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The Secretary of Energy
Washington, DC 20585

February 1, 2000

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DNF SAFETY BOARD

The Honorable John T. Conway
Chairman
Defense Nuclear Facilities Safety Board
625 Indiana Avenue, NW
Suite 700
Washington, D.C. 20004

Dear Mr. Chairman:

We are pleased to forward the Department of Energy implementation plan for addressing the issues raised in the Defense Nuclear Facilities Safety Board Recommendation 99-1, "Safe Storage of Pits at Pantex." Defense Nuclear Facilities Safety Board Recommendation 99-1 is consistent with the Department's focus to develop and implement improved pit storage programs.

The primary objective of this implementation plan is to expeditiously repackage pits into containers that will provide long-term, safe storage. The activities delineated in the plan are aimed at achieving that goal and provide for the development and implementation of a pit container surveillance program so the Department can monitor the AL-R8 Sealed Insert to ensure its continued quality and reliability.

Mr. Dave Beck, Deputy Assistant Secretary for Military Application and Stockpile Operations, Defense Programs, is the responsible manager for this implementation plan. He can be contacted at 202-586-4879.

Yours sincerely,

Bill Richardson

Enclosure



IMPLEMENTATION PLAN 99-1

for

**Defense Nuclear Facilities Safety Board
Recommendation 99-1**



Department of Energy
Defense Programs
Military Application and Stockpile Operations

January 27, 2000

Implementation Plan 99-1

EXECUTIVE SUMMARY

On October 12, 1999, the Department of Energy accepted Defense Nuclear Facilities Safety Board Recommendation 99-1, which addressed issues for the safe, long-term storage of pits at the Pantex Plant. The Board has been following the development of Departmental plans regarding the storage of pits over the past seven years, with frequent correspondence and communication between the Board and the Department. The Board considers, and the Department agrees, that the issues identified in Recommendation 99-1 require expeditious resolution to ensure the long-term safety of pits awaiting return to the strategic stockpile or disposition that would permanently remove plutonium from weapons use. Specifically, the Board recommended that:

- Issues regarding the compatibility of materials used on pit storage containers be settled as soon as possible;
- Action be taken to accelerate the repackaging of pits into containers designed to provide safe storage conditions;
- A container sampling program be instituted to monitor the integrity of pit storage containers and predict the need for repackaging; and
- An individual within the Department with the authority and resources to execute the actions necessary to ensure safe storage of pits be identified.

The Department has been taking actions to address these and other issues associated with the storage of pits. For example, the Department has evaluated the potential for corrosion of capscrews used in the pit storage container and has determined that a replacement capscrew is warranted. Qualification activities are in process to support replacement of the carbon steel capscrews. The new capscrews will be incorporated into the AL-R8 Sealed Insert design upon completion of qualification testing and depletion of the current inventory of carbon steel capscrews. Pit surveillance programs are being conducted and will provide supporting information. Additionally, a container surveillance program has been developed and is currently being updated to include more detailed information on the statistical basis, data collection, and how the data will be used. The container surveillance program will be implemented during the third quarter of FY 2000. Repackaging of pits into the AL-R8 Sealed Insert began in July 1999. These containers will provide the appropriate environment to help enable safe and reliable storage of pits. Efforts are being made to establish a repackaging rate that will ensure all pits are repackaged within the timeframe recommended by the design laboratories to address concerns with the current storage environment. Two double shift repackaging lines will be operational beginning in the fourth quarter of FY 2000, with an estimated repackaging rate of 200 pits per month.

The Department recognizes, however, that a concerted and integrated effort is needed to ensure that pit repackaging continues in a manner that ensures timely implementation. Therefore, the Department has designated the Deputy Assistant Secretary for Military Applications and Stockpile Operations (DASMASO) as the responsible manager for assuring the safe management of pits. This Deputy Assistant Secretary will be responsible for overall management of this implementation plan (IP).

Specific commitments, deliverables, milestones, and responsible entities associated with 99-1 recommendations are summarized in the following table:

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Commitment	Discussion	Lead Responsibility	Deliverable	Due Date
5.1.1	Incorporate a new corrosion resistant capscrew into the AL-R8 Sealed Insert design to replace the carbon steel capscrews	DOE/AAO	Final Change Order	November 30, 2000
5.2.1	Establish and sustain two double shift repackaging lines for an estimated repackaging rate of 200 pits per month.	DOE/AAO	Work Scope as defined in the Work Authorization Directive for the AL-R8 Sealed Insert Repackaging Program	March 1, 2000
5.2.2	Issue quarterly repackaging status reports	DOE/AAO	First Status Report	August 30, 2000
5.2.3	Issue Pantex Pit Management Program Plan	DOE/AAO	Plan	November 15, 2000
5.3.1	Issue Technically Justified Container Surveillance Program Plan	DOE/AAO	Plan	March 31, 2000
5.3.2	Issue annual container surveillance reports	DOE/AAO	First Annual Report	January 15, 2001

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1.0 BACKGROUND

The Defense Nuclear Facilities Safety Board (DNFSB, hereafter referred to as the Board) has transmitted written correspondence, a technical report, and most recently a formal recommendation to the Department of Energy (DOE, hereafter referred to as the Department) regarding its observations and concerns for the safe and long-term storage of pits at the Pantex Plant. Further, the Board has communicated its observations and concerns on the planning and internal Departmental Program Office coordination for accomplishing safe pit storage of all pits and subsequent shipment of surplus pits to a disposition facility. From review of Recommendation 99-1¹ and other Board correspondence, as well as the Department's own evaluation of the full body of documentation addressing the safe storage of pits, we have summarized the Board's concerns into two areas: (1) pit storage environment and (2) planning and execution. This Implementation Plan (IP) provides for the resolution of the Board's concerns and sub-recommendations contained in Recommendation 99-1.

1.1 Pit Storage Environment

The primary concern for safe pit storage stems from the Department's reliance on the pit's outer metal shell or cladding as the only barrier to prevent plutonium oxidation and release. This concern has been described in numerous documents: the DOE Plutonium Vulnerability Study,² the Board Technical Report 18,³ and the General Accounting Office (GAO) report regarding plutonium management.⁴ These reports all express concerns that pits are currently stored in AL-R8 containers, which are not hermetically sealed and would not totally contain plutonium released from a failed pit.

Since the late 1980s, most pits at the Pantex Plant have been stored in the AL-R8 container in the Zone 4 magazines. The pit storage environment is relatively humid, the container is not hermetically sealed, and a packing material (Celotex) is used that is a source of moisture and chlorides. The combination of moisture and chlorides is potentially corrosive. Because the container is unsealed, atmospheric moisture can be added by means of temperature and pressure variations. For long-term storage, an environment must be provided that will ensure the safety and reliability of the pit, similar to the environment that is present when a pit is part of a weapon assembly.

The nuclear design laboratories, Los Alamos National Laboratory (LANL) and Lawrence Livermore National Laboratory (LLNL), have expressed concern with pit storage conditions. Pit storage temperatures became a concern in 1992 when a pit undergoing removal of the high explosive experienced severe temperatures and temperature cycling, causing a rupture of the outer cladding material (this dismantlement process was unique and is no longer used). The pit storage environment became an issue in 1994 when corrosion was discovered on the outer cladding material of some pits subjected to unique conditions. In response to these issues, the nuclear design laboratories recommended to the Department, in a 1995 memorandum,⁵ that national security pits "be removed from AL-R8's as soon as possible because of a potential corrosion problem caused by moisture and chloride in the Celotex." Further, the nuclear design laboratories urged that an aggressive surveillance program be instituted if national security pits and surplus pits continue to be stored in AL-R8 containers. These concerns prompted the nuclear design laboratories to develop specifications for safe pit storage.⁶⁻¹⁰

While there is no evidence that the current storage environment poses an imminent threat to plutonium release, the Department, based on input from the nuclear design laboratories, believes it is prudent to move all pits into a more reliable environment. In 1994, the

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Department began evaluating potential solutions for safe storage of pits at the Pantex Plant. Facility-control options (such as temperature and humidity regulation) and sealed container options were both considered. It was determined that the AT-400A, a Type B transportation container that was being designed, along with facility temperature controls for selected pit types, would provide the appropriate environment for long-term storage of pits at the Pantex Plant. The AT-400A was considered a good choice as a long-term storage container, because it was a robust design and could provide safe storage for a minimum of 50 years with minimal pit surveillance. These container characteristics were compatible with the Department's plans to place both national security and surplus pits in storage indefinitely.

The AT-400A designers estimated that a repackaging rate of 200 pits per month should be attainable, with repackaging beginning in FY 1995. As this container proceeded through the design phase, many design and assembly problems surfaced. In FY 1997, with a two-year delay in the repackaging schedule, it was determined that the repackaging rate of 200 pits per month could not be attained without modifications to the process at a significant cost increase (over \$10M).¹¹

With the delays to the AT-400A repackaging program and the slower than estimated repackaging rate, Mason and Hanger Corporation (MHC), in coordination with the nuclear design laboratories, began evaluating interim measures to place the national security pits into a better environment. In April 1997, MHC presented the Department with a proposal for an interim-storage container that involved inserting a sealed containment vessel into the AL-R8. The sealed insert would separate the pit from the Celotex material in the AL-R8 container, provide an inert environment for safe pit storage, and provide for a more rapid repackaging rate. The Department endorsed this new design concept.

In August 1997, the Department assigned the AL-2100 Advanced Container Product Realization Team (PRT) to develop design criteria and assess options available for cost-effective repackaging of pits in a modified AL-R8 container. To achieve the objective of a quick and inexpensive design, the requirements were limited to a modification of the existing AL-R8 that would be appropriate for on-site transport and interim-term (20-year) storage in zones 4 and 12 at Pantex.

Bounding design criteria for the container were established using an expert-based approach and included the following attributes: (a) Pantex on-site storage and transportation only, (b) has a minimum 20-year life, (c) provides humidity control, (d) uses existing AL-R8 overpack, (e) uses the existing holding fixtures, and (f) does not preclude off-site transportability with a 10 CFR 71 certified containment vessel. In addition to these bounding criteria, testing and analysis requirements were established for criticality, shielding, thermal performance, postulated handling events, leak rate, and external fires.

In addition, the decision was made not to replace the Celotex packing material in this new design. Even though Celotex potentially promotes corrosion, it has many qualities that make it an excellent packing material. Celotex is excellent for shock absorption in the event of a drop, it has excellent thermal and fire protection properties, it is relatively lightweight, and it is relatively inexpensive. It was considered that the time required to identify an adequate replacement material would delay moving the pits into a better environment.

To find the most cost-effective and best design, three modified AL-R8 designs, conceptualized by MHC, LLNL, and Sandia National Laboratories, were evaluated. Test results indicated that all three modified AL-R8 designs met bounding criteria and testing requirements. The MHC AL-R8 Sealed Insert design was chosen as the preferred design in April 1998 because of lower life cycle cost and personnel exposure.

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While evaluating container options, the Department began evaluating whether the modified AL-R8 container could replace the AT-400A as the Pantex long-term storage container. It was determined that the vulnerable component within the modified AL-R8 designs was the sealing mechanism and that periodic replacement of the seal (o-ring or copper gasket depending upon design chosen) might be required to extend the container life. In addition, the Department evaluated impacts associated with transporting the surplus pits off-site if the Pit Disassembly and Conversion Facility (PDCF) was not located at Pantex (preferred site for PDCF was not identified until December 1998).

Repackaging of pits in the AL-R8 Sealed Insert as compared to the AT-400A is estimated to be significantly more expedient and less expensive, with a decrease in personnel radiation exposure. Further, cost evaluations for transporting pits to an off-site PDCF indicate a minimum cost savings of over \$100M when using the AL-R8 Sealed Insert and repackaging into a new shipping container like the Model FL over using the AT-400A. Personnel radiation exposure was slightly lower when compared to the AT-400A manual repackaging line and slightly higher when compared to the AT-400A mechanical repackaging line.^{11,12}

In April 1998, it was agreed that the AL-R8 Sealed Insert was an acceptable storage container to replace the AT-400A for both the national security and surplus pits.¹³ In July 1999, the Department approved the final container design and MHC began repackaging pits.

Recommendation 99-1 states that the "Board regards the use of these sealed inserts for repackaging of pits stored at Pantex to be the basis for acceptable solution during the near term. Repackaging of pits into the AL-R8 Sealed Insert should adequately solve the problems that the design laboratories identified as attached to the existing system of storage."¹

Although the Board supports the AL-R8 Sealed Insert container as a near-term solution, the Board notes that only "inspection over time will tell how long such storage can be relied on."¹ The Department agrees that a container surveillance program is crucial in demonstrating the long-term viability of the AL-R8 Sealed Insert containers for the safe storage of pits. An AL-R8 Sealed Insert container surveillance program was developed and concurred upon by the nuclear design laboratories through the AL-R8 Sealed Insert PRT in April 1999.¹⁴

The repackaging rate achieved to date remains a concern, and the Department recognizes that near-term efforts are needed to expedite this activity. Initial estimates related to steady-state packaging into the AL-R8 Sealed Insert suggest a repackaging rate on the order of 200 pits per month using two double shift repackaging lines. The following baseline operations are involved: unpackaging from an AL-R8, visual inspection of the pit, alpha contamination check of the pit and the AL-R8, digital imaging of the pit, leak test of the Sealed Insert and contained pit, and purge and helium backfill of the AL-R8 Sealed Insert. These initial estimates are the cornerstone of the Department's projection to complete the repackaging effort in approximately 5.5 years from start-up. Based on the pit quality information that they have gathered, the nuclear design laboratories concur with a repackaging rate of 200 pits per month. However, the Department has not yet attained this rate. The Department is committed to achieving and sustaining a 200 pit per month repackaging rate and, therefore, has begun efforts to optimize the process for an increased rate.

Another concern is the compatibility of materials used in the AL-R8 Sealed Insert container. The AL-R8 Sealed Insert PRT expressed concerns related to the use of carbon

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steel capscrews in an uncontrolled Celotex environment. In Recommendation 99-1, the Board also expressed similar concerns, stating that "the Celotex in the outer container may constitute a chemical threat to the sealed insert because of questions of moisture and chlorides."¹ Material compatibility concerns associated with the capscrews are recognized by the Department as being important and will be expeditiously resolved.

The Board has also raised concerns regarding the current pit surveillance program.³ The Board states that "the relatively new surveillance program for pits stored at Pantex does not appear to be sampling the pits at a rapid enough rate to characterize in a timely manner the real potential for corrosion of the stored pits." In 1993, a pit storage safety program was initiated. The evaluations performed to date have given the nuclear design laboratories and the Department a much better idea of the condition of pits stored at the Pantex Plant than was available prior to this program.

Over the last six years, the nuclear design laboratories have inspected more than 1,500 pits. Approximately 200 of the pits were reviewed through the formal surveillance program. The additional 1,300 pits were reviewed during supplemental evaluations, a special finding investigation, pit shipments from the Rocky Flats Plant to the Pantex Plant, thermal monitoring studies, and pit repackaging into the AL-R8 Sealed Insert. These evaluations include such activities as radiological swiping, visual assessment, thermal monitoring, and leak-testing. However, none of these evaluations provides the level of detail needed to assess the progression of corrosion. Future surveillance efforts will attempt to evaluate pit corrosion processes as a result of storage in the AL-R8 and verify that pit corrosion is controlled or prevented in the AL-R8 Sealed Insert.

1.2 Planning and Execution

The Department has developed several documents since 1995 that provide programmatic direction on pit storage and disposition.¹⁵⁻¹⁹ These documents and Records of Decision associated with them establish the following:

- Continue interim pit storage and increase in pit storage level from 12,000 to 20,000 pits at Pantex (Pantex Site-Wide Environmental Impact Statement [SWEIS]).
- Repackage pits stored at Pantex into sealed containers (Pantex SWEIS).
- Phase out storage of all weapons-usable pits at Rocky Flats and move pits to Pantex (Storage and Disposition [S&D] Programmatic Environmental Impact Statement [PEIS]).
- Repackage Rocky Flats pits in Pantex Zone 12, and then place pits in existing storage facilities in Zone 4, pending upgrades in Zone 12 (S&D PEIS).
- Upgrade storage facilities at Zone 12 South (to be completed by 2004) to store surplus pits currently stored at Pantex and surplus pits from Rocky Flats, pending disposition (S&D PEIS).
- Store national security pits in other upgraded facilities in Zone 12 facilities (S&D PEIS and Stockpile Stewardship and Management [SSM] PEIS).
- Disposition surplus plutonium pits at Savannah River (Surplus Plutonium Disposition [SPD] EIS).
- Implement a Component Recertification and Requalification Project at Pantex (SWEIS & SSM PEIS).

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The Department has initiated actions to accomplish many of these pit related end-states. Pits have been removed from the Rocky Flats and Savannah River Facilities, and most of the pits are stored at the Pantex Plant. A small number of pits were sent to the nuclear design laboratories. The Department has begun storage of national security pits in Building 12-116.

The Board has continued to express concerns with the Department's management of efforts toward the end-states.^{3,20} The Board states "it appears that wide-ranging issues remain to be resolved and that past DOE management of pits has focused on short-term goals without considering long-term implications." The Board also emphasized "that the continued safe storage of pits at Pantex depends heavily on DOE completing these activities in a thorough and well-considered manner."

To better document Departmental decisions and develop a program plan for pit storage at the Pantex Plant, the Department developed the Integrated Pit Storage Program Plan (IPSP).¹¹ A draft of this document was formally provided to the Board in November 1998.²¹ Although this document focused mainly on pit management at the Pantex Facility, it also discussed future pit disposition activities considered at major decision points. For example, prior to the decision to use the AL-R8 Sealed Insert, the Department took into consideration the time, cost, and personnel radiation exposure associated with the design, development, production, and repackaging of pits into a new Type B transportation container. In addition, upgrades to the Zone 4 magazines are being performed to ensure safe storage of surplus pits (see Appendix A). It was the intent of the Department to increase the scope of this document once final decisions were made regarding disposition of surplus pits. With the announcement in December 1998 that Savannah River is the preferred site for the PDCF, planning efforts have begun between Office of Defense Programs (DP) and Office of Fissile Materials Disposition (MD) to evaluate transportation options and lag-storage configurations at the PDCF. An initiative has begun to develop a complex-wide pit management plan to pull together the various pit management initiatives and enable informed planning decisions to be made on critical elements of the pit management system.

2.0 UNDERLYING CAUSES

The Department has evaluated Recommendation 99-1 to determine the underlying safety issues that resulted in a recommendation. The Department has determined the underlying cause to be the result of its inability to expeditiously develop and implement a pit management program to ensure safe and reliable pit storage. Following is the Department's assessment of the issues associated with pit management at the Pantex Plant:

- ***New Mission for the Pantex Plant.*** Prior to the closure of the Rocky Flats Environmental Technology Site (RFETS) in 1989 the Department did not have a need for a long-term pit storage container or program. Prior to 1989, pits taken from disassembled weapons were held in short-term storage in AL-R8 containers at the Pantex Plant and RFETS until the material could be reprocessed through the pit production facility at RFETS. When the RFETS was shut down in 1989, the Pantex Plant began accumulating significantly more pits than it had stored in the past, but it was anticipated that the RFETS would reopen and continue its pit production mission. In 1992, when it was decided that the RFETS would not reopen, the Department embarked upon a new mission to ensure the long-term, safe storage of pits. At this time, there was no defined long-term storage program, including storage requirements or facilities.

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- **Inadequate Planning.** Once it was determined that the RFETS would not reopen, the Department did not perform the planning and assessment necessary to fully evaluate the impacts and requirements of long-term pit storage and ultimate disposition of surplus pits. It was assumed that the pits would remain in AL-R8 containers in the Zone 4 magazines. It was not until the identification of specific environmental safety concerns that the Department recognized a need for a better storage environment. These concerns led to the Department's eventual design of the AL-R8 Sealed Insert. The Department has continued to struggle with identification of all programmatic requirements for pit management and is currently working to develop an integrated program plan.
- **Funding Constraints:** Because of competing priorities and limited resources, pit management at the Pantex Plant has not been of a sufficient priority to ensure the necessary funding to allow adequate program planning and implementation in a timely manner. The priority for this effort has been raised consistent with the Department's move toward a longer-range focus.

3.0 BASELINE ASSUMPTIONS, DECISIONS, AND PRIORITIES

The Department has made the following decisions regarding the pit repackaging program:

- All pits stored at the Pantex Plant will be repackaged into the AL-R8 Sealed Insert container. This decision is based on the current plans and schedules for pit repackaging to be completed prior to initiation of the shipping campaign to the PDCF. The Department will re-evaluate the pit repackaging program should the PDCF startup schedule be accelerated or other significant programmatic changes require pit transportation earlier than 2005.
- Two double shift repackaging lines will be established by the fourth quarter of FY 2000. This repackaging effort is projected to support a sustained estimated repackaging rate of 200 pits per month.
- The pit repackaging priority is different for the national security and the surplus pits. The national security pits are an invaluable national resource that needs to be maintained in a reusable condition. Therefore, the priority of repackaging these pits into a long-term storage environment is equal to that of weapon support activities that contribute to maintaining and certifying the stockpile as safe and reliable. The surplus pits have been determined to be excess to Departmental needs and, therefore, have a lower priority for packaging. The priority of the surplus pits will not change unless a specific safety issue is identified.
- Currently, the repackaging strategy is to repackage pits on a magazine-by-magazine basis, focusing on magazines that contain the greatest number of national security pits. This strategy will enable the Department to focus on getting the national security pits into a suitable environment, in a cost-effective manner, while limiting personnel radiation exposure. Existing weapon disassembly and pit surveillance schedules will also be incorporated in the annual repackaging plan, where practical, to reduce multiple handling of these components. This repackaging strategy would be modified if a safety issue were identified for a specific pit type.
- The Department is developing an Integrated Pit Management Plan (IPMP) to provide a Departmental vision and path forward for management of national security and surplus pits. Upon completion of the IPMP, the IP 99-1 will be re-evaluated and modified if

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the IPMP changes any of the schedules or assumptions that were made to complete this IP.

- Transfer of surplus pits to the PDCF will be in a newly designed Type B shipping container beginning in FY 2005 to support PDCF startup in FY 2006. The additional personnel radiation exposure that will occur from this effort has been analyzed and is consistent with the exposure from the AT-400A pit repackaging operation.^{11,12}

4.0 SUMMARY OF COMPLETED AND NEAR-TERM ACTIONS

The Department has been aggressively working on a number of pit management activities at the Pantex Plant over the last several years. A number of the significant activities are briefly discussed in Section 1 and are described in more detail in Appendix A. The following outlines actions that have been taken since receipt of Recommendation 99-1:

- ***AL-R8 Sealed Insert Materials Compatibility Issues.*** The Department has completed its evaluation of the outstanding compatibility issues associated with the grade 8 carbon steel capscrews in combination with the Celotex environment. Based on results of corrosion studies performed by MHC²³ and information provided by corrosion experts from the nuclear design laboratories²⁴, the Department has decided that the best path forward is to proceed with replacement of the capscrews. The AL-R8 Sealed Insert PRT has completed their preliminary evaluation regarding an appropriate replacement capscrew and provided their recommendation to the Department. The Department is in agreement that the Inconel 718 capscrew appears to be an acceptable replacement and has directed MHC to proceed with qualifying this capscrew for use in the AL-R8 Sealed Insert.^{26,27}

This action relates directly to DNFSB Recommendation 99-1, Sub-recommendation 1, and is further elaborated upon in Section 5.1.

- ***Supplemental Pit Evaluation Program.*** A supplemental pit evaluation effort is being performed on 24 pits stored at the Pantex Plant in the AL-R8 container for an extended period of time. Pit surfaces are being examined for the early onset of corrosion using an optical microscope. This effort began in August 1999 with the inspection of nine pits and is projected to be complete by the second quarter FY 2000. No safety concerns have been identified as a result of this study. A report by the nuclear design laboratories documenting this effort will be provided in the third quarter FY 2000. This study will aid the nuclear design laboratories and the Department to facilitate understanding of the impact of the past and current storage condition on pit quality.

This action is indirectly related to Recommendation 99-1, Sub-recommendation 2.

- ***Container Surveillance Program.*** To ensure container quality and reliability are sustained throughout the life of the container, MHC developed a container surveillance program.¹³ This plan was generated as part of the AL-R8 Sealed Insert PRT activity and was reviewed and concurred upon by the PRT members in April 1999. The container surveillance plan is being modified to incorporate improvements suggested by the nuclear design laboratories. More formalized information will be added regarding the statistical basis for the plan, the quantitative and qualitative analyses that will be performed, and how the results of these analyses will be used to predict future container performance.

This action relates directly to Recommendation 99-1, Sub-recommendation 3, and is further elaborated upon in Section 5.3.

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- **Responsible Manager for Assuring Safe Storage of Pits.** The Secretary has assigned the DASMASO as the responsible manager for assuring the safe management of pits. Mr. Dave Beck currently holds this position. Mr. Beck is responsible for management of all stockpile activities, including the accomplishment of the preceding three sub-recommendations. Mr. Beck will ensure that materials compatibility issues associated with the AL-R8 Sealed Insert are expeditiously resolved, pit repackaging at the Pantex Facility is provided the appropriate priority and level of funding to repackage pits in a timely fashion, and a container-surveillance program is implemented to ensure the continued integrity of the AL-R8 Sealed Insert. He has the technical knowledge to understand the importance of this program and the authority to prioritize funding relative to other DP initiatives. For surplus pits, he retains programmatic responsibility until that responsibility is transferred to the Office of Fissile Materials Disposition (MD).
- This action relates directly to Recommendation 99-1, Sub-recommendation 4, and no further action is necessary.

The following ongoing actions are not directly related to the sub-recommendations in Recommendation 99-1; however, they are related to issues discussed in the Recommendation:

- **Pantex Pit Management Plan.** MHC is updating the IPSPP based on comments received from the Board in March 1999. The current IPSPP will remain a historical document to outline decisions that the Department has made related to selection of the AL-R8 Sealed Insert container, evaluation of facilities, safety analysis documentation, etc. The updated document will support the Department's IPMP, and it will provide necessary detail to meet Pantex pit management program requirements. It will describe all work being performed at Pantex in the area of pit management, actions that need to be taken in the future, constraints of performing this work, and risks associated with not performing it. A program schedule and estimated funding requirements will be associated with this document.
- **Integrated Pit Management Plan (IPMP).** The Department is developing an IPMP to provide its vision and path forward for management of national security and surplus pits. This plan, when completed, will provide guidance on pit storage to ensure pit safety, security, and reliability. It will include all pit populations and will address storage, surveillance, transportation across the complex, and research and development relating to these activities. This plan will describe end-states for national security and surplus pits, major constraints in meeting those end-states, risks of not meeting those end-states, identification of line responsibility and accountability for each end-state, resource requirements, and schedules for executing the Departmental plans. Additionally, it will identify and coordinate ongoing initiatives related to these pit storage activities and identify existing working groups to enable better coordination across the Department in this vital area. Development of this plan will be managed by the Office of Defense Programs (DP), with participation from all Departmental organizations. It is anticipated that the final document will be approved by the Secretary of Energy and a copy will be provided to the DNFSB.
- **Formalization of DP and MD Roles and Responsibilities.** The Department is in the process of documenting the DP and the MD roles and responsibilities, including fiscal responsibilities, for future management of surplus pits. The transfer in funding responsibilities will start in FY 2001, at which time MD will assume funding

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responsibilities associated with storage of surplus pits, which includes safeguards and security, thermal monitoring, surveillance and maintenance operations.

- **Type B Transportation Container for PDCF.** The Department is in the process of determining the logistics for transferring the pits to the PDCF, which is currently planned to be operational by FY 2006. An interdepartmental working group has conducted a systems analysis study to review transportation container requirements, establish options and recommend a path forward. In FY 2000, the Department will decide on the shipping configuration that will be used to support transferring pits to the PDCF. In FY 2001, a shipping container design effort will begin with a scheduled completion by FY 2005, in time to initiate the pit shipping campaign to the PDCF. This schedule will allow sufficient time to complete the various phases required for a Type B shipping container including design, development testing, safety analysis report development, certification, fabrication, and delivery.

5.0 SAFETY ISSUE RESOLUTION

The actions defined in this section are designed to ensure that pits are managed so as to ensure their continued safety and reliability. The nuclear design laboratories have defined safe and reliable storage as storage conditions that meet specification RM257919.⁶ Specification RM257919 requires pits to be visibly clean and stored in a low moisture, helium environment, at temperatures below limits as specified in RM257945.⁷ Storage that meets these conditions will eliminate pit corrosion concerns and ensure the quality of the pit is maintained.

To meet the nuclear design laboratory storage requirements, the Department's long-term plans are to repackage all pits stored at the Pantex Plant into the AL-R8 Sealed Insert and place these containers into specified facilities. To ensure the container's continued performance and provide a sampling method to support prediction of when and how container failure will occur, the Department will implement a container surveillance program. Pit condition will continue to be assessed through the pit surveillance program.

5.1 AL-R8 Sealed Insert Materials Compatibility

Issue Description. The Celotex packaging material used in the AL-R8 Sealed Insert design provides for a source of moisture and chlorides. This combination provides an environment that can potentially accelerate corrosion of certain materials.

Sub-recommendation 1. *The remaining questions of materials compatibility affecting the possibility of chemical attack on closure of sealed inserts for AL-R8 containers to be settled expeditiously.*

Resolution Approach. During development of the AL-R8 Sealed Insert, corrosion experts from the nuclear design laboratories were requested to review the container design for materials compatibility issues. The grade 8 zinc-plated carbon steel capscrews, 304L stainless steel inner containment vessel (Sealed Insert), the copper gasket, and the carbon steel AL-R8 drum were evaluated.²² It is the opinion of the corrosion experts that corrosion of the Sealed Insert and the gasket in the Celotex environment will not be an issue because of the slow rate of corrosion of these materials. The AL-R8 drum is not expected to be affected by the Celotex environment in the near-term as a result of a phenolic, phosphate coating that is applied to the inside of the drum. This coating has a projected life of approximately 20 years. It is anticipated that the AL-R8 drums may need to be replaced during life-extension maintenance activities (copper seal replacement) in 30 years.

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A potential materials compatibility issue was identified regarding the grade 8 zinc-plated carbon steel capscrews that secure the flange on the Sealed Insert. To better quantify this concern, MHC performed a number of corrosion studies.²³ MHC analysis suggests that the capscrews will not corrode appreciably during the expected container life. However, corrosion experts from the nuclear design laboratories feel that the MHC studies and data analysis were somewhat limited and did not take into account the effects of potential pitting corrosion. The experts would require additional testing and more in-depth analysis of the data before they could endorse long-term use of the carbon steel capscrews.^{24,25} The Department has decided that further testing and analysis are not cost effective and has directed MHC to implement a replacement capscrew that is compatible with the AL-R8 Sealed Insert environment.^{26,27}

MHC has evaluated various replacement capscrews of a similar or higher quality than the current grade 8 zinc-plated carbon steel capscrews.²⁸ The recommended replacement capscrew is made of Inconel 718 alloy. MHC is in the process of qualifying the Inconel 718 capscrew for use in the AL-R8 Sealed Insert. New capscrews are scheduled to be incorporated into the AL-R8 Sealed Insert design as soon as they are qualified and the current carbon steel capscrew inventory is depleted.

It is anticipated that upon implementation of the new capscrew, approximately 1,800 containers will have the grade 8 zinc-plated carbon steel capscrews. The capscrews in these containers will be monitored for corrosion through the surveillance program. Should corrosion be found on these capscrews that is significant enough to jeopardize the container seal, carbon steel capscrews on all remaining containers will be replaced. Containers returned to storage after surveillance will have the new replacement capscrews installed.

The Department has also tasked LLNL to complete its evaluation of Celotex replacement materials. LLNL is evaluating three replacement materials: cork, foam, and Celotex coated with a silicone material. The evaluation will include testing the replacement material to AL-R8 Sealed Insert acceptance test requirements. LLNL will document the results of this evaluation, including an outline of the testing that was performed, analysis of the results, and a recommendation if a suitable replacement is identified. The Department does not intend to replace the Celotex material unless other container corrosion issues associated with Celotex are identified in the future. However, completion of this effort is important to have a replacement material available for future use or for use in new container designs.

Deliverables and Milestones. To resolve the AL-R8 Sealed Insert materials compatibility issue, the Department will perform the actions outlined in Table 5.1.

Table 5.1. Deliverables and Milestones for Sub-recommendation 1

Commitment	Discussion	Lead Responsibility	Deliverable	Due Date
5.1.1	Incorporate a new corrosion resistant capscrew into the AL-R8 Sealed Insert design to replace the carbon steel capscrews	DOE/AAO	Final Change Order	November 30, 2000

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5.2 Pit Repackaging Rate

Issue Description. Long-term storage of pits in the AL-R8 is an unacceptable storage strategy. To date, repackaging rates have not met expectations. Because of upgrades occurring in Building 12-64, operations were relocated to Building 12-99; however, because of competing priorities, the Department was only able to install one double shift repackaging line. In addition, repackaging in this facility has remained below the baseline rate because of limited staging capacity and as a result of leak-checking requirements for pits stored in the Model FL and slower unpackaging rate for this container.

Sub-recommendation 2. Action be taken to accelerate the repackaging of pits into containers suited to safe storage for the near term.

Resolution Approach. Repackaging the pits in the AL-R8 Sealed Insert will place the pits in an acceptable environment for safe, long-term storage. Upon completion of the Building 12-64 upgrades, MHC will operate two double shift repackaging lines. Upon completion of repackaging the approximately 200 pits from the Model FL container, estimated to be complete by June 2000, it is anticipated that a baseline repackaging rate of 200 pits per month will be achieved. The two double shift repackaging lines will be sustained throughout the repackaging program.

Some of the known risks associated with achieving and maintaining the 200 pit per month rate include the following: delay in the relocation of the program back into Building 12-64, availability of necessary equipment and facilities (pit cleaning station, development of the AL-R8 Sealed Insert 2040 container, upgrades to Building 12-116), shutdown of operations for maintenance, maintenance of an adequate work force, and changes to the baseline repackaging process (pit tube bending, pit cleaning, current pit storage configurations, and pit leak checking).

To optimize the repackaging process and facility utilization, MHC will commence a productivity study once Building 12-64 is functioning at full baseline capacity. The intent of the study will be to maximize the packaging rate, while reducing operator radiation exposure, cost, and process time.

In support of the Departmental IPMP, MHC is developing a Pantex pit management program plan. It will describe all work that is being performed at Pantex in the area of pit management, actions that need to be taken in the future, constraints of performing this work, and risks associated with not performing it. A program schedule and estimated funding requirements will be associated with this document.

MHC will provide a quarterly status report to the Department that summarizes the pit repackaging activities. This report is due from MHC to the Department on January 15, April 15, July 15 and October 15 each year that repackaging is occurring. A copy of the first status report will be provided to the Board on August 30, 2000, as a commitment in this IP. Subsequent status reports will be provided to the Board.

Deliverables and Milestones: To resolve the pit repackaging rate issue, the Department will perform the actions outlined in Table 5.2.

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Table 5.2. Deliverables and Milestones for Sub-recommendation 2

Commitment	Discussion	Lead Responsibility	Deliverable	Due Date
5.2.1	Establish and sustain two double shift repackaging lines for an estimated repackaging rate of 200 pits per month.	DOE/AAO	Work Scope as defined in Work Authorization Directive for AL-R8 Sealed Insert Repackaging Program	March 1, 2000
5.2.2	Issue quarterly repackaging status reports	DOE/AAO	First Status Report	August 30, 2000
5.2.3	Issue Pantex Pit Management Program Plan	DOE/AAO	Plan	November 15, 2000

5.3 Container Surveillance Program

Issue Description. The MHC container surveillance plan needs to be revised to include sufficient detail to ensure that the technical basis can defensively predict container quality and reliability.

Sub-recommendation 3. *A system of statistical sampling for continued integrity of containers and their sealed inserts for repackaged pits be put into effect be suited to forecasting the horizon for need for further repackaging.*

Resolution Approach. The container surveillance plan has been modified to provide more formalized information regarding the statistical basis for the plan, an outline of the quantitative and qualitative analyses that will be performed, and an explanation of how the results of these analyses will be used to predict future container performance.

The sample size and techniques are designed to provide a yearly reliability of 95 percent with a 99 percent confidence. Each year, the results from the previous year will be combined with the results from the current year, providing for a surveillance program that has a 99 percent confidence level with a 99 percent reliability, after a five-year sampling period. This surveillance program will provide the Department with the appropriate level of assurance that container defects will be identified prior to any significant compromise to the pit storage environment. Upon concurrence by the AL-R8 Sealed Insert PRT members, the revised container surveillance plan will be entered into a formal configuration management system to formally control changes.

MHC will provide a report to the Department by November 30 of each year that documents the results of container surveillance activities performed the previous Fiscal Year. A copy of the first annual report will be provided to the Board on January 15, 2001, as a commitment in this IP. In subsequent years a copy of the report will be provided to the Board.

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Deliverables and Milestones. To resolve the issue associated with the AL-R8 Sealed Insert Container Surveillance Program the Department will perform the actions as outlined in Table 5.3.

Table 5.3. Deliverables and Milestones for Sub-recommendation 3

Commitment	Discussion	Lead Responsibility	Deliverable	Due Date
5.3.1	Issue technically justified Container Surveillance Program Plan	DOE/AAO	Plan	March 31, 2000
5.3.2	Issue annual container surveillance reports	DOE/AAO	First Annual Report	January 15, 2001

6.0 ORGANIZATION AND MANAGEMENT

6.1 Organization

As the responsible manager for assuring the safe storage of pits, the DASMASO has been designated by the Department as the responsible manager for development and execution of IP 99-1. The DASMASO has overall responsibility for all pit management activities and leads the inter-office coordination activities between DP and MD that establishes roles, responsibilities and accountability relating to all activities relating to the transfer of surplus pits from DP to MD. (Although the Department has been directed to reorganize the national security segment in FY 2000, it is not expected that the DP-20 responsibilities will be significantly changed.) The DASMASO has assigned the Director, Office of Stockpile Support, as the technical lead for Recommendation 99-1 and relies on both the DOE's Albuquerque Operations Office (AL) and Amarillo Area Office (AAO) and for coordination and daily management of the IP 99-1 activities. Specifically, the:

Assistant Manager, Office of Technology and Site Program, DOE/AL

- Coordinates IP 99-1 development and directs implementation of program elements that support IP 99-1 commitments.

Area Manager, DOE/AAO

- Manages actions associated with site operations and execution of commitments outlined in IP 99-1.

Mason and Hanger Corporation

- Management and Operating Contractor with line management responsibility for safe pit storage and executing programmatic direction provided by the Department.

Lawrence Livermore National Laboratory and Los Alamos National Laboratory

- Provide technical guidance and support to the Department regarding pit quality and pit storage requirements.

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6.2 Change Control

Complex, long-range plans require sufficient flexibility to accommodate changes in commitments, actions, or completion dates that may be necessary because of additional information (completion of studies), improvements, or changes in baseline assumptions. The Department's policy is to:

- (1) Notify the Board if any deliverables within this plan cannot be achieved as a result of funding limitations.
- (2) Bring to the Board's attention any substantive changes to IP 99-1 as soon as identified and before the established milestone date is reached;
- (3) Have the Secretary approve revisions to the scope and schedule of plan commitments that result in the plan not resolving the identified safety issues within one year of the issuance of the plan; and
- (4) Clearly identify and describe the revisions and bases for those revisions.

Fundamental changes to the plan's strategy, scope, or schedule will be provided to the Board through formal revision of IP 99-1. Other changes to the scope or schedule of planned commitments, as well as the basis for the changes and appropriate corrective actions, will be formally submitted in correspondence approved by the Secretary.

6.3 Reporting

To ensure that all Departmental implementing elements and the Board remain informed of the status of plan implementation, the Department's policy is to provide periodic progress reports until all IP 99-1 commitments are completed. For this plan, the Department will provide reports or briefings on the status of commitment actions to the Board and/or its staff within one month of completion of each quarter (quarters ending in March, June, September, and December). The DASMASO Management will be responsible for issuing reports and conducting briefings. The frequency of reports and briefings may be revised pursuant to mutual agreement between the Department and the Board.

7.0 ATTACHMENTS

7.1 Glossary

Bolt, capscrew – fasteners used in the closing mechanism of containers. While the term "bolt" has been used in most of the correspondence on the storage environment of pits, the term "capscrew" is more precise and is used in this IP. The current capscrew is galvanized (Zn/Cr plated) carbon steel and the planned replacement is an Inconel 718 stainless steel.

Celotex – ligno-cellulosic fiberboard used in packaging, manufactured by the Celotex Corporation. Celotex is used primarily as a spacing structure but also has desirable thermal, fire-resistant, neutron-absorbing, and shock-absorbing properties, as well as being relatively inexpensive.

Container – the drum-type device and primary component of packaging used to store and/or ship nuclear materials. In this IP, reference is made to the following types of containers and packaging components:

AL-R8 – a container currently used for storing pits at the Pantex Plant. It does not provide an inert storage environment.

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Sealed insert – a packaging component designed to fit inside the AL-R8 container and to provide an inert storage environment for pits.

FL – the only container currently certified by the Department to ship pits. Some of the pits recently shipped from Rocky Flats to the Pantex Plant are currently stored in this container. There are fewer than 300 in service, and the current certification does not allow new FL containers to be procured.

AT-400A – a container designed in the 1990s to store and transport pits. The Department decided to discontinue procurement of this container due to cost and operational considerations.

Pit – component of nuclear weapons containing fissionable material. National security pits are those pits that will be retained indefinitely for use in the weapons stockpile; surplus pits are those pits that are excess to Departmental needs and will be dispositioned in the future. Storage concerns are the same for both pit types; providing a storage environment that will ensure the reliability of the national security pits will in turn provide safe storage to the surplus pits.

10 CFR 71 (Title 10 of the Code of Federal Regulations, Part 71) – The Nuclear Regulatory Commission regulations that establish the requirements for packaging, preparing for shipment, and transportation of licensed material and that establish the procedures and standards for approving packaging and shipping procedures for fissile material. As a matter of policy, the Department approves packages intended for the transportation of pits in accordance with these regulations.

7.2 Acronyms and Abbreviations

AAO	Amarillo Area Office
AL	Albuquerque Operations Office
DASMASO	Deputy Assistant Secretary for Military Applications and Stockpile Operations
DNFSB	Defense Nuclear Facilities Safety Board (or Board)
DOE	Department of Energy (or Department)
DP	Office of Defense Programs
EIS	Environmental Impact Statement
FY	Fiscal Year
GAO	General Accounting Office
IP	Implementation Plan
IPMP	Integrated Pit Management Plan
IPSP	Integrated Pit Storage Program Plan
LANL	Los Alamos National Laboratory
LLNL	Lawrence Livermore National Laboratory
MD	Office of Fissile Materials Disposition
MHC	Mason and Hanger Corporation

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PDCF	Pit Disassembly and Conversion Facility
PEIS	Programmatic Environmental Impact Statement
PRT	Product Realization Team
RFETS	Rocky Flats Environmental Technology Site
ROD	Record of Decision
S&D	Storage and Disposition
SPD	Surplus Plutonium Disposition
SSM	Stockpile Stewardship and Management
SWEIS	Site-Wide Environmental Impact Statement

7.3 References

1. *Defense Nuclear Facilities Safety Board Recommendation 99-1 to the Secretary of Energy*, August 11, 1999.
2. **DOE/EH-0145**, *Plutonium Working Group Report on Environmental, Safety and Health Vulnerabilities Associated with the Department's Plutonium Storage*, November 1994.
3. **DNFSB/TECH-18**, *Review of the Safety of Storing Plutonium Pits at the Pantex Plant*, November 25, 1997.
4. **GAO/RCED-98-68**, *Department of Energy – Problems and Progress in Managing Plutonium*, April 1998.
5. Memorandum, LLNL (J. Dow) and LANL (L. Salazar) to DOE/AL (H. Season), "Storage Facility Environmental Requirements for Pits and CSAs," August 22, 1995.
6. **RM257919**, *Specifications for Storage of LANL and LLNL Pits in the AL-R8 Sealed Insert (U)*, Lawrence Livermore National Laboratory and Los Alamos National Laboratory, April 30, 1999.
7. **RM257945**, *AL-R8 Pit Matrix Requirements (U)*, Lawrence Livermore National Laboratory and Los Alamos National Laboratory, April 30, 1999.
8. **RM257948**, *Joint Pit Cleaning Specifications (U)*, Lawrence Livermore National Laboratory and Los Alamos National Laboratory, June 26, 1998.
9. **RM257445**, *Specifications for LLNL Pit Surveillance Sampling (U)*, Lawrence Livermore National Laboratory, July 10, 1997.
10. **2Y59408**, *Evaluation of Los Alamos Pits at Pantex*, Los Alamos National Laboratory, January 2, 1997.
11. *Integrated Pit Storage Program Plan, Revision Draft 1.0*, DOE/AL, October 1998.
12. Memorandum, DOE/AL (Sena) to DOE/MD (Stevenson), "National Environmental Impact Statement (NEPA) Input for Storage and Disposition Programmatic Environmental Impact Statement (PEIS) Supplemental Analysis," February 18, 1999.
13. Memorandum, DOE/AL (Whiteman) to Distribution, "April 24, 1998, Pit Storage Container Decision Meeting Documentation," May 21, 1998.
14. **RPT-MIS-238533**, *Pit Container Surveillance Plan*, Mason and Hanger Corporation, April 12, 1999.

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15. **DOE/DP-0137**, *Plutonium: The First 50 Years*, February 1996.
16. **DOE/EIS-0225**, *Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components*, November 1996.
17. **DOE/EIS-0229**, *Storage and Disposition of Weapons-Usable Fissile Materials Final Programmatic Environmental Impact Statement*, December 1996.
18. **DOE/EIS-0236**, *Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management*, September 1996.
19. **DOE/EIS-0283**, *Surplus Plutonium Disposition Final Environmental Impact Statement*, November 1999.
20. Letter, DNFSB (J. Conway) to DOE/DP (V. Reis), transmittal of DNFSB staff issue report on the Integrated Pit Storage Program Plan, March 12, 1999.
21. Letter, DOE/DP (G. Ives) to DNFSB (J. Conway), transmittal of Integrated Pit Storage Plan, November 6, 1998.
22. Memorandum, LANL (Lillard) to DOE/AL (Arp), "Request for Position on the Susceptibility of the AL-R8 SI and Pit Cladding Material to Corrosion," November 15, 1999.
23. *Oxidation of Galvanized Grade 8, Carbon Steel Bolts Used In Sealed Insert (SI) Container*, Mason and Hanger Corporation and Lawrence Livermore National Laboratory, November 1999.
24. Memorandum, LANL (Garcia) to AL-R8 SI Product Realization Team, transmittal of AL-R8 SI Bolt Recommendation, October 29, 1999.
25. Memorandum, LANL (Lillard) to DOE/AL (Arp), "Corrosion of the Zn/Cr Conversion Coated Carbon Steel Bolts Proposed for the ALR-8/SI," November 23, 1999.
26. Memorandum, DOE/DP (Beck) to DOE/AL (Glass), "Pit Storage Container Sealed Insert Capscrew Replacement," December 7, 1999.
27. Memorandum, DOE/AL (Whiteman) to DOE/AAO (Glenn), "Bolt Replacement on AL-R8 Sealed Insert," December 22, 1999.
28. **PXAT-99-01**, *AL-R8 Sealed Insert Container Fastener Replacement Material Evaluation Report*, Mason and Hanger Corporation, November 1999.

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Appendix A Pantex Pit Management Program Initiatives

This appendix outlines actions that have been taken over the last several years to resolve pit management and storage concerns at the Pantex Plant.

- ***Design/Development of AL-R8 Sealed Insert Container.*** The Department has completed the design and development effort on the AL-R8 Sealed Insert container, which will provide a sealed environment for long-term storage of pits at the Pantex Plant. This container was designed to meet the pit storage specification RM257919. MHC led the development of the AL-R8 Sealed Insert container using a PRT process. A key element of this process is the utilization of multidisciplinary teams that are tasked with early identification and resolution of cost, schedule, technical performance, and manufacturability issues. PRTs were established for the AL-R8 Sealed Insert container, AL-R8 Sealed Insert Purge and Backfill Station, and Pit Imaging Station. MHC acted as the Team Leader, and representatives from the Design Agencies served as Team Members. Representatives from DOE/AL, DOE/AAO, and DP-45 participated as ad hoc members.

The PRT established design requirements for the AL-R8 Sealed Insert container by choosing requirements that would be applicable for on-site storage and transportation from off-site transportation regulations (10 CFR 71) using an expert based approach because there is not an approved DOE Directive that provides these requirements. Testing and analyses were performed on the AL-R8 Sealed Insert container in the following areas: (a) thermal characterization, (b) 6-foot bare container drop, (c) 20-foot pallet drop, (d) bare container puncture, (e) vibration survivability, (f) fire survivability, (h) material compatibility, (i) seal maintainability/gas leak resistance, and (j) criticality/shielding analysis. The results of the MHC acceptance testing relative to the derived criteria were documented in an on-site container approval document and approved by the DOE/AAO in July 1999. The container was conditionally approved for use by the PRT. Conditions of the approval were associated with performing an additional drop test with a carbon steel fixture and resolution of the compatibility issues associated with the capscrew and Celotex. The process will also require about one third of the surplus pits to be taken out of the current "bird cages" and put into new shippable "bird cages" because this process is not part of the current repackaging program.

This action is directly related to Recommendation 99-1, Sub-recommendation 1. The PRT members brought the appropriate technical expertise into the design process in order to evaluate the design and qualification requirements from a variety of technical aspects, including materials compatibility. The PRT members are responsible for raising concerns regarding the compatibility of the grade 8 carbon steel capscrews in the Celotex environment. The PRT does not, at this time, have any additional concerns regarding materials compatibility in the container design.

- ***Pit Surveillance and Evaluation Programs.*** In 1993, the nuclear design laboratories initiated a pit staging safety surveillance program. This program was initiated to better understand pit integrity and to ensure that pits stored at the Pantex Plant are safe. The program surveyed 10 pits the first year, 20 pits the second year, and 30 pits each year thereafter. Of the 30 pits sampled per-year, full nondestructive analysis is performed on 20 of the pits, and the other 10 are visually examined and checked for alpha contamination. The nondestructive analysis includes visual examination, alpha swipe, radiography, mass determination, a check for leak tightness, and, when appropriate, gas analysis. Four of these pits are selected per year for destructive analysis. The pit types selected are varied in order to sample various types of cladding, alloys of plutonium, design features, and storage locations. All pits are sampled and analyzed in accordance with nuclear design laboratory guidance. The basis for the sampling

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rationale is to ensure a timely review of critical pit features in various storage environments. In addition to the pits that are evaluated through the formal surveillance program, a number of pits have been inspected as a result of other programs and studies, such as the pit consolidation program, significant finding investigation, pit repackaging program, and thermal working group efforts.

Since 1993, more than 1,500 pits have been visually inspected and swiped for alpha contamination. Of these 1,500 pits, more than 800 pits have been checked for leak tightness.

In these evaluations, there have been three types of concerns. The first concern is a result of corrosion that was identified on a pit from a specific weapon system that was subjected to unique conditions while in the stockpile. An extensive investigation of this pit type was further performed to determine the extent of the corrosion. All pits of this type stored at the Pantex Plant were evaluated by performing visual examinations and alpha swipes. It was determined that a small number of pits from this specific weapon system have corrosion. The majority of the corrosion is associated with the storage environment that the pit experienced while in the stockpile. It has not been determined if the corrosion has worsened during storage at the Pantex Plant. The Department is working with LANL and MHC to get these pits transferred to LANL for disassembly.

The second concern was identified as a result of performing leak tightness checks in which a small number of pits were found with leak rates that are greater than the rates that were observed at production. These leaks have not resulted in any alpha contamination. Investigations of this issue are ongoing.

The third concern involves damaged pit tubes, which have resulted in small leaks around the tubes. It is believed that this damage is from improper handling. An investigation is ongoing to determine the specific cause of this concern so that it can be prevented in the future. These pits will be transferred to LANL for disassembly.

During pit repackaging, 100 percent of all pits are visually inspected, swiped for alpha contamination, and checked for leak tightness. Digital images of the pits are taken as part of the pit repackaging program to document the condition of the pit at the time of repack. The nuclear design laboratories will evaluate the images during the repackaging program. Pits will be further evaluated if an image indicates the presence of corrosion or other nonconformances. The pit images will also be used during the surveillance program to evaluate the condition of the pit at time of repack as compared to its condition at the time of surveillance. Information gathered during the pit repackaging program will provide further evidence regarding the condition of pits in storage at the Pantex Plant and will aid the Department in assessing future pit repackaging rates.

This action is indirectly related to Recommendation 99-1, Sub-recommendation 2.

- **Building 12-116.** Building 12-116 has been selected as the permanent storage facility for the national security pits. Phase I modifications have been completed, and operations are currently being conducted to perform manual stage-right storage of these pits, storage of tritium reservoirs, and radiography.

MHC has also completed thermal testing in Room 120 to determine the effects from loss of air conditioning. The results of these tests show that in the event that air conditioning is lost, the temperature rise in the building is slow enough that corrective action (chiller maintenance or removal of pits) can be implemented without concern of exceeding pit storage thermal requirements. Additional thermal testing will be performed as other rooms are loaded in this building.

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To complete loading of 12-116 magazines, a number of actions must be completed. Phase II modifications are planned to be completed in the second quarter FY 2000. However, under the current Pantex budget allocation, there is no funding to complete this work. In addition, there is no funding in FY 2000 to complete the Sandia Automated Guided Vehicle guidance control system. Delay in Phase II physical modifications may result in some national security pits being temporarily stored in Zone 4.

- **Zone 4 Magazines.** The majority of pits located at the Pantex Plant are currently stored in the Zone 4 magazines. As the pits are repackaged into the AL-R8 sealed insert containers, they will be separated - the national security pits will be placed in Building 12-116 for long-term storage, and the Department is considering storing surplus pits in Zone 4 until they are shipped to the Savannah River Site for disposition¹.

The Department made a decision in January 1997² to use Building 12-66 for the storage of surplus pits pending disposition. A subsequent analysis determined that pit storage in Building 12-66 provided no net safety advantage over storage in Zone 4 and keeping the pits in Zone 4 could provide financial and programmatic advantages. Two actions are required to implement this determination. First the thermal effects of storing the various surplus pit types in a AL-R8 SI container in Zone 4 magazines must be determined. Second, the potential environmental impact of this proposed action must be analyzed prior to making a final decision.

Recent prototype thermal testing using the AL-R8 SI container suggests that passive cooling of the surplus pits in Zone 4 magazines is sufficient protection. It was originally thought that active cooling (air conditioning) would be required and some magazines were modified with one-through air conditioning units. To validate this proposal, the Department will perform a thermal study using pits in AL-R8 SI containers stored in the "stage right" configuration. The study will begin in May 2000 and conclude in October 2000.

The Department expects to complete a National Environmental Policy Act (NEPA) review of the potential impacts of storing surplus pits in Zone 4 by March 2000. The review will be a supplemental analysis to the Storage and Disposition (S&D) Programmatic Environmental Impact Statement (PEIS). If the impacts are "bounded" by the analysis in the S&D PEIS an amended Record of Decision could be issued in March. However, if the impacts are not bounded, a Supplement to the PEIS will have to be issued for public review in accordance with NEPA, a process that could take six months. Both active and passive cooling alternatives are being analyzed in the supplemental analysis. No decision will be made on which cooling alternative will be used until the thermal testing study is completed in October 2000.

Until the above decision is made the Department will continue to store surplus pits in Zone 4. However, minor modifications to the Zone 4 magazines will be made in accordance with the Zone 4 Upgrade Project Plan.⁶

The decision to use the AL-R8 SI container, vice the AT-400A container, and the decision to disposition the surplus pits at the Savannah River Site has created the requirement for the development, certification and manufacture of a new shipping container for pits. The new shipping container will affect the Pantex Pit Management Program by requiring the removal of the pit from the AL-R8 SI, and insertion of the pit into the new shipping container. The process will all require about one third of the surplus pits to be taken out of the current "bird-cages" and put into new "bird-cages" because this process is not part of the current repackaging program. The need for a new pit shipping container was recognized and discussed in the Surplus Plutonium Disposition EIS.

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Appendix A References

1. **DOE/EIS-0283**, *Record of Decision on Surplus Plutonium Disposition Environmental Impact Statement*, January 4, 2000.
2. **DOE/EIS-0229**, *Record of Decision on the Storage and Disposition of Weapons Usable Fissile Materials Programmatic Environmental Impact Statement*, January 1997
3. Memorandum, LANL (through D. Varley) to DOE/AL (A. Whiteman), "Excess Pit Long Term Storage Requirements," May 24, 1999.
4. Memorandum, LLNL (J. Dow) to DOE/AL (A. Whiteman), "Long term pit issues," June 21, 1999.
5. Memorandum, LLNL (J. Dow) to DOE/AL (A. Whiteman), Long-term Pit Storage Concerns, June 17, 1999.
6. *DOE/AL Pantex Plant Zone 4 Storage Upgrades Project Plan, Issue A*, DOE/AL, dated July 15, 1999.