Fermilab

INTERNAL ASSESSMENT REPORT

Department of Energy (DOE) Order 474.2 Change 4, *Nuclear Material Control and Accountability* (MC&A) Self-Assessment of MC&A Plans, Procedures, Performance Tests, and Training

Start Date	End Date	Area Assessed
6/1/21	7/30/21	MC&A Plans, procedures, performance tests, and training

Assessment Team

Name	Role[1] (L, A, O)	Fermi ID#
Sue McGimpsey	Lead	12359N
Ben Russell	A	42144N
T.J. Sarlina	A	4129N

[1] Role on assessment team: L=Lead, A=Assessor, O=Observer

Interviewees

Name	Title
Dan Curatolo	MBA Custodian
Kathy Graden	Nuclear Materials Representative
Tom Miller	MBA Custodian

Assessment Type

- ☐ QA Assessment
- ■ Line Organization Self-assessment
- ☐ Management System Assessment
- ☐ Tripartite Assessment
- ☐ Triennial Assessment
- ☐ FESHCom Assessment
- ☐ Other:

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Report

Title
Same as above.

Scope

This self-assessment was evaluated against DOE Order 474.2 Change 4, dated September 13, 2016, *Nuclear Material Control and Accountability*. This self-assessment specifically focused on the Fermilab MC&A Plan as approved by the DOE Fermi Site Office, MC&A procedures, performance tests, and MC&A training.

Criteria

Provide reasonable assurance of compliance with DOE O 474.2 Change 4, *Nuclear Material Control and Accountability* with respect to MC&A Plan and procedures for Other Accountable Nuclear Materials (OANM), performance tests, and training. Lines of Inquiry (LOIs) for program management, performance tests, and training were utilized by assessment team members.

Report

Previous External DOE Reviews and Internal Self-Assessments

All recommendations and opportunities for improvement items identified in the 2019 DOE Office of Science (SC) Consolidated Services Center (CSC) Periodic Safeguards and Security Survey and the Fermilab Nuclear Materials Program Self-Assessment of June 2019 have been addressed. iTrack Review #51526, Safeguards and Security Audit, Opportunity for Improvement (OFI) item from the 2019 DOE CSC survey has been closed.

iTrack Review #50726, MC&A Program Assessment items from the 2019 MC&A Program self-assessment have been closed.

DOE O 474.2, Nuclear Materials Control & Accountability Self-Assessment of Access Controls for OANM and Protection of the Public resulted in four iTrack findings that are currently still open. iTrack Review #53587 has open iTrack items. The due date for completion of these items is 12/31/23.

This self-assessment addresses MC&A Plans and procedures (iTrack Assessment Plan ID 1548), performance tests (iTrack Assessment Plan ID 1550), and MC&A training records, reports, and lesson plans (iTrack Assessment Plan ID 1549).

DOE-Approved Fermilab MC&A Plan and Procedures

The purpose of the Fermilab Control and Accountability (MC&A) Plan is to describe how the requirements set forth in applicable DOE Orders are implemented at Fermilab. The Fermilab DOE-Approved MC&A Plan describes how the MC&A program at Fermilab is documented, implemented, and maintained.

The Fermilab MC&A Plan describes how OANM are accounted for and controlled on a graded safeguards basis. The Fermilab MC&A Plan documents comprehensive, effective, and cost-efficient nuclear materials control and accounting procedures to control and account for OANM. The Fermilab MC&A performance goals are designed based a graded approach for the control and accounting of OANM to detect and deter theft, diversion, loss, or misuse of materials, and to maintain accurate accounting systems.

The MC&A Plan was reviewed. MC&A program management, policies, and procedures to control and account for Other Accountable Nuclear Materials (OANM) were verified to be in place.

The Fermilab ES&H Section management has provided the necessary personnel and resources to fulfill the objectives of the Fermilab MC&A Program. MC&A responsibilities have been documented in the Fermilab MC&A Plan. The Nuclear Materials Representative (NMR) and NMR Alternate are appointed by the ES&H Section Chief Safety Officer. Documentation of these appointments is on file.

MBA Custodians are responsible to provide support to the Fermilab MC&A program. MBA Custodians are designated for particular locations where nuclear materials are used and stored. Fermilab currently has five MBA Custodians.

Fermilab was verified to be graded as a Category IV, Attractiveness Level E facility per DOE Order 474.2 Change 4, *Nuclear Material Control & Accountability.* This categorization and Attractiveness level will remain unchanged for the foreseeable future. Fermilab has no plans to acquire additional nuclear materials. This self-assessment verified that Fermilab does not have any reportable quantities of special nuclear material. Fermilab is not a nuclear facility as defined by DOE-STD-1027-2018, *Hazard Categorization of DOE Nuclear Facilities* dated November 2018.

The Fermilab MC&A Plan references specific procedures that have been developed to support activities and reports required by the MC&A Plan and applicable DOE Orders. A cross-walk of DOE O 474.2, *Nuclear Materials Control and Accountability* (current revision) was conducted to ensure that the Fermilab MC&A Plan includes descriptions of all applicable MC&A elements, maintenance of associated procedures, operating conditions, and compliance with applicable DOE requirements.

MC&A Performance Tests

There are two performance tests that Fermilab completes at periodic intervals as described in the MC&A Plan. The first is a physical inventory of nuclear materials. The Fermilab physical inventory reconciliation program is designed to provide assurance that nuclear materials are accounted for and that the accounting records system reflect the physical inventory. The physical inventory serves to identify and resolve any discrepancies between the physical inventory and the accounting records system.

A physical inventory of all nuclear materials was completed in August 2020 by the Fermilab MBA Custodians. The inventory list as stated on *Fermilab Areas Approved for Use and Storage of Nuclear Materials* (R.P. Form #122) was compared to the physical inventory at each area and building where nuclear materials are used and stored. All materials were identified and matched the inventory listing. The next physical inventory is due in 2022.

The second performance test that Fermilab conducts is verification that nuclear materials data systems are capable of being restored within 24 hours in case of an emergency. This verification is conducted via a Service Desk ticket. Documentation in the form of a Service Desk ticket and emails verify that the nuclear materials database is capable of restoration within a 24 hour period. The two most recent database restorations were conducted on 2/5/20 and 2/10/21.

The assessment team conducted a physical inventory of nuclear materials on 7/13/21 and found nuclear materials and items in place and correctly labeled. Note that NM4 enclosure was not accessible and therefore, not inventoried. During this inventory, the assessment team conducted interviews with Material Balance Area (MBA) Custodians. See Opportunity For Improvement 1.

MC&A Training

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The scope and level of MC&A training is implemented on a graded approach and is tailored to the NMR and NMR Alternate's assigned duties and responsibilities. This training is based on an analysis of skills, prior experience, and training in nuclear materials control and accountability. MC&A training is documented in ESHS-MCA02. The training may be selected from self-study, on-the-job training (OJT), attendance at DOE National Training Center (NTC) courses, completion of NTC correspondence courses, NTC computer-based training, or attendance at Annual NMMSS Users Training Meeting.

DOE NTC training for the NMR is documented in TRAIN. DOE NTC training and OJT for the NMR Alternate is documented in TRAIN and on the Fermilab MC&A program On-The-Job Training Validation Form (R.P. Form #100).

Training functions for the NMR and NMR Alternate are reviewed when the training procedure (ESHS-MCA02) is revised. The NMR maintains OJT documentation.

Training records for the NMR and NMR Alternate were reviewed and found to be complete. OJT records for the NMR Alternate were reviewed and found to be complete.

Results

(Describe items found and categorize according to definitions below.)

Item Types

Non-conformance - The nonfulfillment of a specified requirement. This is limited to substantive issues that are worthy of being addressed. Word them as **statements of fact** rather than instructions.

Management Concern - An issue that management has identified as a concern requiring action to be taken to mitigate associated risk.

Recommendation - A suggestion or proposal for the best course of action to take on the identified topic.

Opportunity for Improvement - Suggestion on how to improve the identified topic.

Best Practice – A positive example of a work process or innovative approach with the potential to be the basis for significant operational improvements or cost savings.

Lesson Learned – A best practice that is captured and shared to promote repeat application, or an adverse work practice or experience that is captured and shared to prevent recurrence.

Non-Conformances

None

Management Concerns

None

Recommendations

None

Opportunities for Improvement

1. MBA Custodians were not fully aware of their responsibilities beyond conducting a biennial physical inventory of their areas/locations of responsibility. The NMR should follow up with each MBA Custodian to clarify responsibilities and review the MBA Custodian Designation Form (R.P. Form #116).
2. MC&A program functions within the Safeguards and Security program should be reflected in the ES&H Section organization chart under the Security Department section. The NMR should work with Security Department personnel to decide where MC&A program functions fit best within the Security Department section of the organization chart.
3. The NMR should coordinate with the person responsible for contract deliverables items to include the MC&A Plan revision schedule in the list (three year revision cycle). Likewise, the NMR should work with ES&H Section Admin Team to add

the MC&A Plan revision schedule to the list of Routine Items.

4. When the Fermilab MC&A Plan is revised, the following should be added:
   - Introduction: The Fermilab MC&A Plan provides the process for flowing down requirements of DOE Orders to the extent necessary to ensure that applicable MC&A functions and requirements are met
   - Section A.1: The Fermilab Security Department project/task code is used to track MC&A functions in the Fermilab Time and Labor system
   - Section B.1: The NMR is the primary author of the MC&A chapter of the Fermilab Site Security Plan
   - Add References section
   - Fermilab Security Department template should be used for the MC&A Plan and accompanying procedures

Best Practices

1. The NMR is the primary author of the MC&A chapter of the Fermilab Site Security Plan. Additionally, the NMR is a member of the Safeguards and Security Subcommittee.

Documents Reviewed

(List procedures, manuals, forms, etc. reviewed.)

- DOE O 474.2 Material Control and Accountability Lines of Inquiry for Program Management and Physical Inventory (performance testing)
- ESHS-MCA01 Fermilab Nuclear Materials Control & Accountability Plan (DOE FSO approval in July 2020)
- ESHS-MCA02, Fermilab MC&A Training
- ESHS-MCA03, SAMS Data Entry procedure
- ESHS-MCA04, Fermilab Uranium Database Data Entry Procedure
- Areas Approved for Use and Storage of OANM, Radiation Physics Form #122
- NMR and NMR Backup training logs
- 2019 DOE SC CSC Safeguards and Security Survey (iTrack Review #51526)
- 2019 Fermilab Nuclear Materials Program Self-Assessment (iTrack Review #50726)
- iTrack items #1548, 1549, and 1550.
- 2020 Nuclear Materials Physical Inventory
- 2021 APEX Oracle database backup refresh documentation

Distribution

RPO Department Head
Quality Section Liaison

CSO
SRSO
Security Chief

References

DOE O 474.2, Change 4, dated September 13, 2016, Nuclear Material Control and Accountability: https://www.directives.doe.gov/directives-documents/400-series/0474.2-BOrder-chg4-pgchg
DOE O 474.2, Change 4, dated September 13, 2016, Nuclear Material Control and Accountability Cross-Walk: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=6434
ESHS-MCA01, Fermilab Nuclear Materials Control & Accountability Plan (DOE FSO approval in July 2020): https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=2024
ESHS-MCA02, Fermilab MC&A Training: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=137
ESHS-MCA03, SAMS Data Entry procedure: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=144
ESHS-MCA04, Fermilab Uranium Database Data Entry Procedure: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=3240
MC&A Program DOE Lines of Inquiry for Assessments: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=6672
Memorandum, from A. Kenney to R. Snyder dated September 1, Subject: Calendar Year (CY) 2020 Fermi National Accelerator Laboratory Nuclear Materials Physical Inventory Report: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=134
Radiation Physics Form #116, Material Balance Area Custodian Designation Form: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=5448
Radiation Physics Form #122, Fermilab Areas Approved for Use and Storage of Nuclear Materials: https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=2062