

Nuclear Materials Review Board at the Nevada National Security Site

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ABSTRACT

The Nuclear Materials Management Program at the Nevada National Security Site (NNSS) implemented a Nuclear Materials Review Board (NMRB) process in 2014 to provide an independent and objective review of matters related to life-cycle planning of nuclear materials of interest at NNSS and its offsite facilities. The NMRB process ranks the relative risk of acquiring accountable nuclear materials and includes a storage plan and defined disposition path to ensure materials meet facility acceptance criteria. Acquisition of accountable nuclear materials is determined based on votes cast by NMRB primary members who evaluate the relative risk of complexity or difficulty of implementing programmatic requirements in each member's area of expertise. Votes are submitted via an electronic checklist of the Nuclear Material Request (NMR) which ranks the complexity or minor difficulty that can be expected for each member's area of expertise throughout a project's life-cycle based on the material in question. The NMRB primary members are key stakeholders representing NNSS facilities: the nuclear materials program, nuclear materials inventory, the certified packaging program, environmental compliance, the receiving facility's manager(s), nuclear assurance, nuclear criticality safety, nuclear materials control and accountability, radiological control, safety and security, and storage. Supplemental members representing process controls systems, sealed source program, transportation, and waste generator services are included as applicable and requested by the primary NMRB members. The representation of each of these functional areas provides a complementary and thorough evaluation of nuclear material acquisition compliance with overarching DOE Orders and NNSS company directives. Once all votes are electronically submitted, the NMRB Chair provides the final risk ranking determination to the nuclear materials requestor. This risk ranking NMRB process is unique to NNSS, and this process has progressed throughout the years; as of Fiscal Year 2023, the NMRB has made two noteworthy advancements: to involve the site facility stakeholders in the voting and to have the process translated to an electronic workflow. Inclusion of NNSS facility representatives in the NMRB and the voting process supports consideration of the risk of each proposed nuclear material acquisition at the level of facility impact in addition to the site-level impact.

INTRODUCTION

The Nevada National Security Site (NNSS) implemented an independent and objective review of acquisitions of accountable quantities of nuclear materials (NM) of interest. The Nuclear Materials Review Board (NMRB) was conceptualized and implemented by NNSS company directive on December 31, 2013. At the time of initial implementation, the NMRB was comprised of the Chair position held by the Nuclear Materials Manager, the Deputy Chair position held by the Nuclear Material Control and Accountability (NMC&A) Manager, the Safeguards and Security (S&S) Manager, and the Secretary. The NMRB was charged with ensuring effective life-cycle planning for NM.

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The review and evaluation conducted by the NMRB began when a Nuclear Material Request (NMR) form was completed via a hard copy by an NM Requestor and provided to the NMRB Chair no less than 90 days prior to the project/program start. The NMR was the catalyst to convene an NMRB meeting. Throughout the course of the NMRB process, the voting members reviewed the NMR within the context of the potential risk of each member's area of expertise. To better inform the risk assessments, subject matter experts (SMEs) were invited on an as-needed basis to advise the voting members of further potential risks. Each voting member completed an area-specific checklist—Nuclear Materials Management (NMM), NMC&A, and S&S—to ensure comprehensive and consistent review of correlated risk areas. The corresponding checklists were also prepared via hard copy. Once the NMRB meeting was concluded, each NMRB voting member provided the completed checklist to the NMRB Chair, which included a risk ranking and comments or recommendations.

CURRENT STATE

The NMRB process continues to be the manner by which the NNSS assesses the inherent and expected risks of accepting NM at the NNSS. An NM Requestor submits an NMR to initiate the NMRB process. The current NMR captures the basic information regarding the associated NM and the expected use. The NMM organization screens the NMR to determine whether an NMRB is required. The NMM organization also assists the NM Requestor with completing the NMR as needed.

Each NMRB voting member's program/facility requirements, such as S&S, are used to evaluate the relative risks to the site and to the personnel receiving the NM. The risks are based on each member's associated area of expertise, as well as any input received by SMEs. The input is then documented on the corresponding NMRB checklist. For example, the NMM and NMC&A Managers make risk ranking determinations based on separate criteria that are unique to the respective program. Specific criteria for NMM include funding, characterization, and disposition. The NMC&A Manager ensures that the receipt will not exceed roll-up limits, a Material Balance Area (MBA) is available, and that the NM Requestor is aware of Authorization to Ship (ATS) requirements.

Currently, voting members who do not have a specific checklist complete a generic version. The NMM organization is in the process of developing specific checklists for each voting member. Sections of unique checklists used by NMRB voting members are pictured in Figure 1. The NMRB Chair ensures that all required input has been collected to make a final risk ranking determination. At the conclusion of the risk ranking assessment, notification is provided to appropriate NNSS senior management representatives. The collection of the completed checklists, as well as the compilation of the risk ranking votes, is the core of the NMRB process. As depicted at the bottom of the NMRB Chair's checklist in Figure 1, concurrence is required from varying levels of NNSS senior management depending upon the associated risk ranking.

FORM MUST BE REVIEWED BY AUTHORIZED DERIVATIVE CLASSIFIER WHEN COMPLETED

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Project Title	NMR Number	Project Number
		Response Required
Does the NM request comply with the NMM Program requirements?		Yes <input type="checkbox"/> No <input type="checkbox"/>
Is the NM designated as Restricted Use?		Yes <input type="checkbox"/> No <input type="checkbox"/>

FORM MUST BE REVIEWED BY AUTHORIZED DERIVATIVE CLASSIFIER WHEN COMPLETED

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Project Title	NMR Number	Project Number
		Response Required
Has the accountable NM attractiveness and security category been determined?		Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Has an MBA been identified, established, and available?		Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

FORM MUST BE REVIEWED BY AUTHORIZED DERIVATIVE CLASSIFIER WHEN COMPLETED

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Project Title	NMR Number	Project Number
		Response Required
Has a security plan been written and approved, if applicable?		Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>
Have any applicable vulnerability/risk assessments been completed?		Yes <input type="checkbox"/> No <input type="checkbox"/> N/A <input type="checkbox"/>

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Project Title	NMR Number	Project Number
		Response Required
Have all voting NMRB member checklists been completed?		Yes <input type="checkbox"/>
Comments:		
Risk Ranking Vote: Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/>		
If the relative risk is Medium, the Facility and Testbed Engineering Director's concurrence is required on the NMR. If the relative risk is High, the Stockpile Experimentation and Operations Senior Director's concurrence is required on the NMR.		
NMRB Chair	Signature	Date

Project Title

Does the NM request comply with the NMM Program requirements?

Is the NM designated as Restricted Use?

Is an accep removal of

Is funding acquisition NM?

Has potential evaluated?

If yes, is th any other r mixture of:

If the NM is NNSS?

Are approv

Anticipatec

Anticipatec

Comment

Project Title

Has the accountab NM attractiveness and security category been determined?

Has an MBA been identified, established, and available?

Is a roll-up

Has the Au

Commen

Project Title

Has a security plan been written and approved, if applicable?

Have any applicable vulnerability/risk assessments been completed?

Will additional :

Comments:

Project Title

Have all voting NMRB member checklists been completed?

Comments:

Risk Ranking Vote: Low Medium High

If the relative risk is Medium, the Facility and Testbed Engineering Director's concurrence is required on the NMR.
If the relative risk is High, the Stockpile Experimentation and Operations Senior Director's concurrence is required on the NMR.

NMRB Chair Signature Date

Figure 1. Select View of Four Current Nuclear Materials Review Board Voting Member's Checklists

The first NMR form was submitted in April 2014 and was not approved until January 2015. During the first year of the NMRB, five requests were submitted, although none were approved until 2015. The average time for the first year of NMRs to be approved was 232 days. Between 2015 and 2022, process improvements reduced the time to an average of 27 days between NMR submission and final risk ranking determination. Shifting the NMRB function to a risk ranking process, rather than an approval recommendation process, contributed to reducing the time spent between the NMR and NNSS senior management concurrence. The time recorded between NMR submittal and risk ranking determination is depicted graphically in Figure 2.

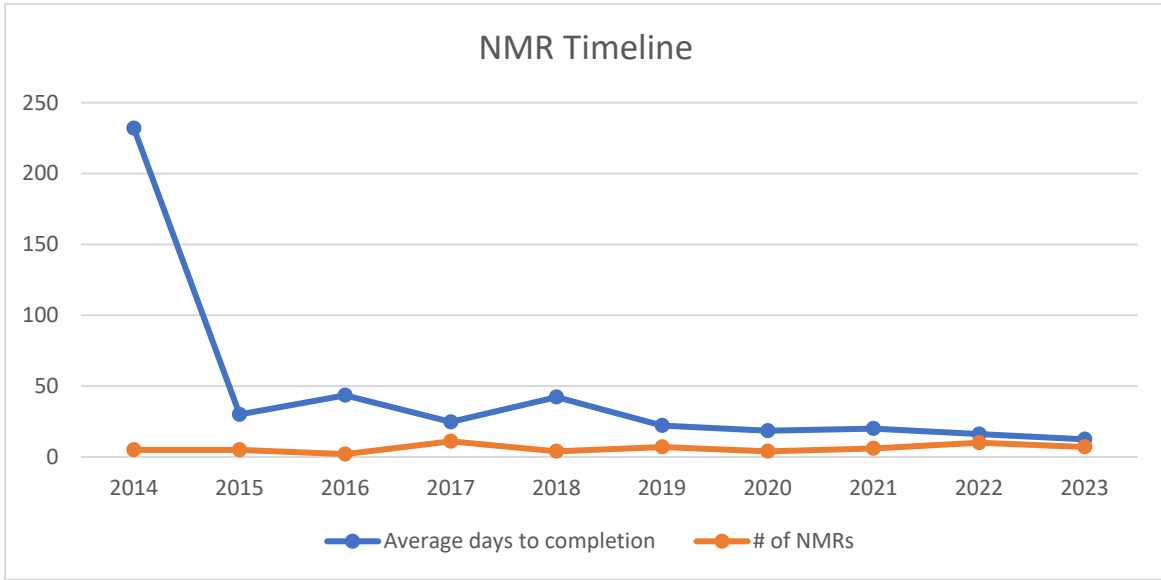


Figure 2. Nevada National Security Site Nuclear Materials Review Board Number of Nuclear Material Requests Reviewed and Average Time (in Days) to Complete Per Year

As stated in the introduction, input and decisions were previously completed via hard copy. On average, this process took multiple weeks. As of November 2022, the risk ranking process has been automated, which enables NMRB voting members to provide input and decisions in a timelier manner by use of automatic system notifications. The NMR initiation and NMRB process, including the checklists, are completed via an electronic workflow. The timeline for collecting all input and providing a consolidated risk assessment is now completed on an average of days versus weeks. The quantity of NMRs has significantly increased since the origination of the NMRB.

Overall, the new NMRB electronic workflow process has made impacts that extend beyond the ability to review and rank a greater quantity of requests. The timeline of initial NMR submission to concurrence by NNSS management supports mitigation of the time pressures that are associated with programmatic receipt of NM. Timing is imperative when assessing the risk of NM acceptance by NMRB voting members. For example, delays in confirming an acceptable risk for an NMR will not only impact the shipping site, but the timelines for each NNSS receiving facility as well. Many of the changes implemented by the NMRB process allow for better coordination between the shipping and receiving facilities to limit operational impacts and reduce delays in receipt of programmatic NM.

The NNSS implemented the NMRB process as a solution to assess the potential risk of NM receipts. Intra- and inter-site communication and working relationships have improved through the integrated

NMRB process. The NMRB process keep DOE policy and requirements at the forefront of the assessment. NMRB records provide a historical account of risk assessments and management decisions since the implementation of the NMRB process.

NUCLEAR MATERIALS REVIEW BOARD MEMBERS

The number of NMRB voting members has expanded since 2014. In addition to the original voting members, these programs are also represented:

- Certified Packaging Program (CPP)
- Environmental Compliance
- Facility Management for each designated receiving facility
- Nuclear Assurance
- Nuclear Criticality Safety Program
- NM Inventory Management
- Process Controls Systems Engineering
- Radiological Control
- Sealed Source Program
- Storage Program
- Transportation Management
- Waste Generator Services

Nuclear Materials Management

As the NMRB Chair, the NM Program Manager focuses on life-cycle management, as required by NNSS directives and U.S. Department of Energy (DOE) Order 410.2, *Nuclear Materials Management*. Funding for life-cycle management of new NM acquisitions helps to ensure the NM does not become orphaned. Failure to identify a viable disposition pathway could also result in the NM becoming abandoned at the NNSS.

Nuclear Material Control and Accountability

NMC&A representatives focus on the potential risks to, or imposed by, the access, use, oversight, management, and/or operation of the NMR acquisition at the NNSS. DOE Order 474.2A, *Nuclear Material Control and Accountability*, is the overarching policy for the NMC&A Program and drives the risk assessment for the NMC&A representatives' involvement with the NMRB. The NMC&A Program has been bolstered and supported by the NMRB process by providing the NMC&A Program representation regarding the decision to accept accountable NM acquisitions such that the changes may impact requirements set forth by DOE Order 474.2A.

Certified Packaging Program

The CPP focuses on ensuring NM are properly shipped and staged, as required by NNSS directives and DOE Manual 441.1-1 Chg 1 (Admin Chg), *Nuclear Material Packaging*. Proper packaging of NM is a critical component of ensuring worker safety and mitigating facility contamination hazards. Areas of potential impact include the packaging of incoming NM as well as the chemical, radiological, and physical characteristics for staged NM.

Safeguards and Security

The focus of S&S is to evaluate MBA security plans for compliance with the physical security requirements as detailed in DOE Order 473.1A, *Physical Protection Program*, and determine if any additional security protection or surveillance is required. S&S also ensures any applicable vulnerability assessments are completed by the project/program prior to the receipt of NM. The NMRB process supports the ability of S&S to ensure that an NM acquisition does not impact the protections which are currently in place.

Additional Nuclear Materials Review Board Members

The remaining members of the NMRB represent specialized areas of expertise to evaluate the potential impact to each respective program. The NNSS has responsibilities to worker health, policy requirements, environmental safety, and national security interests which must receive detailed consideration prior to receiving NM with potential impact or risk. Given the multitude of requirements in each program’s policies and directives, the NMRB process helps to ensure that all potential programmatic impacts are assessed prior to risk ranking.

RISK MANAGEMENT

Risk management is the primary focus of the NMRB when considering an NMR. The NMR is evaluated from the context of the expertise fields of the voting members. An example of the risk assessment originally enacted by the NMRB is depicted in Figure 3.

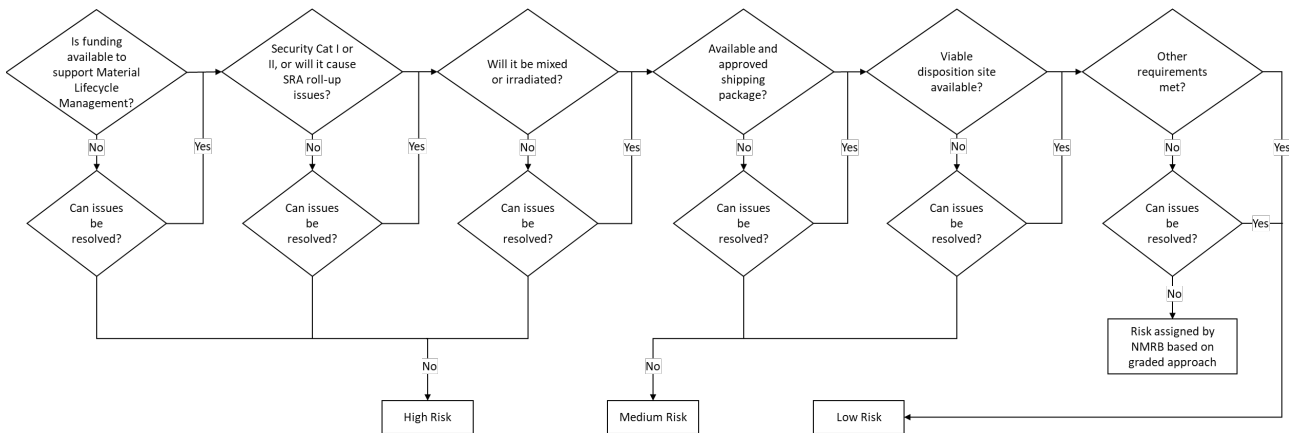


Figure 3. Nevada National Security Site Nuclear Materials Review Board Risk Assessment Flow Diagram

The risk ranking reached through the NMRB process assists in determining the overall risk that the NNSS assumes if NM is received. The NMRB process documents whether:

- NM of interest can be received onsite within existing or planned security provisions,
- NM modifications will result in adverse impacts to NNSS,
- resources for life-cycle planning for material use, inventory, staging, and final disposition have been identified and committed at the appropriate management levels,
- suitable MBAs and locations to stage the NM have been identified, and
- any additional security protection or surveillance is required.

Following the final risk ranking determination, the NMRB provides to the NM Requestor a formal notification of the assigned risk ranking. Should the risk be ranked *medium* or *high*, the NMRB process also ensures NNSS senior management is notified.

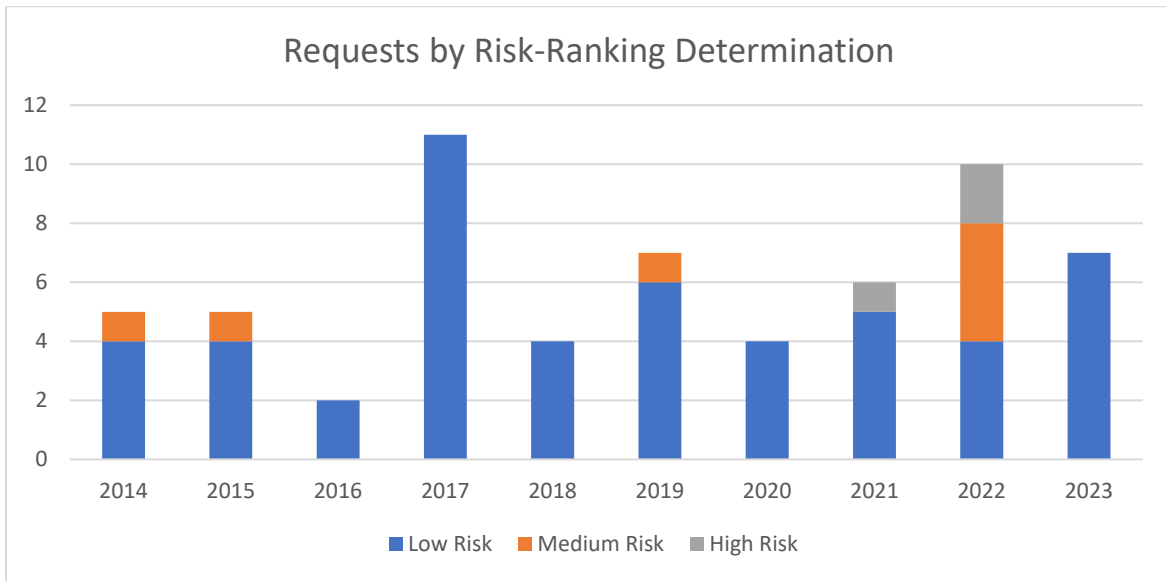


Figure 4. Total Nevada National Security Site Nuclear Material Requests by Risk Level Per Year, as of March 31, 2023

Through the NMRB process, the NNSS has avoided receipt of non-compliant material. In 2022, two potential receipts were declined. Due to information provided during the NMRB meetings for each respective NMR, a facility Unreviewed Safety Question (USQ) was conducted. Each resulted in a positive USQ determination, meaning the material was not in compliance with the facility’s Safety Basis.

Identification of potential risks leads to informed acceptance of those risks. The situations summarized in the preceding paragraph were efficiently and effectively flagged. The risk evaluation and mitigation exemplify the value of the overall risk management process.

PATH FORWARD FOR NNSS NMRB

The efforts to automate the process are ongoing and substantial improvements have been made to the NMRB’s efficiency. The required time between receiving an NMR, finalizing the risk ranking, and obtaining NNSS senior management concurrence has been significantly reduced. It is the goal of the NNSS to continue to improve upon the automated NMRB workflow process and provide an example that other sites may emulate.