

**DOE O 474.2A, NUCLEAR MATERIAL CONTROL AND ACCOUNTABILITY  
FREQUENTLY ASKED QUESTIONS (FAQs)**

Frequently Asked Questions (FAQ) will be used to further clarify the intent of language in the MC&A Order. FAQ numbers correspond to an explanation of a sentence or section. These FAQs do not establish policy or impose additional requirements.

- FAQ-1 Interfaces and interactions between the MC&A program, other S&S programs, and other disciplines are identified and clearly defined. These disciplines include safety, emergency management, classification, counterintelligence, facility operations, cyber system operations and security, and business and budget operations, including property management. Interfaces and interactions are maintained throughout the lifecycle of protective measures to ensure that the MC&A program work together effectively with S&S planning and operations and the disciplines listed above. Reference: DOE O 470.4B, Paragraph 4.d. [O 474.2A, Paragraph 4.d.]
- FAQ-2 Methodology of categorization of SNM should be described in your MC&A Plan and may include reference to DOE-STD-1194-2019, *Nuclear Materials Control and Accountability* Figure 6.2-1, Decision Tree for determination of material attractiveness level for SNM or Table 6.2-3, Additional Attractiveness Level E Criteria for SNM. [O 474.2A, Paragraph 5.f.(3)]
- FAQ-3 Integrate with S&S and other programs means to ensure the MC&A program and its assets and processes are identified accurately within S&S documents and programs such as the Site Security Plans, facility specific security plans, the Security Risk Assessment/ Vulnerability Assessment (SRA/VA), and facility operating procedures. Additionally, ensure there are processes to have MC&A included in new project development and changes to operations. [O 474.2A, Attachment 2, Chapter I, Paragraph 1.a.(6)]
- FAQ-4 The MC&A Organization is sufficiently independent of operations so as to not be overly influenced by operations to minimize or curtail MC&A activities that slow down or stop production and/or other MBA activities during a period of time (i.e., physical inventory). An example would be that the different organizations that have operations and MC&A in them report to senior site leadership held accountable for both programs and responsible for the effectiveness of both. Organizational independences in smaller organizations, such as in Category III and IV facilities, can be more difficult to achieve than in large organizations. In smaller organizations independence can be achieved through other means of checks and balances. [O 474.2A, Attachment 2, Chapter I, Paragraph 1.b.(2)]
- FAQ-5 Job Task Analysis – See DOE O 470.4B, *Safeguards and Security Program*, Appendix B, section 5.

All programs within S&S require a training program.

The S&S training program for each facility is encompassed by all program elements which are performed by employees working at that location. The content of training (initial, refresher, and on-the-job) is consistent with the knowledge and skills required to perform assigned S&S tasks and/or responsibilities as determined by valid and complete job analyses.

Individual training needs are evaluated against a job or functional analysis of the position to ensure that appropriate job-related training is identified. Training requirements are determined by analyzing needs, the job or function, and/or desired performance. Analyses are conducted to ensure that training courses identify and address the requirements of the job competencies. [O 474.2A, Attachment 2, Chapter I, Paragraph 1.c.(2)(b)] [O 474.2A, Attachment 2, Chapter II, Paragraph 1.a.(2)(b)]

- FAQ-6 Credible substitution materials identified by material form and type may also be identified by item identification number. [O 474.2A, Attachment 2, Chapter I, Paragraph 1.c.(3)(c)]
- FAQ-7 Materials not amenable to measurement identified by material form and type, may also be identified by item identification number. [O 474.2A, Attachment 2, Chapter I, Paragraph 1.c.(3)(d)]
- FAQ-8 An accountable quantity of SNM is commonly split into many less than accountable items as part of routine operations, particularly for analytical characterization or other testing of bulk materials. These split items (with individual primary containers) are often stored together in a single location such as a shelf, tray, rack, or a variety of other types of secondary convenience containers. In the case of a theft or diversion event, such LTA items could be readily re-constituted into an accountable quantity of SNM. Provisions covering this cumulative potential of SNM items are also needed to curtail purposeful splitting of accountable SNM to avoid MC&A program requirements. [O 474.2A, Attachment 2, Chapter I, Paragraph 1.d.(4)(b)]
- FAQ-9 MC&A system elements may include:
- 1 Access Controls
  - 2 Material Surveillance
  - 3 Tamper-Indicating Devices
  - 4 Portal Monitoring
  - 5 Accounting Record Systems
  - 6 Measurements.
  - 7 Inventory Difference Evaluation

If an MC&A program is not required to implement any of the system elements noted in this section, then they are not required to performance test them. For example, a Category III/IV facility is not required to have portal monitors, therefore they are not required to performance test portal monitors. [O 474.2A, Attachment 2, Chapter I, Paragraph 1.e.(4)(b)]

FAQ-10 DOE has not established a final disposition for SNM managed as High-Level Waste (HLW). Therefore, SNM managed as HLW which has been transferred to HLW facilities in accordance with DOE policy is not required to be controlled and accounted for per DOE O 474.2A, including Predisposition MBA requirements. The SNM in HLW is accounted for and protected in accordance with waste management policies and all physical protection requirements pursuant to DOE directives.

For illustration purposes, several DOE sites currently or have previously dissolved spent nuclear fuel which results in HLW solutions. Such solutions are typically transferred from the SNM processing facilities to HLW processing facilities which may include tank farms, vitrification plants, and glass waste storage buildings. Transfer of the SNM solutions (or other forms as appropriate) from the SNM processing facilities to the HLW facilities is subject to the “Final Disposition of SNM” requirements of DOE O 474.2A and reporting to the NMMSS. After transfer, the HLW material is no longer subject to DOE O 474.2A. [O 474.2A, Attachment 2, Chapter I, Paragraph 2.d.(6)]

FAQ-11 All of the listed information is important for understanding and identifying nuclear materials and nuclear material items on the inventory, and much of the information is required on a per item basis for all applicable items (e.g., identification, material type, element weight, isotope weight). However, some information (e.g., total measurement uncertainty) may be available on a more general basis or in other record sets rather than maintained on a per item basis in the accountability system. [O 474.2A, Attachment 2, Chapter I, Paragraph 2.e.(3)]

FAQ-12 The resulting resolution value is reported to NMMSS by shipper and receiver to update previously reported transaction on Form DOE/NRC F 741 transaction, which is maintained by NMMSS. As needed, the shipper and the receiver provide NMMSS Concise Note with relevant information. The Concise Note by either or both the shipping MBA and/or as measured at the receiving MBA includes, as appropriate, difference evaluation, investigation, corrective actions, and/or other details.

At the option of the shipper, receiver or at the discretion of the site offices involved, an independent laboratory may be engaged to resolve the difference to a single value for official reporting purposes. The findings of independent laboratory will be considered final for official reporting purposes. [O 474.2A, Attachment 2, Chapter I, Paragraph 2.g.(8)(c)]

- FAQ-13 Facilities that implement process monitoring for bulk materials or items should investigate and resolve differences exceeding error thresholds. The error thresholds, also referred to as control limits, are derived from statistical analyses using process or measurement data. For example, when a parent item is split into multiple daughter items, control limits for process monitoring differences are calculated based on the measurement uncertainties corresponding to the measurement techniques used for the parent and daughter items (referred to as “combined limit of error”). A second example involves processes known to have normal operating losses (due to holdup, waste generation, machining, etc.) The limits on process differences involving normal operating losses are calculated using process data to determine the mean value for the operating losses and their variability. For processes which utilize scales or balances as the sole measurement technique, statistical analysis may result in very low control limits which result in increased process monitoring anomalies. For such processes, control limits may be based on specific quantities with documented justification. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.b.(4)]
- FAQ-14 Equipment that would require controlled access by personnel would include bar code readers, portal monitors, and measurement equipment. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.c.]
- FAQ-15 Data generating and recording devices are apparatus, equipment and instruments used to produce, collect and store information. This information could be in digital and/or analog formats. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.c.(4)]
- FAQ-16 Automated Capabilities for Material Surveillance Methodologies Reference: DOE O 473.1A (see current version).
- Refers to monitoring systems, devices, sensors or other instrumentation. Examples include but are not limited to intrusion detection systems (IDS), perimeter intrusion detection and assessment systems (PIDAS), balanced magnetic switches (BMS), microwave sensors, passive infrared sensors, buried line sensors, “statement of health” alarms, sensor alarms, tamper alarms, radio frequency jamming indications, and closed-circuit television (CCTV)/ video assessment and surveillance system (VASS). Systems, devices, sensors, and instrumentation report status to alarm stations staffed by trained protective force or security personnel. In turn, alarm stations provide a capability for monitoring and assessing alarms and initiating responses to S&S events. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.d.(1)(a)]
- FAQ-17 Visual surveillance/direct observation –Reference DOE-STD-1194-2019, Material Surveillance (see current version). Visual surveillance can be attained through Two-Person Rule, Daily Administrative Checks, and continuous video surveillance through remote CCTV/VASS. Motion detection equipment alone may not be sufficient. As stated in the Tech Std, if recognition or assessment is not effectively implemented other means are instituted. Material under an

effective material surveillance program can take credit for TID, but not in lieu of continuous monitoring. Material is in an authorized location or under two person controls during transfer otherwise it is considered in an unauthorized location.

The material surveillance program is primarily concerned with detection of insider adversary activities, and is, therefore, a collection of information through devices and/or personnel observation to detect unauthorized movements of nuclear material, tampering with containment of nuclear material, falsification of information related to location and quantities of nuclear material, and tampering with safeguards devices. In order for visual surveillance to be considered effective, the person(s) observing is capable of recognizing unauthorized activities, correctly assessing the situation, and reporting the activities to appropriate response personnel in time to deter theft, diversion, or radiological sabotage. If the recognition, assessment, or reporting is not effectively implemented, then the visual surveillance methodology is deficient, and additional means are used to ensure detection and response. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.d.(1)(b)]

- FAQ-18 When secure storage locations for Cat I and II SNM are in “access” mode (i.e., not locked and not protected by an active alarm system), the site/facility ensures that there is continuous active surveillance on either the SNM or the persons accessing the location. Active surveillance techniques for personnel consist of direct visual observation and may include Two-Person rule and/or Closed Circuit TV cameras monitored by CAS. Active surveillance techniques for SNM are monitored and may include: (1) motion detection sensors or scene change detection cameras which surveil either the SNM containers or all credible pathways to the SNM; and (2) active TIDs such as Radio Frequency TIDs. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.d.(2)(d)]
- FAQ-19 Loss detection capability is the ability to monitor and identify the diversion or theft of SNM from a facility. These capabilities are usually a combination of administrative controls, statistical methodologies as well as physical and electronic systems used to prevent unauthorized facility intrusions, to measure material property amounts to established threshold limits, and to discover anomalous conditions (e.g., out-of-place and/or misallocated items). [O 474.2A, Attachment 2, Chapter I, Paragraph 3.e.(2)(a)2]
- FAQ-20 For the purposes of transfer checks item is defined as the uniquely identifiable container in which material is shipped. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.e.(5)(d)]
- FAQ-21 Items can be accepted without confirmation/verification measurements based on being manufactured to program specifications which are also characterized as intrinsically tamper -indicating. Intrinsically tamper-indicating is defined as an item (i.e., a single piece or container of nuclear material) constructed so that a malevolent act cannot be accomplished without permanently altering it in a

manner that would be obvious during visual inspection. Examples include but are not limited to weapons, weapon components, fuel elements, critical assemblies, and sealed sources. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.e.(5)(d)]

- FAQ-22 The main purpose of TIDs within a defense-in-depth system is to provide a time-limited deterrent and, upon inspection, an indicator of obvious tampering. TIDs should be used to provide an indication that containers, items, doors, or sensitive areas have not been violated since the previous TID inspection. The TID should be applied to container access points so that the TID effectively indicates whether the container has been opened. Procedures should be written to ensure the integrity of the container and the TID are verified to ensure no tampering has occurred. The decision to use TIDs should be based on site/facility-specific differences, concerns, and environmental conditions, as well as whether SNM is in an item or bulk (e.g., solution, powder, gas) form. TIDs are most effectively used in the management, control, and accountability of SNM items that allow for more cost-effective control and accountability of items. Most sites/facilities may see a clear benefit from TID usage. Smaller sites with SNM of lower safeguards attractiveness level and category may not, particularly Category IV locations. Coordination with the applicable site/program office and ODFSA is essential to ensure agreement and approval of TID usage as part of an effective MC&A program. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.f.(1)(a)]
- FAQ-23 TID exclusive use can be achieved through a documented, vendor-certified statement that TIDs/seals bearing the unique characteristics of the supplied TIDs/seals will not be provided to another customer without approval from the purchaser. Other specific security requirements at the vendor's facility, such as stock control, die and mold control, access to product, and item accounting may be considered for inclusion in the contract. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.f.(1)(c)2]
- FAQ-24 To deter unauthorized access and use, unissued TIDs are secured and access limited to the TID Administrator and Alternate Administrator(s). This may be done using, for example, a locked repository, cabinet, or office. There is a risk of unauthorized access and diversion of TIDs following delivery to the site but prior to receipt by the TID Administrator. To detect such an occurrence, the TID Administrator should perform a receipt inspection to validate that all TIDs were received as ordered and that there are no indications of tampering or other anomalies. Any anomalies should be investigated and resolved. [O 474.2A, Attachment 2, Chapter I, Paragraph 3.f.(1)(c)5]
- FAQ-25 Independence of operations and measurement/measurement control is necessary so that operations personnel with hands-on access to SNM are not aware of inventory difference and process control limits so that they can carry out a diversion scenario that would not be detected by the limits. [O 474.2A, Attachment 2, Chapter I, Paragraph 4.b.(2)]

- FAQ-26 Measurement methods for each site should be chosen based upon the SNM and operations at the site. For example, a site that is item-based with no processing operations only requires measurement methods capable of making confirmatory measurements. Likewise, a site that processes SNM requires measurement methods capable of making accountability measurements. [O 474.2A, Attachment 2, Chapter I, Paragraph 4.d.]
- FAQ-27 A linearity check for a balance traditionally encompasses three data points: a low standard, a high standard, but also includes zero for tare, where the low and the high standard bracket the material being measured on that scale. This linearity check is different than the calibration services organizations use to validate a scale which includes adding one standard on top of each other building their calibration linearity check. [O 474.2A, Attachment 2, Chapter I, Paragraph 4.e.(1)]
- FAQ-28 Uncertainties associated with sampling methods and measurement methods change over time due to equipment/operators/environmental factors, to ensure that the identified uncertainties remain valid to the operation, the site repeats the process for determining uncertainties and statistically validate that the uncertainties are still representative of the operation or if they need to be updated. [O 474.2A, Attachment 2, Chapter I, Paragraph 4.e.(3)]
- FAQ-29 Some credible substitution materials emit the same energy as their SNM counterparts. In instances where these materials are co-located, if the items are not tamper-indicating and the items themselves are not distinguishable then measurements methods used are capable of distinguishing between the SNM and substitute material. For example, depleted uranium and high enriched uranium will both have the 186 keV energy from the U-235 isotope. In these cases, a measurement is able to determine the differences in enrichment (.711% and  $\geq 20\%$ ). Credible substitution material should be identified in the MC&A Plan by material form and type, not item identification number. [O 474.2A, Attachment 2, Chapter I, Paragraph 5.b.(5)]
- FAQ-30 The difference between a storage or processing MBA is a storage MBA is one that materials are not adjusted, they are either staged, stored, or just moved around. A processing MBA is one where there is an opportunity for gain or loss of nuclear material either through processing of material from one form to another, splitting or mixing of materials, or repackaging of materials. With the exception of Cat IV and some Cat III MBAs, an inventory is conducted more frequently for Processing MBAs than storage MBAs due to the possibility of inventory changes. [O 474.2A, Attachment 2, Chapter I, Table VII]
- FAQ-31 Item Monitoring – The intent of this requirement is to ensure timely detection of the loss of items that total a Category I quantity of material. To achieve this capability, the contractor is expected to verify the presence and integrity of selected SNM items on a periodic basis. The required frequency of tests for missing items is graded according to the relative attractiveness of the material type in the item, the ease with which the item could be diverted without being

observed, and the degree of surveillance and containment provided for by the material control and physical security systems.

Process Monitoring – For material in process such as undergoing a chemical or other process changing form, mixing or splitting, or repackaging, the contractors shall monitor internal transfers, storage, and processing of SNM. The process monitoring achieves the detection capabilities with process detection capability. For each process, a production quality control program capable of monitoring the status of material in process. [O 474.2A, Attachment 2, Chapter I, Paragraph 5.b.(9)]

FAQ-32 Facilities prepare for a physical inventory by completing the planning and preparation steps included in the MC&A Order. Many facilities include these steps in their physical inventory procedures. One of these required steps is to establish a date/time after which there can be no movement of SNM (or substitution material) across the Material Balance Area (MBA) boundary until the inventory is reconciled. This step also requires that SNM in transit to the MBA should be received and recorded in the accounting system prior to this date/time. This date/time is referred to as the physical inventory cutoff time.

Establishing this time is important as it reduces the probability of occurrence of the “shell game.” In the shell game, SNM inventory is moved from one MBA undergoing physical inventory to another MBA and moved back again after physical inventory is complete thereby hiding the SNM from the process. This principle also applies to facilities in which the MBA account structure utilizes sub MBAs or subsidiary balance accounts. When sub MBAs are inventoried sequentially, the facility should apply the physical inventory cutoff time to all sub-MBAs to ensure that SNM cannot be moved internally from one sub-MBA to another during the MBA physical inventory.

A related concept is the physical inventory declaration time. This is the time at which the actual physical process of conducting the physical inventory is initiated. In some facilities, it is the same as the physical inventory cutoff time, but it does not have to be. However, the physical inventory cutoff time cannot be after the physical inventory declaration time. It is a good practice to record both times in the physical inventory procedure for documentation and future reference. [O 474.2A, Attachment 2, Chapter I, Paragraph 5.c.(1)(c)6]

FAQ-33 Per the NMMSS Guide, an inventory of site nuclear material holdings is to be reported annually. Most sites report site inventories monthly to avoid complicated reconciliations with NMMSS on an annual basis. These site-reported inventories are a snapshot in time – mainly at the end of each month. Typically, there is no direct relationship with the reconciliation of a site physical inventory and the monthly (or annual) inventory reported to NMMSS. This would be impractical due to the varying inventory periods at sites due to different categories of MBAs as well as approved extended inventories. [O 474.2A, Attachment 2, Chapter I, Paragraph 5.c.(2)]



- FAQ-34      Alternative methods for determining control limits may be based on a defined quantity approved by ODFSA in the MC&A Plan. For MBAs the use of statistics or historical limits may be more applicable. This may be a specific quantity or percentage of active inventory. An additional methodology may be to use historical 2 and 3 sigma limits based on historic inventory differences (ID)s to determine the average and standard deviation with enough data points. Parameters are defined in the methodology for the ODFSA approval in the MC&A Plan. [O 474.2A, Attachment 2, Chapter I, Paragraph 5.c.(3)(c)2]
- FAQ-35      The use of threshold limits for processing MBAs should be determined based on a review of throughput, the type of processing in the MBA, the standard material forms being processed, forms and quantities of materials, historical performance, etc. This review should document the rationale for determining the threshold limits for ease of understanding the risk accepted by the ODFSA. [O 474.2A, Attachment 2, Chapter I, Paragraph 5.c.(3)(d)]
- FAQ-36      Removing Berkelium, Californium from the list of Other Accountable Nuclear Material does not remove any other non-MC&A requirements for those materials including, but not limited to, radiological controls and cost-financial accounting. [O 474.2A, Attachment 2, Chapter II, Table X]
- FAQ-37      There are programmatic drivers for Other Accountable Nuclear Material (OANM) reporting – these include Nuclear Materials Management and Safeguards System (NMMSS) and Nuclear Material Inventory Assessment (NMIA). Transactions for OANM should be completed in a timeframe that ensures information on OANM for reporting is accurate. These timeframes should be documented in the site OANM Plan. [O 474.2A, Attachment 2, Chapter II, Paragraph 2.a.]
- FAQ-38      For OANM, a complete audit trail pertains only to activities related to accounting and reporting at the RIS level. External shipments and receipts are documented and reported as they occur. Any changes to RIS totals as a result of internal operations are documented in the annual inventory reporting to NMMSS. [O 474.2A, Attachment 2, Chapter II, Paragraph 2.b.(4)]