/21/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Identified issues, deficiencies, and non-conforming items are appropriately resolved in a timely manner, including findings and recommendations from assessments and audits. (CR – 15)

Documents and Records Reviewed

- UCRL-AR-114203-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Documented Safety Analysis, June 2009
- UCRL-AR-132403-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Technical Safety Requirements, June 2009
- FSP-B331-09, Weapons and Complex Integration, *Tritium Facility – Building 331*, Facility Safety Plan, June 2009
- B331 NMTP Response Actions Forms, 08/01/08 through 8/19/09
- NMTP Master Action Database entries for B331, data range 08/01/08 through 8/19/09
- Issue Tracking System entries for B331, through 8/19/09
- TF09-031, Tritium Facility Modernization Project MSA Corrective Action Plan, August 14, 2009

TF09-031, Tritium Facility Modernization Project MSA Corrective Action Plan, August 14, 2009

Evolutions Performed and Observed

- None

Discussion of Results

Criterion 1 There are no open items included in ITS, NMTP Master Action Database (MAD), open occurrence reports, nonconformance reports, MSA findings, and employee concerns that could preclude safe operation of TPS SSCs and programmatic equipment.

The RA Team reviewed the current entries from several issue tracking databases (e.g., ITS, MAD, etc.). Facility management has identified six open pre-start findings/issues which must be adequately closed prior to radiological operations commencing in TPS. With the exception of the previously identified open pre-start findings/issues, no open items were identified which would preclude the safe operation of TPS SSCs.

Several issues identified in MSA were selected to ensure the appropriate actions had been identified and implemented. Specifically, MSA findings MG-3-2, MG-4-1, SB-2-1, and OP-2-1 were reviewed in ITS. With the exception of OP-2-1 the closure documentation had been entered into ITS and reviewed by the NMTP Assurance Manager. While OP-2-1 (ES&H staff must perform a walk-down of the as built TPS and its operating procedures) did not have the associated closure documentation, the Assurance Manager confirmed with facility management that the walk-down had taken place. These findings were not categorized at a level which would require validation by the assurance manager but it was nonetheless performed as a best practice. During these reviews it was confirmed that all MSA pre-start and post-start findings had been closed or entered into ITS.

The NMTP Facilities Responses and Events procedure, NMTP-FMP-0400, was reviewed to ensure the program has been effectively implemented. Multiple Response Actions Forms (RAF) were reviewed and in general complied with the program expectations. One discrepancy was identified with RAFs B331-090303-01-R and B331-090305-01-R where the corrective action for 090303 was actually the corrective action for 090305. In general, the program is being effectively implemented with the exception of Section 3.4 of NMTP-FMP-0400. (**Observation MG-3-1**)

The NMTP Feedback and Improvement Plan (FIP) was also reviewed to ensure the applicable tenets have been effectively implemented within B331. A self assessment schedule has been developed. The FIP program also includes a scheduled management walk-through process. With one exception the walk-through's for B331 are on schedule.

The current self-assessment and management walk through programs are not being executed as explicitly described in the FIP. The program manager is aware of the differences and indicated that a revision to the FIP will be conducted once the institutional assessment program has been revised which is currently in process. While there are differences between the description and execution of the program, the RA team concluded that the differences are minor

Issue(s)

Observation MG-3-1

The NMTP Assurance Manager is not currently fulfilling the requirements of Section 3.4 of NMTP-FMP-0400.

Conclusion

Based on the review conducted by the RA Team, NMTP has a mature and effective assessment program. B331 assessments have also been effectively integrated into the NMTP program. With the exception of the previously declared open pre-start findings, no additional open actions were identified which would preclude safe startup and operation of TPS SSCs and programmatic equipment.

This objective has been met.

Functional Area:	Objective:	Date:	Objective Met:	
Management and Organization	MG-4	08/21/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Line management has confirmed through the MSA that event as identified on a

Based on interviews with facility management and review of the prerequisites and MSA findings all open items have been reviewed by facility management. The Facility Manager formally provided a declaration of readiness which identified six open findings/issues that are considered a manageable list of open items.

All MSA findings have been entered into ITS. The various findings and associated actions are

Functional Area: Operations	Objective: OP-1	Date: 08/18/09	Objective Met:	
			<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Sufficient numbers of qualified personnel are identified and available to conduct and support safe operations of TPS and TFM conventional facilities. (CR 1, CR 6)

Documents and Records Reviewed

- UCRL-AR-114203-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Documented Safety Analysis, June 2009
- UCRL-AR-132403-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Technical Safety Requirements, June 2009
- FSP-B331-09, Weapons and Complex Integration, *Tritium Facility – Building 331*, Facility Safety Plan, June 2009
- Operational Safety Plan No. 331.099, Tritium Process Station (TPS), expires June 30, 2012, including Attachments 1-5
- SRP-B331-4.1.1/4.1.2, Nuclear Materials Technology Program, Administrative Control Procedure, *Surveillance Requirement Procedure SRP-B331-4.1.1/4.1.2, Tritium Gloveboxes*, CMU08-000178 Rev. AB, July 9, 2009
- SRP-B331-4.6.1/4.6.2, Nuclear Materials Technology Program, Administrative Control Procedure, *Surveillance Requirement Procedure SRP-B331-4.6.1/4.6.2, Annual Inspection of Fire Barrier Wall and Doors*, CMU09-000073 Rev. AB, July 9, 2009
- SRP-B331-4.6.3, Nuclear Materials Technology Program, Administrative Control Procedure, *Surveillance Requirement Procedure SRP-B331-4.6.3, Increment Fire Barrier Structural Inspection*, CMU09-000068 Rev. AA, July 1, 2009
- ACP-B331-001, Nuclear Materials Technology Program, Administrative Control

- B331 Facility Manager

Evolutions Performed and Observed

- TPS operations demonstration and drill

Issue(s)

None

Conclusion

Minimum staffing levels of qualified personnel for facility and TPS operations are specified and provided. This number is sufficient and the qualifications of these personnel are appropriate to support safe operations of TPS and TFM conventional facilities.

This objective has been met.

Functional Area: Operations	Objective: OP-2	Date: 08/20/09	Objective Met:	
			<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Adequate and correct procedures are in place for operating the process systems and utility systems that include revisions for modifications that have been made to the facility. (CR – 10)

Documents and Records Reviewed

- UCRL-AR-114203-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Documented Safety Analysis, June 2009
- UCRL-AR-132403-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Technical Safety Requirements, June 2009
- SRP-B331-4.1.1/4.1.2, Nuclear Materials Technology Program, Administrative Control Procedure, *Surveillance Requirement Procedure SRP-B331-4.1.1/4.1.2, Tritium Gloveboxes*, CMU08-000178 Rev. AB, July 9, 2009
- SRP-B331-4.6.1/4.6.2, Nuclear Materials Technology Program, *Surveillance Requirement Procedure SRP-B331-4.6.1/4.6.2, Annual Inspection of Fire Barrier Wall and Doors*, CMU09-000073 Rev. AB, July 9, 2009
- Operational Safety Plan No. 331.099, Tritium Process Station (TPS), expires June 30, 2012, including Attachments 1-5
- ACP-B331-001, Nuclear Materials Technology Program, *Inventory Control Procedure for Building 331*, CMU06-000057 Rev. AC, July 9, 2009
- ~~ESP-B331-09 Weapons and Complex Integration, Tritium Facility, Building 331 Facility~~

- NMTP-FMP-0102, Nuclear Materials Technology Program, Facilities Management Procedure, *OSP Development and Implementation Guide*, CMU07-000132, Rev. AB, July 2, 2008

Interviews Conducted

- Deputy Facility Manager
- TFM Special Facilities Project Manager and Leader for Installation/Startup
- OSP 391.099 Responsible Individual
- Tritium Associate Program Leader

Evolutions Performed and Observed

- TPS operations demonstration

Discussion of Results

Criterion 1 The existing approved set of plans and procedures for the TPS, the OGCS, and TFM conventional facility are sufficient to ensure that the facility is operated safely and in compliance with the safety basis.

The safety basis was reviewed to identify aspects related to the TPS, OGCS and TFM conventional facility that should flow into plans and procedures. Related safety-significant SSCs include the TPS glovebox and the Increment fire barrier. The credited function of the TPS glovebox is to provide a passive barrier that protects workers in the room when tritium processing in a glovebox involves 600 Ci or more of tritium. SRP-B331-4.1.1/4.1.2 confirms the physical integrity of the glovebox, and ensures the glovebox is capable of maintaining a differential pressure. These attributes are necessary for confinement of tritium. The credited function of the increment fire barrier is to prevent the propagation of a fire between Increment 1 and Increment 2. SRP-B331-4.6.1/4.6.2 confirms the physical integrity of the fire barrier and verifies its fire-resistance rating.

OSP 331.099 for the Tritium Process Station (TPS) evaluates the hazards and controls for TPS and OGCS operations. The OSP addresses radioactive materials inventory control, and directs the operator to ACP-B331-001 prior to introduction of any radioactive material. ACP-B331-001 delineates the process by which the facility maintains its radioactive inventory within the limits specified in the safety basis. In addition, the OSP addresses contamination hazards, thermal

Issue(s)

Finding OP-2-1 (Pre)

The procedure for the annual glovebox inspection, SRP-B331-4.1.1/4.1.2, was not followed as written.

Observation OP-2-1

The process used for establishing and setting the overpressure/underpressure bubblers on the TPS glovebox lacked formality.

Observation OP-2-2

The most recent ECMS Document Expiration Report listed several procedures that have expired and have not been reviewed/ revised within the expected time frame.

Conclusion

Generally, adequate and correct procedures are in place for operating the process systems and utility systems. There is one specific example where no procedure was used to establish a defense-in-depth component function. The operators did not strictly follow procedure compliance requirements.

This objective has been met.

Functional Area: Operations	Objective: OP-3	Date: 08/19/09	Objective Met:	
			<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

An adequate startup program has been developed and includes plans for needed operations

and testing after startup to simultaneously confirm operability of equipment, the viability of procedures, and the performance and knowledge of the operators. The startup plan identifies validation processes for equipment, procedures, and operators after startup of operations, including any required restrictions and additional oversight. (CR 12)

Documents and Records Reviewed

- TE09-013, Revision 1, Weapons and Complex Integration, Startup Plan, Tritium Process

knowledge of the operators for TPS. Their proficiency in operating TSS provides assurance that operations on TPS will be successful.

Although not required, the body of the Startup Plan does not clearly state the expected performance and acceptance criteria, and it is unclear on the acceptable outcome before proceeding to the next step. The Tritium APL disagreed, and indicated that he believed the criteria were well enough defined for him to know when success has been achieved. The TFM Special Facilities Project Manager and Leader for Installation/Startup pointed out that Attachment B, page 2 provides a Guidance Checklist to be used when evaluating the startup steps. Attachment B, page 2 provides appropriate expectations and acceptance criteria, but it is not referenced in the body of the Startup Plan. In addition, the body of the Startup Plan does not provide expectations or criteria for those individuals who will serve as management oversight during the startup activities. The TFM Special Facilities Project Manager and Leader for Installation/Startup pointed out that Attachment B, page 1 provides appropriate expectations and criteria. Attachment B, page 1 is also not referenced in the body of the Startup Plan. **(Observation OP-3-1)**

NMTP-FMP-0600 requires application of the USQ Process to procedures and other documents. The Tritium Process Station Startup Plan falls into this category, but the USQ process has not yet been completed. **(Finding OP-3-1)**

This criterion is met.

Issue(s)

- | | |
|----------------------|---|
| Finding OP-3-1 (Pre) | The USQ process has not been completed on the Tritium Process Station Startup Plan. |
| Observation OP-3-1 | The body of the Startup Plan does not reference Attachment B where expectations and acceptance criteria for Startup Plan steps, and expectations for management oversight are provided. |

Conclusion

Although there are weaknesses, the TPS Startup Plan meets the requirements of DOE-STD-3006-2000. It delineates plans for graded operations and testing after startup to confirm operability of equipment, the viability of procedures, and the performance and knowledge of the operators.

This objective is met

Functional Area:	Objective:	Date:	Objective Met:	
Operations	OP-4	08/19/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

The formality and discipline of B331 operations, including support activities, is adequate to conduct work safely and programs are in place to maintain this formality and discipline. (CR 1, CR 2, CR 13)

Documents and Records Reviewed

- UCRL-AR-135456, *Nuclear Materials Technology Program Management Plan*, Rev. 4, September 2005
- Operational Safety Plan No. 331.099, Tritium Process Station (TPS), expires June 30, 2012, including Attachments 1-5
- FSP-B331-09, Weapons and Complex Integration, *Tritium Facility – Building 331*, Facility Safety Plan, June 2009
- LLNL-AR-409585, Weapons and Complex Integration, *Superblock Work Control Manual*, December 2008
- UCRL-AM-214434, Rev. 3, Nuclear Materials Technology Program, *NMTP Conduct of Operations Manual*, CMU06-00030, Rev. AC, July 2008
- Conduct of Operations Applicability Matrix, Nuclear Materials Technology Program (NMTP) – Superblock, February 1, 2009
- NMTP-FMP-0303, Facilities Management Procedure, *Operating Area Logbook Procedure*, CMU07-000101, Rev. AB, May 14, 2008
- NMTP-FMP-0301, Facilities Management Procedure, *Operator Aids*, CMU06-00087, Rev. AB, February 10, 2009
- SRP-B331-4.1.1/4.1.2, Nuclear Materials Technology Program, *Administrative Control Procedure, Surveillance Requirement Procedure SRP-B331-4.1.1/4.1.2, Tritium Gloveboxes*, CMU08-000178 Rev. AB, July 9, 2009
- SRP-B331-4.6.1/4.6.2, Nuclear Materials Technology Program, *Surveillance Requirement Procedure SRP-B331-4.6.1/4.6.2, Annual Inspection of Fire Barrier Wall and Doors*, CMU09-000073, Rev. AB, July 9, 2009
- SRP-B331-4.6.3, Nuclear Materials Technology Program, *Surveillance Requirement Procedure SRP-B331-4.6.3, Increment Fire Barrier Structural Inspection*, CMU09-000068, Rev. AA, July 1, 2009
- ACP-B331-001, Nuclear Materials Technology Program, *Inventory Control Procedure for Building 331*, CMU06-000057, Rev. AC, July 9, 2009

- ACP-B331-003, Nuclear Materials Technology Program, Administrative Control Procedure, *Building 331 Combustible Loading Administrative Control Procedure*, CMU08-000056, Rev. AB, July 9, 2009
- ACP-B331-004, Nuclear Materials Technology Program, Administrative Control Procedure, *Combustible Loading Limit for Hydrogen Species*, CMU08-000057, Rev. AC, July 9, 2009
- NMTP-FMP-0800, Facilities Management Procedure, *Occurrence Critiques*, CMU07-000058, Rev. AD, January 21, 2009
- NMTP-FMP-0400, Facilities Management Procedure, *Facilities Responses and Events*, CMU06-000169, December 18, 2006
- NMTP-FMP-0211 (ECMS No: CMU08-000175, Rev.AA), *Equipment Identification, Numbering and Labeling Procedure*, February 29, 2008
- B331 Operations Logbook
- B331 Facilities Operator Aids
- B331 Room 157 Operations Logbook
- B331 Room 157 Operator Aids Logbook
- B331 Response Action Forms 9/08 through 8/09
- Critique Report No. 331-09-0002, *B157 High Level Room Tritium Alarm Due to Welding*, May 18, 2009
- B331 Health Physics Discipline Action Plan (DAP)

Interviews Conducted

- Responsible Individual, OSP 331.099
- Alternate Responsible Individual, OSP 331.099
- Tritium Associate Program Leader
- Facility Point of Contact
- Facility Manager
- Deputy Facility Manager

Evolutions Performed and Observed

- TPS operations demonstration and drill

Discussion of Results

Criterion 1 Personnel responsible for TPS, OGCS, and TFM conventional facility operation, including programmatic activities, demonstrate adherence to NMTP Conduct of Operations requirements during evolutions, drills, and full scale simulated or actual operations.

Applicable elements of Conduct of Operations were sampled to evaluate implementation and adherence to Conduct of Operations requirements. The Conduct of Operations matrix was used as a guide for sampling.

Operations, Organization, and Administration

This aspect of Conduct of Operations considers policies, resources and expectations for safe operations.

Facility operations are supported by a suite of documents that delineate expectations with respect to safe operations. This includes the NMTP Management Plan (Preface), B331 Facility Safety Plan (Preface), NMTP Work Control Manual (section 1, Purpose and Scope), OSP 331.099 (entire document), as well as a set of Facilities Management Procedures, Surveillance Requirements Procedures, and Administrative Control Procedures.

Personnel interviewed indicated an awareness of these documents, and the expectations they contained.

The Facility Manager summarized his responsibilities as creating a safe environment for work. He monitors operating (facility and personnel) performance by performing regular facility walk throughs, and by receiving input from facility personnel, such as the FPOC, Safety officer, etc. Deficiencies discovered during the walkdowns are evaluated, and corrective actions developed and tracked, if appropriate.

See also MG-2, OP-1.

This aspect of Conduct of Operations is met.

Shift Routines and Operating Practices

to changing the facility mode in the morning, he monitors the status panels to ensure they are functioning. If there are any off normal indications, he would respond accordingly, including

delaying the change in facility mode if necessary. Additionally, the Health and Safety Technician routinely monitors the facility status as indicated by the display panel as part of his DAP routine.

This aspect of Conduct of Operations is met.

Communications

This aspect of Conduct of Operations considers clarity and effectiveness of communications.

The facility has a communication system for alerting facility personnel of emergencies. During the RA, a variety of announcements were heard over the system. These announcements were clear and audible.

The public address system is frequently used. It is an effective way to communicate with facility

Notifications

This aspect of Conduct of Operations considers notification procedures and occurrence reporting.

Facility Management is aware of occurrence reporting requirements in ES&H Manual Document 4.2, and follows the Occurrence Reporting process with the assistance of the NMTP Assurance Manager

This aspect of Conduct of Operations is met.

Controlling Equipment and System Status

See EN-1 and MT-1.

Lockout and Tagout

This aspect of Conduct of Operations addresses the execution of the Lockout and Tagout process.

B331 follows ES&H Manual Document 12.6 LOTO process. The FPOC was aware of the process and indicated that LOTOs in the facility are simple LOTOs and most are applied for electrical hazards. Typically, the panel schedules are reviewed with the electrical engineer, to confirm the appropriate LOTO point, prior to executing the LOTO. Locks and tags are provided in the B331 Lock and Tag station, near the entry to the RMA. The LOTO logbook was reviewed and appeared to be in order.

This aspect of Conduct of Operations is met.

Independent Verification

This aspect of Conduct of Operations considers the need for and conduct of independent verifications.

The FPOC was asked about independent verification. He understood the concept and practice, and indicated that there was no facility equipment requiring independent verification. The Facility Manager also indicated that there was no equipment requiring independent verification.

The NMTP Conduct of Operations Manual says independent verification requirements are identified in specific procedures. The Surveillance Requirement Procedures, Administrative Control Procedures, Maintenance Procedures, and Facilities Management Procedures were reviewed, and it was confirmed that there is no equipment requiring independent verification.

This aspect of Conduct of Operations is met.

Logkeeping

This aspect of Conduct of Operations considers formal record keeping in logbooks.

A logbook is maintained for Room 157, where TPS is located (and for each room in the RMA). Facilities Management Procedure, NMTP-FMP-0303, Operating Area Logbook Procedure, provides the instructions for keeping operating area logbooks. The Room 157 logbook was evaluated against the criteria in the procedure and found to be weak in a few areas (**Observation 4-1**):

- In several instances, a name is not always provide at the end of an entry as expected by procedure NMTP-FMP-0303,

- Lines are sometimes not skipped between entries as expected by procedure NMTP-FMP-0303,
- A clear statement is not made when an SRP has been completed, along with the outcome
- The state of equipment, etc. is not consistently documented at the end of each day.

The FPOC maintains the B331 Operations Logbook. The logbook is well kept, legible, with appropriate entries. The logbook underwent a review within the last quarter, by the NMTP Facilities Operations and Maintenance Manager. NMTP-FMP-0303 indicates the review for the B331 Operations logbook is to be provided by the B331 Deputy Facility Manager, or designee. The B331 Deputy Facility Manager stated that they would like to transfer the NMTP Facility

Timely Orders and Instructions to Operators/Workers

This aspect of Conduct of Operations considers communications of critical information and instructions to workers.

There are a number of mechanisms for communicating orders and instructions to workers. For urgent information, the public address system is used. A B331 staff meeting is conducted biweekly with the primary purpose of communicating important information to B331 personnel. In addition to its work control process function, the WAL meeting is used to communicate important and timely information to facility and programmatic staff. The pre-job brief is also an opportunity that is used to convey information, to give instructions, and to make sure workers understand those instructions.

This aspect of Conduct of Operations is met.

Operating Procedures for Equipment and Systems

See OP-3.

Operator Aid Postings

This aspect of Conduct of Operations considers identification, maintenance and approval of operator aid postings.

Facilities Management Procedure, NMTP-FMP-0301, *Operator Aids*, provides the direction for consistency in identifying, preparing, displaying, and controlling Operator Aids. Five Operator Aids have been identified for TPS. These were identified jointly by the RI and the Tritium APL.

and were approved by the Tritium APL. The B157 Operator Aid Logbook identifies the aids. During the TPS operations demonstration, the operator aids were reviewed in Rm 157. They were found to be current, in good condition, legible, and in close proximity to where they are used. The operator aids are reviewed at least annually to ensure they have remained current.

B331 has an official listing of operator aids for facility equipment, which is maintained by the FPOC. The operator aids were approved by the Facility Manager as required by NMTP-FMP-0301, and have undergone a review within the last quarter by the NMTP Facilities Operations and Maintenance Manager, consistent with procedure NMTP-FMP-0301.

This aspect of Conduct of Operations is met.

Equipment and Piping labeling

This aspect of Conduct of Operations considers the need for and execution of equipment piping and labeling.

Facilities Management Procedure NMTP-FMP-0211, *Equipment Identification, Numbering and Labeling Procedure* is used to establish equipment numbering and labeling protocol in B332.

The procedure states that as Essential Drawings are developed for other NMTP facilities then those SSCs determined to be on Essential Drawings would then be governed by NMTP-FMP-0211. Per the NMTP Engineering Manager, the B331 facility does not have any Essential Drawings, but does anticipate adding three drawings of the TPS Glovebox to the Essential Drawing list. At that time, facility management will determine the appropriate graded level of application of Procedure NMTP-FMP-0211 for this component. The glovebox currently has an acceptable "AAA" drawing including all major components of the glovebox, but has not been configured according to Procedure NMTP-FMP-0211.

Issue(s)

Observation OP-4-1

The Room 157 logbook was evaluated against the criteria in procedure NMTP-FMP-0303 and found to be weak in several areas.

Observation OP-4-2

There is no consistent mechanism for appropriate turnover information to be provided to the personnel next to perform work in TPS.

Conclusion

Personnel responsible for TPS, OGCS, and TFM conventional facility operation, including programmatic activities, demonstrate adherence to NMTP Conduct of Operations requirements. Although there are a few weaknesses and opportunities for improvement, the formality and discipline of B331 operations, including support activities, is adequate to conduct work safely and programs are in place to maintain this formality and discipline.

This objective has been met.

Functional Area:	Objective:	Date:	Objective Met:	
Integrated Safety Management	ISM-1	08/21/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

The radiological protection program has been effectively implemented to support TPS operations and the TFM conventional facilities. Sufficient numbers of qualified radiological protection staff and management are provided, and adequate facilities and equipment are available to ensure services are adequate to conduct and support TPS operations and the TFM conventional facilities. Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management control of safety. Should be coordinated with MG-2 and OP-1 (CR 1, CR 2, CR 6)

Documents and Records Reviewed

- UCRL-AR-114203-06, Weapons and Complex Integration Tritium Facility—Building 331 Documented Safety Analyses, Chapters 1 thru 17, September 2008
- UCRL-AR-132403-06, Weapons and Complex Integration Tritium Facility—Building 331 Technical Safety Requirements, September 2008
- COR-NSI-3/23/2009-95757, Approval of the 2009 Annual Update of the Documented Safety Analysis and Technical Safety Requirements for the Building 331 Tritium Facility (TS: 090026)
- ESP-B331-09, Weapons and Complex Integration Tritium Facility – Building 331

- HP-DAP B3315.2, Health Physics Discipline Action Plan for Tritium Facility, July 2009
- USQ #B331-09-054-D, Baseline Review of the ES&H Team 1 Health Physics Discipline Action Plan for Tritium Facility, August 2009
- Memorandum from Kiell Tengesdall, Additional HP DAP Requirements for Building 331

- ES&H Manual Document 20.2, Radiological Safety Program for Radioactive Materials, March 2009
- USQ #B331-09-008-D, Baseline Evaluation of ES&H Document 20.2, Radiological Safety Program for Radioactive Materials, March 2009

Interviews Conducted

- Tritium Facility ES&H Technician
- Tritium Facility Health Physicist
- Tritium Facility FPOC/POC
- Tritium Facility Safety Officer
- ES&H Team Leader
- Facility Manager
- Deputy Facility Manager
- Responsible Individual
- Operator Trainee

Evolutions Performed and Observed

- Participated in walkthrough of Tritium Facility Modernization project areas
- Observed drill for release of tritium from Tritium Process Station

Discussion of Results

Criterion 1 The Radiation Protection Program has been properly incorporated into TPS and TFM conventional facility operation to ensure safe accomplishment of work.

The Building 331 Documented Safety Analysis (DSA) specifies the establishment of a Radiation Protection Program as a safety management program. The Radiation Protection Program for Building 331 is well developed, and has been adequately implemented to provide for contamination swipes of all material entering the facility, instructions for packing and unpacking materials, and routine surveys of the facility.

Staffing, as well as facility and equipment resources for the Building 331 Radiation Protection Program appears adequate. The program is currently supported by a dedicated Hazards Control Technician (HCT) and a primary Health Physicist. Backup support for both is available as needed. An additional HCT has been hired in anticipation of projected support needs for the Tritium Process Station (TPS) as well as the Tritium Device Recycling project and other superblock related missions.

Incorporation of the Radiation Protection Program into TPS and TFM conventional facility operations required no changes to either the As Low As Reasonably Achievable (ALARA) program or Dosimetry program elements.

The Health Physics Discipline Action Plan (HP DAP) for Tritium Facility (July 2009) consists of specific radiological monitoring procedures for the implementation of the radiation protection program. The TPS and TFM conventional facility operations were not, however specifically

addressed in the approved HP DAP. The TFM Management Self Assessment (MSA) included a finding that the ES&H Team should review the HP DAP to see if any additional HP routines need to be incorporated. The results of this review are documented in a memo from the HP to the HCT outlining additional HP DAP surveillance requirements to support operation of the TPS. The specified, additional HP DAP surveillance requirements have undergone the USQ process. These additional HP DAP surveillance requirements have been implemented by the HCT. A review of HP DAP documentation showed that the HCT is presently unable to complete weekly and monthly tritium air monitor operability checks as specified in HP DAP items HP-14-W and HP-14-M for rooms 154, 158, and 170 as tritium air monitors are not presently installed in these locations. Rooms 154, 158, and 170 are in Repair Mode and do not require tritium air monitors for current operations. As specified in the HP DAP, the HCT has made notifications to the HP and Facilities personnel.

As observed, facility postings are compliant with ES&H Manual Document 20.2. Also included in the memo outlining additional HP DAP requirements in support of TPS was direction to (temporarily) post the TPS in preparation for the Readiness Assessment – with a caveat making it clear that tritium had not yet been introduced; this too has been implemented. As directed in the memo, TPS radiological posting will be revised in a manner compliant with the ES&H Manual once tritium has been introduced.

The RA team concluded that radiation protection controls have been appropriately incorporated into the TPS OSP and Attachments.

Issue(s)

None

Conclusion

The Radiation Protection Program for Building 331 is well developed, and has been effectively implemented to support TPS operations and the TFM conventional facilities.

This objective has been met.

Functional Area: Integrated Safety Management	Objective: ISM-2	Date: 08/21/09	Objective Met:	
			<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Objective

The Quality Assurance program has been effectively implemented to support TPS operations

- Test Engineer
- QA/CM Manager
- QA Engineer
- Project Manager
- Labor-Only Construction Coordinator
- NMTP Facilities Engineering Manager
- System Engineers

Evolutions Performed and Observed

- Walkthrough of B331 (b)(2)High

Discussion of Results

Criterion 1 The Quality Assurance Program has been properly incorporated into TPS and TFM conventional facility operation to ensure safe accomplishment of work.

The review of the Quality Assurance aspects of the TPS included review of: the quality implementing documents (e.g., the NMTP Quality Assurance Plan and the Tritium Facility Modernization Project Quality Program); a sample of TPS procurements; adequacy of closure of TPS related NCRs; status of open Issues Tracking System (ITS) and Master Action Tracking Database (MAD) items; review of a sample of equipment requiring calibration; software quality assurance; and the MSA finding related to the quality grading of systems and components.

Procurement

In the area of procurement, the documentation related to (b)(2)High were requested (b)(2)High

(b)(2)High The procurement documents for Valve 75A were reviewed and found to

Nonconformance Reports

The Nonconformance Reports (NCRs) for the TPS were reviewed for adequacy of resolution. The NCRs and the status are described below.

NCR #	Nonconforming Condition Description	Status - Comments
09-023	Dwyer pressure gauges did not have required Certificates of Conformance	These gauges will not be used in quality applications; this NCR is closed Resolution is acceptable
09-024	TPS glovebox does not have fabrication documentation	TPS is qualified for its intended function through seismic calculations, pressure and leak tests during functional testing, an Engineering Safety Note, and material testing to confirm use of appropriate stainless steel Evaluation of deflection during functional testing shows good correlation One material sample was nondestructively tested; additional testing is being done to confirm use of appropriate stainless steel
09-025	Palladium storage beds were not purchased as quality-significant	The beds were pressure and leak tested Material certificates are being retrieved; this NCR remains open
09-027	Welder and weld procedure qualifications not demonstrated for 1/4" diameter tubing	Weld procedures and welders were appropriately qualified after-the-fact; tubing and fittings have been pressure and leak tested; visual inspection of accessible welds was performed by certified welding inspector; NCR has been closed Resolution is acceptable
09-032	TPS glovebox leaks identified at bolts for blank flange	Will replace the bolts with bolts that have an o-ring seal; this NCR will remain open pending replacement of the bolts and successful leak testing

In summary, two NCRs (09-023 and 09-027) have acceptable resolutions, two NCRs (09-025 and 09-032) will remain open pending follow-up actions, and one NCR (09-024) should test additional areas of the TPS glovebox to confirm the material used. TPS NCRs need to be resolved, the NCRs closed, and NCRs dispositioned as "use-as-is" reviewed through the USQ

Issues Tracking System / Master Action Database

Corrective actions for B331 are tracked in the LLNL Issues Tracking System (ITS) or in the NMTP Assurance Office Master Action Database (MAD). The B331 ITS listing and MAD report were reviewed. Open actions not yet completed for TPS were reviewed and none found to adversely impact startup of TPS operations.

Calibration

A sample of instruments were selected for a review of calibration documentation (the TPS room tritium monitor, the TPS glovebox tritium monitor, and the TPS glovebox differential pressure gauge). All three instruments have a visible calibration sticker on the instrument or readout. The records for the calibration were complete and demonstrated that the instrument was properly calibrated in accordance with the associated calibration procedure.

Software Quality Assurance

In the review of software quality assurance (SQA), two areas were selected for specific review; 1) the programmable logic controller (PLC) associated with the TPS glovebox and 2) the spreadsheet used to track specific administrative control for radioactive material limits in B331. The PLC software was identified as "safety software" and evaluated to be risk level 4. The LLNL Institutional Software Quality Assurance Program (ISQAP) lists the practices for software quality assurance as applied to the various risk levels. ISQAP requires for safety software "all listed practices for the graded risk level shall be addressed. Justification for the non-applicability of a listed practice for the graded risk level shall be documented." In discussion with the Acting Software Quality Assurance Manager, this means that those practices that are listed in Appendix C, Table 8, for Risk Level 4 as TU (Tailored Implementation and "understood") and TD (Tailored and documented) needs to be addressed and justification documented where it is not applied. The practices stated in the ISQAP have not all been addressed or justified for non-applicability practices for the TPS PLC. **Finding ISM-2-3 (post-start)**

In the evaluation of the SQA practices used for the spreadsheet to comply with the specific administrative control for radioactive material limits, the spreadsheet had been reviewed by the AB Section for technical adequacy, but this had not been documented and no other provisions for SQA had been applied. While there have been no issues identified with the application of the spreadsheet, this application is considered to meet the definition of being "safety software". The ISQAP, Appendix D, LLNL Interpretation of Safety Software states in defining safety software, "*Safety Management Software and Administrative Controls Software* are part of the mitigation strategies through administrative and management functions. For instance ...; and a database that is required to be used to ensure that radiological material safety limits are not exceeded for a location." The identification of the spreadsheet used for radioactive material inventory as "safety software" has not been done. As "safety software" the risk level needs to be determined and the appropriate practices applied. **Finding ISM-2-4 (post-start)**

MSA Finding

An MSA finding related to the risk grading of the Special Facility portion of the TPS. The risk grading has been performed and documented. This risk grading is consistent with the ISQAP.

QA Staffing

In discussions with various managers and staff, it appears that QA staffing appears to be sufficient at this time although the workload has been very high. The QA/CM Manager is actively

evaluating staffing needs and consideration of possible avenues for resources on a temporary basis to deal with resource spikes.

Issue(s)

- | | |
|------------------------|---|
| Finding ISM-2-1 (Pre) | Procurement documents for several Equipment Important to Safety components do not comply with the TFM Project Quality Assurance Program. |
| Finding ISM-2-2 (Pre) | NCRs associated with TPS need to be resolved and any dispositioned as "use-as-is" reviewed through the USQ process prior to startup activities. |
| Finding ISM-2-3 (Post) | Justification for the non-applicability of a listed practice for the TPS Programmable Logic Controller needs to be documented in accordance with the ISQAP. |

Functional Area:	Objective:	Date:	Objective Met:	
Integrated Safety Management	ISM-3	08/21/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

The Radioactive and Hazardous Materials Shipping, Transfer, and Receiving Program has been effectively implemented to support TPS operations and the TFM conventional facilities. Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management control of safety. (CR 1, CR 2, CR 6)

Documents and Records Reviewed

- UCRL-AR-114203-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Documented Safety Analysis, June 2009
- UCRL-AR-132403-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Technical Safety Requirements, June 2009
- FSP-B331-09, Weapons and Complex Integration, *Tritium Facility – Building 331*, Facility Safety Plan, June 2009
- Operational Safety Plan No. 331.099, Tritium Process Station (TPS), expires June 30, 2012, including Attachments 1-5
- Building 331 Tritium Facility, TSR Implementation Plan, Rev 0, May 2009
- Building 331 Tritium Facility, TSR Implementation Matrix

Interviews Conducted

- Facility Manager
- Deputy Facility Manager
- Associate Program Leader
- Responsible Individual
- AB Analyst

Evolutions Performed and Observed

- None

Discussion of Results

Criterion 1 The Radioactive and Hazardous Materials Shipping, Transfer, and Receiving Program has been properly incorporated into TPS and TFM conventional facility operation to ensure safe accomplishment of work.

The Radioactive and Hazardous Materials Shipping, Transfer, and Receiving Program is described in Chapter 5 of the DSA. The description is reiterated in the TSRs. Despite the program being identified as an administrative control program no further description is provided in the DSA except for in Chapter 5. The program is implemented through the FSP.

For the RA, the evaluation of program was limited to product vessels, U-beds, and Pd-beds that hold over 5 g of tritium are filled and stored at or below ambient pressure when outside of secondary confinement (e.g., tritium gloveboxes, UC-609).

The facility has not implemented procedural controls to implement the requirement beyond the statement in the FSP. Opportunities exist for the control to be identified within OSPs or similar applications which may generate vessels relevant to the control. The facility does not formally track vessels which could violate the stated control. Since the pressure within a vessel will change as tritium decays, vessels originally generated which meet the criteria may eventually exceed them.

The facility could benefit from developing a more rigorous implementation of the Radioactive and Hazardous Materials Shipping, Transfer, and Receiving Program. **(Observation ISM-3-1)**

Issue(s)

Observation ISM-3-1

The facility could benefit from developing a more rigorous implementation of the Radioactive and Hazardous Materials Shipping, Transfer, and Receiving Program.

Conclusion

This objective has been met.

Functional Area: Integrated Safety Management	Objective: ISM-4	Date: 08/20/09	Objective Met:	
			<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

The Fire Protection Program has been effectively implemented to support TPS operations and the TFM conventional facilities. Sufficient numbers of qualified fire protection staff and management are provided, and adequate facilities and equipment are available to ensure services are adequate to conduct and support B331 operations. Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management control of safety. Should be coordinated with MG-2 and OP-1 (CR 1, CR 2, CR 6)

Documents and Records Reviewed

- FSP-B331-09, Weapons and Complex Integration, *Tritium Facility – Building 331*, Facility Safety Plan, June 2009
- UCRL-AR-132403-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Technical Safety Requirements September 2008
- UCRL-AR-114203-06, Weapons and Complex Integration, *Tritium Facility – Building 331*

- Management Self Assessment Tritium Facility Modernization Building 331 Final Report, August 2009
- CMU08-000056 Rev. AB (ACP-B331-003), B331 Combustible Loading Administrative Control Procedure, 7/17/09

- C-AJ-3216, Underwriters Laboratories (UL) F rating -2 Hr listing and certificate of Compliance for Hilti CP 618 Fire Stop Putty Stick, February 14, 2006
- Fire sprinkler Shop drawings PLM2007-0331-0003D, PLM2007-0331-0004D, PLM2007-

0331-0005D, PLM2007-0331-0002D, PLM2007-0331-0003D

However, fire doors are typically tested as assemblies with their doorframe, which is also labeled. That is the doors (2) and frames are tested and certified as a unit. NFPA 80 6.3.1.1 states "Only labeled door frames shall be used." The Increment Fire Barrier doorframe has no fire-rating label, the door appears to have been installed in the existing field constructed doorframe. NFPA 80, 5.2.4.2 (11), states, "Gaskets and edge seals, where required, are inspected to verify their presence and integrity." There are no gaskets or edge seals at the jambs or head of the doors and a gap between the doors. There is a seal between the two

Functional Area:	Objective:	Date:	Objective Met:	
Training	TR-1	08/20/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

The training and qualification programs for B331 operations and operations support personnel have been implemented for TPS and TFM conventional facility. The process ensures that personnel have competence commensurate with responsibilities. (The training and qualification program encompasses the range of duties and activities required to be performed). (CR – 1, CR – 2, CR – 3, CR – 5)

Documents and Records Reviewed

- B331 DSA/TSR & FSP Training course development documents, presentation slides, and exam
- DOE O 5480.20A Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities, Chg 1, July 12, 2001
- ES&H Manual, Document 40.1, LLNL Training Manual, Rev 5, March 30, 2009
- NMTP SBK System Engineering Program Manual, Rev 3, NMTP.PD-03-045 March 25, 2009
- Selected completion records
- Tritium Facility Training Implementation Matrix, Rev 4.1, June 2008
- WCI Tritium Facility Training Manual, Rev. 4, September 2008

Interviews Conducted

- Associate Program Leader
- NMTP Training Manager
- NMTP Training Specialist
- TPS Responsible Individual
- TPS Alternate Responsible Individual

Evolutions Performed and Observed

- None

Discussion of Results

Criterion 1 Operations and operations support personnel, including management, have been adequately trained on, and demonstrate adequate understanding of, safety basis requirements for the TPS and TFM conventional facility.

Training regarding the changes to the Building 331 facility safety basis documents resulting from the installation and intended operation of the TPS and TFM conventional facility was presented in the form of a lecture. An exam was given at the close of the training to evaluate and document the trainees understanding of the changes.

The facility safety basis was revised to incorporate the TFM project and operations. Similarly the FSP was revised and an OSP developed for TPS operations. Documentation reviews of the training for these changes identified no significant issues. Knowledge retention and comprehension were acceptable.

Input was also provided from the Operations functional area. Neither in the training evaluation nor in operations were significant issues identified.

Criterion 2 The B331 Training Program has been revised as necessary to incorporate changes resulting from the installation and operation of the TPS and TFM conventional facility and affected personnel have received training on the facility changes.

The only significant change to the B331 Training Program involved the inclusion of expectations for the control of on-shift training which may be used as part of the certified tritium handler program. The non-certified handlers understood the expectations for OJT when an abnormal event occurs.

The fact that the Senior Certified Tritium Handler for TPS is also qualified on the Tritium Science Station and the associate tritium handler was involved with the construction of TPS significantly contributed to their proficiency in TPS operations

Criterion 3 With respect to the startup of TPS and TFM conventional facility, the B331 training program follows the requirements of DOE O 5480.20A and the LLNL ES&H Manual.

The NMTP Training Staff has developed and implemented training for TPS in accordance with DOE O 5480.20A and the LLNL ES&H Manual. Training personnel track the qualification and certification process.

The ES&H Manual (Document 40.1 LLNL Training Manual, Appendix D) defines a formal process to be used for developing training when OJT is part of a formal qualification or certification program in an LLNL nuclear facility. Operations in the TPS are performed by Certified Tritium Handlers. The OJT for these certified positions should be based on "Structured OJT" as described in Appendix D of the LLNL Training Manual. (**Observation TR-1-1**)

Criterion 4 The TPS and conventional facility are adequately staffed with qualified personnel.

Qualification standards have been established for TPS personnel. A sampling of training completions was made for TPS staff and all were found to be in compliance with training required for TPS operations. Tritium operations currently have one senior certified tritium handler and several associate tritium handlers. However, the associate handlers are actively working towards certification. In the near term, the one senior certified handler is acceptable but as the operational tempo of the facility increases more certified handlers may be necessary. Management ought to closely watch the progress of the associate handlers and ensure that their progress is in keeping with the expected increase in tritium operations.

Issue(s)

Observation TR-1-1

The OJT for certified positions should be based on "Structured OJT" as described in Appendix D of the LLNL Training Manual.

Conclusion

This objective has been met.

Functional Area:	Objective:	Date:	Objective Met:	
Training	TR-2	08/20/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

Operations and operations support personnel have adequate understanding of the B331 safety basis changes. (CR – 4)

Documents and Records Reviewed

- B331 DS/TSR & FSP Training course development documents, presentation slides, and exam
- DOE O 5480.20A Personnel Selection, Qualification, and Training Requirements for DOE Nuclear Facilities, Chg 1:7-12-01
- ES&H Manual, Document 40.1, LLNL Training Manual, Rev 5—March 30, 2009
- Selected completion records
- Tritium Facility Training Implementation Matrix, Rev 4.1—June 2008
- WCI Tritium Facility Training Manual. Rev. 4—September 2008

Interviews Conducted

- Associate Program Leader
- NMTP Training Manager
- NMTP Training Specialist
- TPS Responsible Individual
- TPS Alternate Responsible Individual
- Health and Safety Technician
- Health Physicist
- Fire Protection Engineer

Evolutions Performed and Observed

- none

Discussion of Results

Criterion 1 Operations and operations support personnel demonstrate an adequate level of knowledge related to the B331 safety basis changes associated with TFM based on review of examination results and selected interviews.

B331 safety basis changes associated with TFM were presented to operations and operations support personnel in the form of a lecture followed by an exam to evaluate personnel

knowledge. A review of examination results showed a 90% or better passing score of the sampled personnel.

Input from other functional areas (e.g., ISM, OP, MT, etc.) was also evaluated. Based on team member input no significant issues were identified related to knowledge comprehension or

None

Conclusion

This objective has been met.

Functional Area:	Objective:	Date:	Objective Met:	
Training	TR-3	08/20/09	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Objective

A process has been implemented to ensure that modifications to the facility are reviewed for potential impacts on training and qualification. Training has been performed when modifications have been made. (CR – 5, CR – 1, CR – 9)

Documents and Records Reviewed

- Tritium Facility Training Implementation Matrix, Rev 4.1—June 2008
- WCI Tritium Facility Training Manual, Rev. 4—September 2008
- LLNL-AR-409585, Superblock Work Control Manual, December 2008
- 331-09-D-036, B331 Work Permit, TPS Function Test, July 22, 2009

Interviews Conducted

- Associate Program Leader
- NMTP Training Manager
- NMTP Training Specialist
- TPS Responsible Individual
- TPS Alternate Responsible Individual

Evolutions Performed and Observed

- None

Discussion of Results

Criterion 1 A change control process has been implemented for B331 and this process ensures that modifications made to the facility for the TPS and TFM conventional facility have been reviewed for potential impacts on training and qualification.

The Superblock Work Control Manual describes the work control process for work conducted in B331 including the operation and maintenance of TPS and TFM conventional facilities. Section 5 of the Work Control Manual discusses the review process for change control which includes the review of training. For work authorized as Category C work the work permit includes the identification of training under Section 11, General Controls.

The training organization meets routinely with Tritium Facility management and operations staff and is made aware of changes the impact training and qualification by the APL for the Tritium Program. Interviews conducted with the training organization and program personnel indicated a strong reliance on the APL for input and review of potential impacts to training and qualification;

Manual. (Observation TR-3-1)

Issue(s)

Observation TR-3-1

Interviews conducted with the training organization and the Tritium Program APL indicated a strong reliance on the APL for input and review of potential impacts to training and qualification; however, the APL is not in the review and signature chain for the Tritium Facility Training Manual.

Conclusion

This objective has been met.

Attachment 3 Deficiency Forms

DEFICIENCY FORM 2

Functional Area: Safety Basis Management	Objective: SB-2	<input checked="" type="checkbox"/> Pre-start <input type="checkbox"/> Post-Start	Date: 8/24/09
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Finding/Issue (SB-2-1)

Tritium Room Monitors have not been installed within rooms 154 and 158.

Requirement

The Plan of Action for the LLNL Readiness Assessment of Tritium Facility Modernization Building 331 identified tritium room monitors as being part of the scope for the review. Section 11.2.1 of the TFM Project Execution Plan includes the installation of tritium monitors.

Reference

- Plan of Action for the LLNL Readiness Assessment of Tritium Facility Modernization Building 331, April 20, 2009
- Tritium Facility Modernization Project Execution Plan, March 2009, Rev 4

Discussion:

Rooms 154 and 158 within Increment 2 of B331 are currently in the TSR defined mode of repair. Tritium monitors are not required to be installed and operational per the B331 TSRs. However the room monitors are included as part of the TFM project and need to be installed and operational to help ensure safe startup and execution of the TFM mission. Since room 170 will only be used for storage, tritium monitors are not required. If facility management chooses to install tritium monitors in room 170 those monitors are outside the scope of this finding.

DEFICIENCY FORM 2

Functional Area: Configuration Management	Objective: EN-1	<input type="checkbox"/> Pre-start <input checked="" type="checkbox"/> Post-Start	Date: 8/23/09
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Finding/Issue (Finding EN-1-1)

The ECO process is not well defined and could bypass the NMTP Work Control Manual.

Requirement

The B331 FSP, Section 3.3.8, Facility Modifications, states "Facility and equipment modifications, and operations and programmatic work performed in the Tritium Facility is controlled and authorized by the Facility Manager in accordance with the WCM [Work Control Manual]." The NMTP Superblock Work Control Manual does not include provisions for the ECO process. Also, the Work Control Manual defines "Facility Work" as "Any combination of engineering, procurement, installation, assembly, disassembly, construction, demolition, or fabrication work for a new SSC or to maintain, alter, add to, decontaminate, decommission, or rehabilitate an existing SSC." The Work Control Manual describes the processes for conducting this work.

Reference

- Letter from (b)(6) Subject - Design Configuration Change Control Process for Tritium Program High-Curie Workstations, dated 9/30/09
- TF08-018, NMTP Tritium Program Engineering Change Order (ECO) form
- FSP-B331-09, Weapons and Complex Integration, *Tritium Facility – Building 331*, Facility Safety Plan, June 2009
- LLNL-AR-409585, CMU08-000033 Rev AA, Weapons and Complex Integration Directorate Nuclear Materials technology Program Superblock Work Control Manual, December 2008
- Operational Safety Plan No. 331.099, Tritium Process Station (TPS)
- Tritium Facility Modernization Project Quality Assurance Program, Revision 0, May 23, 2006

Discussion:

The Engineering Change Order (ECO) process initiates changes to Special Facilities SSCs. The stated intent of the ECO process is to document changes and allow changes to the Special Facilities SSCs as long as the glovebox boundary is not affected. However, the ECO process is not covered by the NMTP Work Control Manual nor as work covered under an OSP or FSP.

DEFICIENCY FORM 2

Functional Area: Emergency Preparedness	Objective: EP-1	<input type="checkbox"/> Pre-start <input checked="" type="checkbox"/> Post-Start	Date: 8/21/09
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Finding/Issue (EP-1-1)

The B331 Emergency Planning Hazards Assessment (EPHA) has not been updated as required by DOE O151.1C and ES&H Manual, Document 22.1 and Document 51.1.

Requirements

Specific requirements not met:

Discussion:

As part of the document review of the B331 EPHA the RA determined that several sections of information and data associated with the facility was either out of date or inconsistent with the facility's DSA/TSRs. It may be unlikely that emergency classes, protective actions and/or EALs will be impacted by the new processes currently in B331 (TSS) and planned (TPS), but that conclusion is uncertain since the EPHA has not been updated based on these new operations. It was determined by the RA that the B331 EPHA requires updating.

DEFICIENCY FORM 2

Functional Area: Maintenance and Test	Objective: MT-1	<input type="checkbox"/> Pre-start <input checked="" type="checkbox"/> Post-Start	Date: 8/19/09
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Finding/Issue (MT-1-1)

The listing of safety-significant TPS SSCs in the Master Equipment List and the System Design Description are inconsistent with respect to the DSA.

Requirement

10 CFR 830 Nuclear Safety Management Subpart B Safety Basis Requirements, Appendix G Hazard Controls

Safety structures, systems, and components require formal definition of minimum acceptable performance in the documented safety analysis. This is accomplished by first defining a safety function, then describing the structure, systems, and components, placing functional requirements on those portions of the structures, systems, and components required for the safety function, and identifying performance criteria that will ensure functional requirements are

met. Technical safety requirements are developed to ensure the operability of the safety structures, systems, and components and define actions to be taken if a safety structure, system, or component is not operable.

Reference

- 10 CFR 830, Subpart B, Appendix G

Discussion:

The TPS safety-significant SSCs have not been clearly identified. Information in the Master Equipment List and the TPS System Design Description are not consistent. Once the TPS safety function is established and understood, the safety-significant SSCs and their safety function defined.

DEFICIENCY FORM 2

Functional Area: Operations	Objective: OP-2	<input checked="" type="checkbox"/> Pre-start <input type="checkbox"/> Post-Start	Date: 8/21/09
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Finding/Issue (OP-2-1)

The procedure for the annual glovebox inspection, SRP-B331-4.1.1/4.1.2, was not followed as written.

Requirement

DOE O 5480.19, Chapter 16 requires that operations procedures should provide appropriate direction to ensure that the facility is operated within its design bases and should be effectively used to support safe operation of the facility.

UCRL-AM-214434, *NMTP Conduct of Operations Manual*, Chapter 18 states, "in all NMTP nuclear facilities, if procedure compliance cannot be maintained, the operation shall be brought to a safe stopping point and the procedure shall be changed before proceeding."

Reference

- UCRL-AR-114203-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Documented Safety Analysis, June 2009
- UCRL-AR-132403-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Technical Safety Requirements, June 2009
- SRP-B331-4.1.1/4.1.2, Nuclear Material Technical Support, Administrative Control

DEFICIENCY FORM 2

Functional Area: Operations	Objective: OP-3	<input checked="" type="checkbox"/> Pre-start <input type="checkbox"/> Post-Start	Date: 8/21/09
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Finding/Issue (OP-3-1)

The USQ process has not been completed on the Tritium Process Station Startup Plan.

Requirement

ES&H Manual Document 51.3, LLNL Unreviewed Safety Question (USQ) Procedure, requires that a USQD be prepared for procedures.

Reference

- TF09-013, Revision 1, Weapons and Complex Integration, *Startup Plan, Tritium Process Station*, August 13, 2009
- DOE-STD-3006-2000, DOE Standard, *Planning and Conduct of Operational Readiness Reviews*, June, 2000
- NMTP-FMP-0600 Facilities Management Procedure, Unreviewed Safety Question

(USQ) Process, CMU06-000100 Rev AE, June 9, 2009

Discussion:

ES&H Manual Document 51.3 and NMTP-FMP-0600 requires application of the USQ Process to procedures and other documents. The TPS Startup Plan falls into this category, but the USQ process was not applied to the plan.

DEFICIENCY FORM 2

Functional Area: Integrated Safety Management (ISM)	Objective: ISM-2	<input checked="" type="checkbox"/> Pre-start <input type="checkbox"/> Post-Start	Date: 8/21/09
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Finding/Issue (Finding ISM-2-1)

Procurement documents for several Equipment Important to Safety components do not comply

The TFM Project Quality Assurance Program, Section 7, Procurement, Paragraph 5.1, states "Special facilities systems/equipment classified as "high" or "mid" risk in accordance with the DNT Graded Risk Categories (Attachment 1) are procured in accordance with procedure NMTP-FMP-0500, Procurement/Acceptance Process for NMTP Superblock Quality-Significant Orders." The interdepartmental memorandum (b)(2)High identified valves (b)(2)High as a "mid" risk. NMTP-FMP-0500, Section 7.0, Records, states "Records generated by this procedure consist of the RIP [Receiving Inspection Package] form (Attachment A) and all documents referenced on the form."

DEFICIENCY FORM 2

Functional Area: Integrated Safety Management (ISM)	Objective: ISM-2	<input checked="" type="checkbox"/> Pre-start <input type="checkbox"/> Post-Start	Date: 8/21/09
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Finding/Issue (Finding ISM-2-2)

NCRs associated with TPS need to be resolved and any dispositioned as "use-as-is" reviewed through the USQ process prior to startup activities.

Requirement

The Facility Manager's Declaration of Readiness identified the MSA Finding (MG-3-1) - that the TFM nonconformance Reports need to be closed prior to operations.

Reference

Interdepartmental Memorandum, (b)(6) Subject – Declaration of Readiness – Tritium Facility Modernization Project, dated 8/14/09

Discussion:

Three NCRs (09-024, 09-025, and 09-032) related to the TPS remain open.

DEFICIENCY FORM 2

Functional Area: Integrated Safety Management (ISM)	Objective: ISM-2	<input type="checkbox"/> Pre-start <input checked="" type="checkbox"/> Post-Start	Date: 8/21/09
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Finding/Issue (Finding ISM-2-3)

Justification for the non-applicability of a listed practice for the TPS Programmable Logic Controller needs to be documented in accordance with the ISQAP.

Requirement

ISQAP Section 4.3, Practices, states that for safety software "All listed practices for the graded risk level shall be addressed. Justification for the non-applicability of a listed practice for the graded risk level shall be documented."

Reference

LLNL-AM-406580, Institutional Software Quality Program (ISQAP), August 22, 2008

Discussion:

While the software for the PLC for TPS had been evaluated to be risk level 4, the provisions of

Lawrence Livermore

DEFICIENCY FORM 2

Functional Area: Integrated Safety Management	Objective: ISM-4	<input type="checkbox"/> Pre-start <input checked="" type="checkbox"/> Post-Start	Date: 8/21/09
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Finding/Issue (Finding ISM-4-1)

There are numerous fire code discrepancies with the increment fire barrier and door that could impact their credited fire rating.

Requirement

NFPA 1, Section 1-6.1 "Nothing in this Code is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety to those prescribed by this code, provided technical documentation is submitted to the authority having jurisdiction to demonstrate equivalency and the system, method, or device is approved for the intended purpose."

NFPA 80 6.3.1.1 States "Only labeled door frames shall be used."

Listed System No. C-AJ-1277 for fire rated penetrations

Reference

- UCRL-AR-132403-06, Weapons and Complex Integration, *Tritium Facility – Building 331*, Technical Safety Requirements September 2008
- UCRL-AR-114203-06, Weapons and Complex Integration. *Tritium Facility – Building*