

INTERNAL ASSESSMENT REPORT

Part Three of Three Department of Energy (DOE) Order 474.2 Change 4, Nuclear Material Control and Accountability (MC&A) Self-Assessment

Start Date	End Date	Area Assessed
July 13, 2022	8/8/2022	Inventory difference, material control objectives/indicators, materials containment, material surveillance, search procedures, authorization access lists, shipper/receiver difference procedures, and records, portal monitor procedures and records, tamper-indicating device program, daily administrative check program and procedures.

Assessment Team

Name	Role ¹ (L, A, O)	Fermi ID#
Kathy Graden	Lead	08304N
T.J. Sarlina	Lead	04129N

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

Interviewees

Name	Title
None	

Assessment Type

- | | |
|--|---|
| <input type="checkbox"/> QA Assessment
<input checked="" type="checkbox"/> Line Organization Self-assessment
<input type="checkbox"/> Management System Assessment | <input type="checkbox"/> Tripartite Assessment
<input type="checkbox"/> Triennial Assessment
<input type="checkbox"/> FESHCom Assessment
<input type="checkbox"/> Other: |
|--|---|

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Report

Title

Part Three of Three DOE O 474.2, Change 4, Nuclear Material Control and Accountability (MC&A) Self-Assessment

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 following elements of the Fermilab MC&A Plan as approved by the DOE Fermi Site Office:

- Inventory Differences
- Material Control Objectives/Indicators
- Materials Containment
- Material Surveillance
- Search Procedures – Not Applicable
- Authorization Access Lists
- Shipper/Receiver Difference Procedures and Records
- Portal Monitor Procedures and Records – Not Applicable
- Tamper-Indicating Device Program – Not Applicable
- Daily Administrative Check Program – Not Applicable

Note: MC&A Plan procedures were previously reviewed as part of Assessment #1548/iTrack Review #54086 (MC&A Self-Assessment of MC&A Plans, Procedures, Performance Tests, and Training) and Assessment #1551/iTrack Review #56646 (2022 Part Two of Three MC&A Self-Assessment).

Criteria

Provide reasonable assurance of compliance with DOE O 474.2 Change 4, *Nuclear Material Control and Accountability* with respect to MC&A Plan elements as listed in the Scope section above.

Report

Previous External DOE Reviews and Internal Self-Assessments

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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 (iTrack Review #53587) resulted in four iTrack findings. Three are closed and one remains open. iTrack item #104722 has a due date for completion of 12/31/23. The resolution of this iTrack items is based upon the fact that technology, specifically internet is not available at the Railhead - West Lundy Barn section. Therefore, until internet technology is available, this CAP will remain open.

DOE O 474.2, Nuclear Materials Control & Accountability Self-Assessment of MC&A Plans, Procedures, Performance Tests, and Training (iTrack Review #54086) conducted in July of 2021 resulted in one best practice and three opportunities for improvement items. Two of the three iTrack opportunities for improvement items have been closed. iTrack item #106107 remains open until the Fermilab MC&A Plan is revised (scheduled due date is 5/31/23).

DOE O 474.2, Nuclear Materials Control & Accountability Self-Assessment of database descriptions, categorization process documentation, incident reporting process, emergency response procedures, material transfer records, Nuclear Materials Management and Safeguards System (NMMSS) reports, Material Balance Area structure, internal controls, material access, and facility procedures (iTrack Review #56646) conducted in January 2022 resulted in five opportunities for improvement items. All five iTrack items remain open until the Fermilab MC&A Plan is revised (scheduled due date is 5/31/23).

This self-assessment addresses MC&A Plan elements as listed in the Scope section above.

MC&A Plan Overview

The purpose of the Fermilab 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.

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The Fermilab MC&A Plan describes how nuclear materials 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 nuclear materials. The Fermilab MC&A performance goals are designed based on a graded approach for the control and accounting of nuclear materials 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.

Inventory Difference Program

Inventory difference is the arithmetic difference obtained by subtracting the quantity of OANM tabulated from a physical inventory from the book inventory quantity. Book inventory quantity is equivalent to the beginning inventory plus additions to inventory, minus removals from inventory.

Because all nuclear materials at Fermilab are discreet items, no MC&A on-site activities occur that change the quantity of OANM in the inventory (such as processing or sampling). Item counts conducted during physical inventory are checked with book inventory. If there is a difference, the book inventory is corrected. Therefore, no inventory difference occurs.

The MC&A Plan does not specifically address Inventory Difference. Therefore, it is recommended that a section be added to outline the description above. See Opportunity for Improvement Item 1.

Material Control Indicators Program

Fermilab MC&A Plan Section C.1 addresses material control objectives. Due to the limited scope of the Fermilab MC&A program, material control objectives are synonymous with material control indicators. The following material control objectives/indicators are as follows:

- Detect, assess, and prevent unauthorized access to OANM
- Detect, assess, and communicate abnormal circumstances to Fermilab Security Department in time to impede unauthorized use of OANM
- Provide loss detection capability for OANM, and when materials are not in their

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authorized location, be able to provide accurate information needed to assist in locating materials in a timely manner

- Material surveillance program in conjunction with other security program elements must have the capability to detect, assess, and respond to unauthorized activities and anomalous conditions/events
- In coordination with the Fermilab Security Department, ensure that appropriate protection and controls are applied to Category IV, Attractiveness Level E OANM

Materials Containment Documentation

Fermilab MC&A Plan Section C.5 describes material containment. All radioactive OANM at Fermilab are discreet items either in the form of metal plates or sealed neutron sources. OANM are encased in steel plates within containers, calorimeters, or in the form of sealed radioactive sources.

Material Surveillance Procedures

Fermilab MC&A Plan Section C.6 addresses material surveillance. A material surveillance program is concerned with detection of insider adversary activities, and is, therefore a collection of information through devices and/or personnel observation to detect unauthorized movement of nuclear material or falsification of information related to location and quantities of OANM. Physical security controls, access controls, material controls, accounting systems, procedures, and physical inventories are in place to mitigate these circumstances.

The Fermilab Security Department is responsible for security systems including material surveillance, cameras, card readers for access to buildings, locks, and keys.

Fermilab has a graded program for controlling personnel access to nuclear materials and accountability processes. Fermilab has implemented material access controls to ensure that only authorized personnel gain access to nuclear materials. Locked buildings, fences, gates, padlocks, card readers, and surveillance cameras control and monitor unauthorized access to materials.

Search Procedures – Not applicable

DOE O 474.2, Table A, *Special Nuclear Materials*, was reviewed to verify that Fermilab does not have any reportable quantities of special nuclear material (SNM). Therefore, search procedures do not apply.

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Authorization Access Lists

Fermilab MC&A Plan Section C.3 describes authorization access controls and access lists. Access to the neutron storage safe is controlled by use of a combination lock. Only authorized personnel are granted the combination to this lock. Visitors or other Laboratory personnel do not have authorization to access the neutron storage safe or authorization to the combination lock code. Upon removal of any neutron source, the authorized personnel are required to sign a log sheet noting what source is being signed out. Upon return of the source, authorized personnel are required to verify the presence of all neutron sources.

A list of authorized personnel is maintained by designated ES&H Section personnel. The ES&H Section Source Physicist, or designee, has the overall responsibility for the combinations. Random changing of combinations is prohibited. If deemed appropriate, the Source Physicist may reset combination locks. Note that the Source Physicist and the Nuclear Materials Representative (NMR) are the same person.

Shipper/Receiver Difference Procedures and Records

Fermilab MC&A Plan Section E.7 describes shipper/receiver difference and records. A significant shipper/receiver difference occurs when there is a discrepancy in the shipper/receiver item count, regardless of the quantity of nuclear material. If a discrepancy occurs, the NMR/NMR Alternate notifies the shipper to resolve the problem. If the discrepancy cannot be resolved, the receiver notifies DOE FSO to report the shipper/receiver difference. Fermilab does not have a measurement control program. Therefore, independent measurements are not conducted at Fermilab. Fermilab accepts shipper weights. As such, the likelihood of a shipper/receiver difference is extremely remote.

There are no shipper/receiver difference records to review because there has never been a shipper/receiver difference.

Portal Monitor Procedures and Records – Not applicable

DOE O 474.2, Table A, *Special Nuclear Materials*, was reviewed to verify that Fermilab does not have any reportable quantities of SNM. Therefore, portal monitoring systems do not apply.

Tamper-Indicating Device Program – Not applicable

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DOE O 474.2, Table A, *Special Nuclear Materials*, was reviewed to verify that Fermilab does not have any reportable quantities of SNM. Fermilab conducts no statistical sampling since all materials are discreet items. No OANM is stored in waste containers which cross security boundaries. Therefore, a tamper-indicating device program does not apply.

Daily Administrative Check Program – Not applicable

DOE O 474.2, Table A, *Special Nuclear Materials*, was reviewed to verify that Fermilab does not have any reportable quantities of SNM. Therefore, a daily administrative check program does not apply.

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. During the next MC&A Plan revision, add a section to describe Inventory

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Difference to explain that Fermilab does not have Inventory Differences due to the fact that OANM are discreet items.

Best Practices

None

Documents Reviewed

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

- ESHS-MCA01 Fermilab Nuclear Materials Control & Accountability Plan
- 2020 Fermilab Site Security Plan
- 2019 DOE SC CSC Safeguards and Security Survey (iTrack Review #51526)
- 2019 Fermilab Nuclear Materials Program Self-Assessment (iTrack Review #50726)
- 2021 Fermilab MC&A Self-Assessment (iTrack Review #54086)
- 2022 Fermilab Part Two of Three MC&A Self-Assessment (iTrack Review #56646)

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: <https://esh-docdb.fnal.gov/cgi-bin/sso/ShowDocument?docid=2024>