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National Nuclear Security Administration

Post-Closure Strategy for Use-Restricted Sites on the Nevada National Security Site, Nevada Test and Training Range, and Tonopah Test Range, Nevada

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U.S. Department of Energy
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POST-CLOSURE STRATEGY FOR USE-RESTRICTED SITES ON THE NEVADA NATIONAL SECURITY SITE, NEVADA TEST AND TRAINING RANGE, AND TONOPAH TEST RANGE, NEVADA

U.S. Department of Energy
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Las Vegas, Nevada

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POST-CLOSURE STRATEGY FOR USE-RESTRICTED SITES ON THE NEVADA NATIONAL SECURITY SITE, NEVADA TEST AND TRAINING RANGE, AND TONOPAH TEST RANGE, NEVADA

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ACRONYMS AND ABBREVIATIONS

CAS	Corrective Action Site
CAU	Corrective Action Unit
FFACO	*Federal Facility Agreement and Consent Order*
GIS	Geographic Information System
M&O	Management and Operations
NDEP	Nevada Division of Environmental Protection
NNSS	Nevada National Security Site
NTTR	Nevada Test and Training Range
RadCon	Radiological Control
RCRA	*Resource Conservation and Recovery Act*
TTR	Tonopah Test Range
UR	use restriction

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EXECUTIVE SUMMARY

The purpose of this Post-Closure Strategy is to provide a consistent methodology for continual evaluation of post-closure requirements for use-restricted areas on the Nevada National Security Site (NNSS), Nevada Test and Training Range (NTTR), and Tonopah Test Range (TTR) to consolidate, modify, or streamline the program. In addition, this document stipulates the creation of a single consolidated Post-Closure Plan that will detail the current post-closure requirements for all active use restrictions (URs) and outlines its implementation and subsequent revision. This strategy will ensure effective management and control of the post-closure sites.

There are currently over 200 URs located on the NNSS, NTTR, and TTR. Post-closure requirements were initially established in the Closure Report for each site. In some cases, changes to the post-closure requirements have been implemented through addendums, errata sheets, records of technical change, or letters. Post-closure requirements have been collected from these multiple sources and consolidated into several formats, such as summaries and databases. This structure increases the possibility of inconsistencies and uncertainty. As more URs are established and the post-closure program is expanded, the need for a comprehensive approach for managing the program will increase. Not only should the current requirements be obtainable from a single source that supersedes all previous requirements, but the strategy for modifying the requirements should be standardized. This will enable more effective management of the program into the future.

This strategy document and the subsequent comprehensive plan are to be implemented under the assumption that the NNSS and outlying sites will be under the purview of the U.S. Department of Energy, National Nuclear Security Administration for the foreseeable future. This strategy was also developed assuming that regulatory control of the sites remains static. The comprehensive plan is not intended to be a permanent long-term stewardship plan. However, it is intended to clarify requirements and identify components to effectively manage the sites until regulatory requirements are met or management of the site changes.

The Environmental Management Program is required to manage these sites until the NNSS Environmental Restoration program is completed, currently planned for 2030. Prior to completion of the Environmental Restoration program, additional planning will be conducted to ensure that long-term stewardship of the sites is maintained. A comprehensive post-closure plan can be transitioned effectively into any future site-wide long-term stewardship program that may be developed. Therefore, the post-closure plan will include current aspects of the post-closure program that are also important aspects of long-term stewardship, including the following:

- Management of physical and engineering controls such as fences, signs, and soil covers
- Management of institutional and administrative controls such as use restrictions and real estate systems
- Management of monitoring and maintenance programs
- Management of information related to the sites such as geographic information system data and related documentation

The strategy will also allow for periodic review and modification of any aspect of the program to ensure continued effectiveness.

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1.0 INTRODUCTION

This Post-Closure Strategy presents a process for the creation, implementation, and future revision of a single document that contains current post-closure requirements for all active use restrictions (URs). In addition, this document provides a methodology for continual evaluation of post-closure requirements for use-restricted sites on the Nevada National Security Site (NNSS), Nevada Test and Training Range (NTTR), and Tonopah Test Range (TTR) to consolidate, modify, and streamline the post-closure program. This document applies to Corrective Action Sites (CASs) listed in the *Federal Facility Agreement and Consent Order* (FFACO, 1996 as amended).

1.1 OBJECTIVES

The objectives of this document include the following:

- Provide for the creation and implementation of a single consolidated Post-Closure Plan that will document current post-closure requirements for all active URs and supersede all previous requirements.
- Present a strategy for a consistent approach for evaluating post-closure requirements at use-restricted sites to continually ensure effectiveness and efficiency through consolidation, modification, and reduction of post-closure requirements while maintaining regulatory compliance and protection of site workers and the public.
- Outline an approach for updating the consolidated Post-Closure Plan to document changes to the program, such as addition or deletion of URs or modification of inspection and reporting requirements.

Establishing a streamlined approach for continual evaluation and effective management of the post-closure program will increase efficiency and simplify administration of the sites. An approved strategy for recurrent evaluation and improvement, combined with the documentation of all of the post-closure requirements in a single plan will ensure the program is effectively and efficiently managed in the future. A single plan will also enable an effective transition into a formal long-term stewardship program should one be implemented at the NNSS in the future.

1.2 POST-CLOSURE PROGRAM OVERVIEW

More than 200 URs have been implemented on the NNSS, NTTR, and TTR, and most require post-closure inspections and monitoring. Post-closure requirements were initially established in the Closure Report for each site. In some cases, these requirements have been modified in subsequent documents or correspondence. Requirements vary depending on the nature of contaminants left in place, site location, accessibility, land use scenario, and when the closure took place. The goal of the post-closure program is to manage the sites and protect site workers and the public from inadvertent exposure. This goal is achieved through inspections and monitoring, signage and other physical controls, and the real estate management program.

Current post-closure activities include the following:

- Visual inspections are conducted to document the condition of signs, fences, monuments, vegetation, closure covers, other site-specific features, and indications of unauthorized usage, and to identify maintenance, repairs, or other required actions. Inspections are generally performed by walking the site or, at larger sites, by driving on or around the site. Inspections

are performed at various frequencies based on site-specific requirements. Most inspections are performed annually. However, several sites require bi-annual or quarterly inspections, and some sites are required to be inspected every 5 years. In addition, event-based inspections are required at some sites when site-specific threshold values or other criteria are exceeded, such as a precipitation event.

- Monitoring is required at some sites. Monitoring may include soil moisture monitoring, subsidence surveys, precipitation monitoring, or vegetation surveys.
- Routine maintenance and repairs are performed that include the following:
  - Hanging, repairing, or replacing warning signs and signposts
  - Repairing or replacing fencing and fence posts
  - Repairing or replacing monuments
  - Backfilling animal burrows
  - Applying herbicides or clearing vegetation from sites in areas required to be kept clear of vegetation
- Non-routine maintenance and repair activities may include the following:
  - Reseeding and irrigating vegetated covers
  - Repairing or replacing landfill monitoring equipment (e.g., moisture monitoring sensors and associated electronic components)
  - Repairing or augmenting closure covers that have erosion damage, have subsided, or are settling/cracking
  - Construction and maintenance of runoff control features or other features to prevent erosion
  - Trapping of small mammals
  - Repairing access roads and walkways
- Quarterly and annual reports are prepared that summarize inspection, monitoring, maintenance, and repair activities.
- Management and control of facilities and real property on the NNSS is accomplished through a real estate management program. The program is used on the NNSS to document defined scopes of work on designated properties. Protection of URs is enhanced by including the areas in the real estate management program. This reduces the risk of activities taking place in these areas without authorization from the facility owner.
- Use restriction information, including geographical coordinates for the boundaries of the use-restricted areas, is housed and maintained in the Management and Operations (M&O) Contractor's Geographic Information System (GIS) database for the NNSS. The GIS database is a centralized repository that can be accessed by online mapping applications, allowing users to immediately identify use-restricted areas. Within the online mapping application, users can access site-specific information such as contaminants present, inspection requirements, and site controls. Contact information is also provided. Facility boundaries, potential hazards, and infrastructure are also displayed on the mapping application. This system allows work planners to easily identify conflicts with planned activities and overlaps with use-restricted areas. This system also aids emergency responders. As technology improves over time, the GIS database will be updated and modified to increase protection of URs.

1.3 BENEFITS OF CONSOLIDATION AND MODIFICATION

Currently, the post-closure requirements are documented in 150 Closure Reports and addendums. In some cases, changes have been made to post-closure requirements for individual sites in subsequent correspondence and post-closure reports. There is currently no comprehensive Post-Closure Plan that can be referenced and updated that reflects the current post-closure and reporting requirements for all use-restricted sites. A comprehensive Post-Closure Plan that supersedes all previous documents would establish a single source for all post-closure requirements. The single document would reflect the most recent requirements and eliminate the need to locate specific correspondence or reports to identify requirements for individual sites.

The post-closure requirements have been evaluated and streamlined at some sites. However, there is a need for a comprehensive strategy to evaluate requirements and implement improvements to the program. Previous instances of streamlining the program have led to increased efficiency and decreased effort and cost while maintaining regulatory compliance and protection of site workers and the public. A formal and comprehensive strategy to evaluate and implement future changes will continue to improve the program.

Previous improvements to the program that have been implemented include the following:

- The individual annual reports for *Resource Conservation and Recovery Act* (RCRA) sites were combined into one annual report (approved October 20, 2008).
- The individual annual reports for non-RCRA sites on the NNSS were combined into one annual letter report (beginning in 2005).
- Several URs were reevaluated based on changing closure standards, and the URs were either removed or modified to reduce inspection requirements (approved December 5, 2008, and again in November 2013).
- Monitoring requirements (e.g., moisture monitoring, subsidence surveys) were lifted or reduced at several RCRA sites.
- In some cases, when multiple sites are co-located, they have been combined on a single checklist, and a combined inspection is performed.
- Rather than replacing signs when the only issue is faded text, stickers are now placed on the signs over the faded text. For example, the red “WARNING” text on the signs often fades due to its color, and it is cost effective to place a sticker over the WARNING text rather than to replace the sign.
- When signs are damaged due to wind, T-posts are replaced with heavy duty sign posts and hardware to reduce the potential for future wind damage.

A single strategy document to comprehensively and consistently evaluate and implement changes such as these, in conjunction with a single, regularly updated, consolidated Post-Closure Plan will streamline the process of continual evaluation and combine the requirements that are located in hundreds of closure documents, inspection reports, and letters into one source for future use, including potential inclusion in a future long-term stewardship program.

1.4 IMPLEMENTATION OF THE STRATEGY

The transition to the use of a single consolidated Post-Closure Plan would be performed in the following sequence of steps:

1. A consolidated Post-Closure Plan would be prepared that would include the current post-closure requirements for all use-restricted sites. This plan would be developed, reviewed, and approved in accordance with the standard FFACO document methodology. If approved, it would serve as the as the baseline of the post-closure program.
2. Once approved, the plan would be linked to every CAS that is included in the plan in the FFACO database. The document would appear in the FFACO database in an easily identifiable location, along with the links to the Closure Reports and other FFACO documents. The post-closure requirements in the approved consolidated Post-Closure Plan would supersede all previous documentation of post-closure requirements.
3. The FFACO database in the FFACO database would be updated to be consistent with the plan, and future post-closure activities and reporting would be performed in accordance with the requirements outlined in the approved plan.
4. As changes in the program are recommended based on this Post-Closure Strategy document, such as addition or deletion of URs, modifications, or streamlining of requirements, the plan would require revision. Revisions to the plan would generally be prepared annually, but could be prepared more frequently as needed. In addition, over time, revisions may be made several years apart on an as-needed basis. These revisions would also be developed, reviewed, and approved in accordance with the standard FFACO document methodology. Addendums to the Closure Reports for the sites with modified requirements would not be prepared.
5. Implementation of the consolidated program will be performed with the initial assumption that the site will continue to be under federal control in the future. All assumptions affecting the program will be documented in the comprehensive plan and will be modified in subsequent revisions if any changes to the assumptions or other long-term projections occur. Ultimately, the comprehensive plan will be designed to be readily transitioned into a long-term stewardship program should one be implemented in the future.

2.0 CONSOLIDATED POST-CLOSURE PLAN

To improve management of the post-closure sites, a single document is recommended that will include the most current post-closure requirements for all use-restricted sites. The requirements in this document will supersede the post-closure requirements in all previous documents, and any future changes to the requirements will be recorded in this document, eliminating the need for addendums to multiple Closure Reports. This document will provide a single source for post-closure requirements and will be revised as needed. Every use-restricted site (whether inspected or not) will be included in the document with the most current post-closure and reporting requirements and the basis for those requirements.

The consolidated Post-Closure Plan will also detail reporting requirements, including a summary of the most current format and content of the inspection reports. If a change is made, it will be reflected in the document along with the revised justification. Each revision of the plan will be developed, reviewed, and approved in accordance with the FFACO. Typical changes in the program that would be captured in a revised plan would include addition or deletion of sites, changes to inspection requirements, changes to the physical controls, or changes in reporting formats.

For overall program consistency, sites closed in place under the Nevada Division of Environmental Protection's Department of Conservation and Natural Resources, Bureau of Corrective Actions will be included in the plan, even though they are not covered under the FFACO and there are no current requirements other than the need to be use restricted. The plan will also summarize requirements for the closed *Resource Conservation and Recovery Act* (RCRA) sites as well as former CAUs where other monitoring is performed such as what is required under a discharge permit. In addition, the plan will include all monitoring activities whether or not it is dictated by the FFACO, including best management practices.

A conceptual outline of the plan is as follows:

1.0 Introduction

- 1.1 Purpose
- 1.2 Scope
- 1.3 Contents

2.0 Detailed Post-Closure Requirements

- 2.1 FFACO Sites on the NNSS (in order of CAU designation)
- 2.2 FFACO Sites on TTR and NTTR
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  - 2.2.2 NTTR (in order of CAU designation)
- 2.3 RCRA Sites on the NNSS
- 2.4 Other Sites
  - 2.4.1 NDEP UST and Spill Sites

3.0 Reporting Requirements

- 3.1 NNSS Non-RCRA Post-Closure Annual Report

3.0 STRATEGY FOR CONSOLIDATION, MODIFICATION, AND STREAMLINING OF POST-CLOSURE REQUIREMENTS

With an initial comprehensive Post-Closure Plan in place, the post-closure program may be managed using a single strategy for continual evaluation and improvement. This section outlines the four major categories of program improvements and the strategies to implement them. These criteria should be evaluated with the level of risk at each site in question to determine if changes should be considered. These strategies should be implemented to provide input to prepare and, over time, to update the consolidated Post-Closure Plan. Many sites may meet more than one of these criteria.

3.1 CONSOLIDATION OF INSPECTIONS AND INSPECTION DOCUMENTATION

Sites that are co-located, where multiple sites are located immediately adjacent to each other or on overlapping areas, will be evaluated to determine whether they can be inspected simultaneously and whether the inspection results can be documented on a single, combined inspection checklist. This would reduce the time required to perform inspections and complete individual checklists for each site.

Examples of sites that may meet this criterion include the following:

- Corrective Action Unit (CAU) 543, CAS 06-07-01, and CAU 92, CAS 06-04-01, are located in the same fenced area.
- CAU 137, CASs 12-08-01 and 12-23-07, and CAU 552, CAS 12-23-05, are adjacently located at G-Tunnel (U12g).

3.2 STREAMLINING OF INSPECTION REQUIREMENTS

Inspection requirements may be modified at some sites due to the location of the sites or level of accessibility at the sites. The following sections describe the criteria that will be used to evaluate and recommend modification of post-closure requirements based on these factors.

3.2.1 Sites in Remote, Low-Occupancy Areas

At sites that are not located near high-traffic areas and where there are no nearby facilities or operations, inspection requirements can be adjusted according to the level of risk, and the requirements can also be adjusted if that level of risk changes. For example, some large, remote sites are posted with UR signs around the entire perimeter of the site and there is only one practical access point. Rather than inspecting the entire perimeter of the site every year, the inspection requirement could be changed to inspection of the full perimeter every 5 years and annual verification that the signs at the access points or along access roads are intact in the intervening years. This would reduce the time required to perform inspections at the sites that meet this criterion.

Examples of sites that may meet this criterion include the following:

- CAU 372, CASs 20-23-01 and 20-45-01, are large, remote sites located in Area 20 that are rarely visited other than for post-closure inspections.

3.2.2 Sites with Access Controls

Some sites have controlled access with locked gates that are maintained by the facility owner, and several CASs may be located within the same access-controlled areas. Based on the level of risk, at sites that are located within the fenced boundaries of closed facilities, the inspection requirement could be modified to verify that the gate is secure and the perimeter fence is intact without entering the fenced area to verify the condition of each individual site. Some sites that fall into this category have UR signs on the perimeter fence. At other sites, signs could be installed on the perimeter fence. At sites where several individual CASs are located beyond a single access point with a locked gate and a single large UR sign, the inspection requirements could be modified to inspect the individual CASs beyond the gate every 5 years and inspect only the gate and large UR sign annually in the intervening years. Management and protection of secured sites such as these will be ensured through the real estate process since access is arranged through the facility owner. This would reduce the time required to perform inspections at the sites that meet this criterion.

Examples of sites that may meet this criterion include the following:

- CAU 116, CAS 25-41-05; CAU 528, CAS 25-27-03; and CAU 529, CAS 25-23-17, are located in the fenced Test Cell C compound.
- CASs in CAUs 309, 476, 478, and 559 are located behind the main T-Tunnel (U12t) access gate.

3.2.3 Historically Stable Sites

Sites that have required little, if any, repairs or maintenance over time and where the controls have proven to be adequate will be evaluated to determine if the inspection frequency can be reduced. Additionally, the level of detail in the inspections may be adjusted. For example, a full formal inspection may be performed every 5 years, and the intervening annual inspections may be either cursory or eliminated.

Examples of sites that may meet this criterion include the following:

- CAU 357, CAS 10-09-06, has not required repairs or maintenance since closure in 2005.

3.2.4 Sites in Radiologically Controlled Areas

Sites that are use restricted for radiological contaminants and where the UR coincides with radiological postings will be evaluated for modification of the inspection requirements. UR sites that are also posted radiological areas have an additional level of protection that may warrant less stringent post-closure requirements. The risk of the UR being violated at sites that are also posted radiological areas is low because radiological access requirements are sufficient to control the hazards of the site. Therefore, the risk of personnel conducting activities in these areas without proper controls is much lower than the risk at sites that are not located in posted radiological areas. Inspection frequency may be reduced at some of these sites or combined with the periodic inspections performed by the Radiological Control (RadCon) group. For example, sites that are posted as Contamination Areas are inspected by RadCon every 2 years, and an inspection of the UR signs may be integrated into these RadCon inspections. In some cases, a full formal inspection may be performed every 5 years rather than annually, using the intervening RadCon inspections as a data point.

Examples of sites that may meet this criterion include the following:

- CAU 374, CAS 18-23-01, is posted as a Contamination Area.

- CAU 375, CAS 30-45-01, is posted as a Contamination Area.

Additionally, post-closure requirements or UR boundaries may be re-evaluated and modified if there is an indication that the radiological constituents have decayed sufficiently or have migrated outside the original UR boundaries.

3.3 MODIFICATION OF MAINTENANCE AND REPAIR ACTIVITIES

Over time, maintenance trends have been observed at some sites that could be rectified either by modifying the site controls or by targeting maintenance requirements based on what is necessary to control impact to the site. The evaluation based on maintenance trends may result in decreased effort for some sites. At other sites, the evaluation may indicate additional inspection or maintenance needs. The following sections describe the criteria that will be used to evaluate and recommend modification of post-closure requirements based on these factors.

3.3.1 Configuration Modification for High-Maintenance Sites

The configuration of the site controls at some sites leads to the need for frequent maintenance and repairs. These sites will be evaluated for changes that could reduce the frequency of necessary maintenance and repairs. Some of these changes may result in a different site configuration that could greatly reduce long-term maintenance and repair efforts. For example, in areas where high winds cause frequent sign damage, the signs may be placed in a more stable configuration. At some closed landfill sites, the signs mounted on posts could be removed, and smaller signs could be placed on new or existing monuments.

Examples of sites that may meet this criterion include the following:

- CAU 5, CASs 06-15-02 and 06-15-03, have large signs mounted on posts that could be replaced with small signs attached to monuments.

Conversely, if a maintenance trend is observed where impact is being caused by natural elements such as precipitation or wind, site improvements not originally mandated by site closure may be warranted to prevent future impact. Evaluation of trends may also identify features that should be inspected that were not originally required.

3.3.2 Creation of Action Thresholds for Maintenance

The frequency of maintenance and repairs will be weighed against the urgency of performing the repairs. This could result in routine repairs not being performed within the time specified in the original closure documents if they do not affect the effective management and control of the site. At some sites, a threshold could be proposed to determine when repairs are needed. For example, if there are numerous signs at a site, there may not be an immediate need to repair or replace signs until a certain percentage of the total are damaged or missing. In addition, signs may not be repaired or replaced unless adjacent signs are not visible within a certain distance or unless the signs at the logical access points require repair.

Examples of sites that may meet this criterion include the following:

- CAU 370, CAS 04-23-01, has 92 UR signs closely spaced on a large, fenced and posted radiological area.

3.3.3 Elimination of Maintenance of Non-Essential Features

At some sites, the original post-closure requirements may have included maintenance of features that are now known to be non-essential to the effective management and control of the site. If features meeting this definition are identified, they may be excluded from future inspection and maintenance requirements. For example, some sites have legacy fencing that was not part of the closure but was included in the original inspection routine. If the fence is not adding value to the management of the site, it should not require inspection and maintenance and could be evaluated for removal.

Examples of sites that may meet this criterion include the following:

- CAU 137, CAS 07-23-02, has fencing that does not add value to the effective management of the site.

3.4 CONSOLIDATION AND STREAMLINING OF REPORTING REQUIREMENTS AND DOCUMENTATION

3.4.1 Inspection Checklists

The inspection checklists will be evaluated for modification to improve efficiency. Examples of modifications include the following:

- Combining co-located sites onto single checklists
- Adding or removing checklist items to better reflect the information needed for effective management
- Modifying the layout of the checklists
- Evaluating if continuing to include all completed checklists in the final report is necessary

3.4.2 Inspection Reports

The format and content of the inspection reports will be evaluated. For example, an annual report is currently submitted that has detail for each CAS and includes every issue noted and all maintenance performed. The report could be reorganized with a tabular list of sites that were inspected and routine maintenance that was performed. Only sites with non-routine issues such as erosion requiring repair would be discussed in the text of the report. Rather than including a written section for each CAS, the report could note in the summary that all routine maintenance was performed as required.

4.0 CONCLUSION

Establishing a streamlined approach for continual evaluation and effective management of the post-closure program will increase efficiency and simplify administration of the sites. An approved strategy for recurrent evaluation and improvement, combined with the documentation of all of the post-closure requirements in a single plan will ensure the program is effectively and efficiently managed in the future.

Upon approval of this strategy document, preparation of the consolidated Post-Closure Plan will begin. The plan will document all current post-closure requirements and will be developed, reviewed, and approved in accordance with the FFACO. The plan will then be used as a baseline when future changes are made to the program. Subsequent revisions would include modifications recommended based on this approved strategy.

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5.0 REFERENCES

Federal Facility Agreement and Consent Order, 1996 (as amended). Agreed to by the State of Nevada; the U.S. Department of Energy, Environmental Management; the U.S. Department of Defense; and the U.S. Department of Energy, Legacy Management.

Radiological Control Managers' Council, 2012. *Nevada National Security Site Radiological Control Manual,* DOE/NV/25946--801 Revision 2. March 2012. Las Vegas, NV.

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