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SUPPLEMENT ANALYSIS FOR:

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CONTINUED OPERATION OF THE PANTEX PLANT AND ASSOCIATED STORAGE OF NUCLEAR WEAPON COMPONENTS - AL-R8 SEALED INSERT CONTAINER

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SUMMARY

Recently, the Department of Energy (DOE AAO and AL) evaluated the rate at which pits could be repackaged. An analysis, "Preliminary Systems Engineering Analysis of Pit Storage Container Issues for the Pantex Plant," was performed to assist in assessing whether the pits should be packaged in the AT-400A container, a modified AL-R8 container, or some combination of the two containers. Both the AT-400A container and the modified AL-R8 container (or AL-R8 Sealed Insert [SI] container) comply with the latest pit storage specifications to provide an improved storage environment for the pits, and would be considered feasible solutions to long-term pit storage at the Pantex Plant.

DOE has analyzed these issues in this Supplement Analysis (SA) and has concluded that neither a supplemental *Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components* (EIS) to address the use of the AL-R8 SI in the pit repackaging program, nor a new EIS or further NEPA documentation is required. The container specifications were addressed and considered in the approved EIS, and the AL-R8 SI meets these specifications.

INTRODUCTION

Purpose of this Document

This SA is submitted according to the requirements for determining the need for supplemental EISs (10 CFR 1021.314) in DOE's regulations for NEPA implementation. The analysis shall discuss the circumstances that are pertinent to deciding whether or not to prepare a supplemental EIS for the *Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components*. This SA specifically addresses the issue of another type of container for the pit repackaging program.

EIS Background

The EIS was approved in November 1996. At the time the EIS was published, the pits removed from weapons were packaged in AL-R8 storage containers. These containers were previously used for both onsite and offsite transportation and storage. DOE discontinued their use for offsite transportation, and the containers were then used solely for interim storage of pits and onsite transportation. The EIS stated that the AT-400A was in the development and testing stage for use in onsite and offsite transportation and long-term storage.

Appendix F of the EIS, "Transportation Risk Analysis," stated that Pantex Plant uses many different containers for packaging of nuclear explosives, explosives and explosive components, and radioactive materials. Specifications for containers used during offsite transportation of radioactive materials are contained in 10 CFR 71. The EIS listed examples of packaging guidelines for shipment of radioactive material within the DOE complex which would apply to any container considered for pit packaging at Pantex. Appendix F also contained descriptions of the AL-R8 and AT-400A containers. Appendix F

stated that "the (AT-400A) container is expected to replace the AL-R8 for pit staging at Pantex Plant and be the primary container for offsite shipments."

Appendix F stated that the FL-Type Container was the only certified container used for pit transport. The container description with Celotex insulation was included and a diagram was furnished. The FL container is currently used for transporting pits from Pantex Plant to and between DOE sites such as Los Alamos National Laboratory (LANL) and Rocky Flats Environmental Technology. The accident dispersal risk assessment for pit shipments was performed and was based on the performance characteristics of the FL container, not the AT-400A container or the AL-R8 container.

Table 1 identifies the comparison of environmental issues and EIS bounding conditions.

Recent Issues Related to the Pit Repackaging Program

In 1997, the DOE decided to evaluate whether modification of the AL-R8 container would be feasible to address the storage requirements of pits at the Pantex Plant in a timely and cost-effective manner. The proposed modified container would comply with the latest pit storage specifications to provide an improved storage environment for the pits, and would also be considered a feasible solution for long-term pit storage at the Pantex Plant.

A systems analysis was performed to evaluate activities related to the pit storage process with respect to requirements, specifications, and programmatic and site considerations. The preliminary analysis focused on issues related to storage container selection. A full analysis was performed to assist in assessing whether the Pantex pits should be repackaged into the AT-400A container, various modifications to the AL-R8 container, some combination of the two containers, or another type of container.

From several design options, DOE selected three container designs for further development: the Pantex SI, the LLNL C-Container, and the Sandia Sealed Drum. In addition, the AT-400A long-term pit storage and onsite and offsite transportation container design was evaluated as an option for comparison with the other designs. This option was designed to the more stringent 10 CFR 71 Type B onsite and offsite transportation requirements and for long-term (50 years) storage. Two of the options were eliminated because they differed from the basic design concept of upgrading the existing AL-R8 container and fixture without the advantage of being an existing qualified design like the AT-400A. They required new pit fixtures and/or did not use the existing AL-R8 drum as a storage and handling configuration. This would have resulted in a significant time delay and was not considered feasible.

From preliminary experiments, it is evident that the AL-R8 SI provides a better thermal environment than the AL-R8 container. The thermal buffer (12°F) is valuable for all pits in storage. The AL-R8 SI provides an additional barrier for heat transfer and conductivity of at least 10°F. The backfill gas improves it further by approximately another 8°F.

Comparisons of the AL-R8 SI and the AT-400A

Comparisons of the AL-R8 SI and the AT-400A containers have been made, and the AL-R8 SI compares favorably to the AT-400A. For example:

- Treaty verification measurements can be performed on the AL-R8 SI container without removing the container from the Stage Right storage positions.
- The AL-R8 SI container is reusable after physical/visual pit inspection; the AT-400A containment vessel (CV) must be destroyed after physical/visual pit inspection.

- The AT-400A meets the design specifications to satisfy 50-year Pantex storage criteria; the AL-R8 SI meets the design specifications to satisfy up to 30 years of Pantex storage criteria. It is expected that the seal replacement could extend the container storage life up to 30 additional years since the initial AL-R8 design specifications satisfy up to 30 years of Pantex storage criteria.

- Pit repackaging operations for the AL-R8 SI container are similar to packaging operations for the FL transportation container. The AL-R8 SI container satisfies all major requirements and is compatible with other systems at Pantex.

- The repackaging effort could possibly be completed six years earlier using the AL-R8 SI instead of using the AT-400A.

- The available information indicates that there are no negative characteristics of the AL-R8 SI in comparison with the AT-400A.

- The AT-400A container is currently only designed for one pit type while the AL-R8 SI can be designed to handle multiple pit types.

Table 2 demonstrates comparisons of the specific characteristics of the AT-400A and the AL-R8 SI.

Occupational Radiation Dose Information

From a radiation dose perspective, the AL-R8 SI process provides for reduced overall processing time and no bare pit handling, except when more extensive pit cleaning is required, which would be done under a separate process. The most significant doses from the AT-400A process would be from the AL-R8 pit holding fixture disassembly, cursory wipedown, and AT-400A CV holding fixture assembly during which time bare pit handling is required. By keeping the pit in the holding fixture during the SI process, those significant dose operations are avoided entirely. Actual reductions would vary from program to program. However, a strict comparison of process times, especially for close proximity operations, demonstrates dose reductions for the AL-R8 SI over the AT-400A.

Additional dose reductions are realized during repackaging operations. According to the Design Agencies, the pit would require only cursory cleaning (wipe down) if visible material exists on the pit. This is a very brief process and would lead to lower doses than the AT-400A process due to the presence of the holding fixture. The leak test equipment for the SI has been designed to accept the pit in the holding fixture. Hence, with the exception of the "spot wipe down" of portions of the fixtured pit, the SI process involves essentially all "pick and place" operations of the fixtured pit.

The SI avoids both the removal of the pit from the holding fixture and the direct handling (carrying and holding) of the bare pit. AT-400A operations involving bare pit handling and extended close proximity operations were timed and are addressed in the time motion study results later in this analysis.

The total bare pit handling and close proximity operations time was shown to be about 14 minutes. The majority of that dose time (over 11 min.) is spent disassembling the AL-R8 holding fixture and assembling the CV holding fixture. These operations were the most significant dose contributors to the AT-400A process and are completely eliminated in the SI process.

The seal replacement operation, which should only be performed on a small fraction of the total inventory that would still exist after 30 years, does not require removal of the pit from the holding fixture. It is very brief in overall dose duration.

Other considerations, which enter into an As Low As Reasonably Achievable (ALARA) evaluation, point to the SI as a preferred alternative to the AT-400A. Those considerations include the absence of a high-energy source (weld operation) and reduced personal protective equipment (PPE) requirements. The ALARA evaluation will always consider the presence or absence of PPE and the physical stresses it may create on an individual. ALARA evaluations are not restricted to dose evaluations, but consider all impacts that a radiological operation may present from both a routine operation perspective and off-normal perspectives. In that sense, the presence or absence of a high-energy source that processes radioactive material containers has direct pertinence to any ALARA evaluation (ref. Pre-Job ALARA Review [PJAR] for the AT-400A Pit Packaging Program, Revision 5, 26 June 1997).

Specific dosimetric values are not yet available because the sources of the process can vary by orders of magnitude, and the specifics of the procedures have not yet been finalized. The best estimation is to compare the known process times of the AT-400A with those of the proposed processes of the AL-R8 SI. In general, packaging operations that avoid direct handling of the pit and/or extended close proximity operations, but that are similar in other respects, are advantageous from a lower worker dose standpoint.

The timing of the AT-400A operations involving bare pit handling and extended close proximity operations were cited earlier in this analysis. As stated earlier, these operations were the most significant dose contributors to the AT-400A process and are completely avoided in the AL-R8 SI process. No operations have been added to the AL-R8 SI process that would replace or be equivalent to the high dose operations of the AT-400A process.

<u>Comparison of Dose Assessments of the AL-R8 SI to the Original Analysis in the EIS</u>

A dose assessment was performed for an early version of the manual assembly process for the AT-400A with the primary intention of evaluating any dose savings of a mechanical line for W48 packaging (especially for Mod 0s). A time motion study was performed on the approved and operational AT-400A manual process for the purpose of assessing high radiation area posting concerns. This is the best data available for comparison with proposed alternatives.

The key determining factors in any dose assessment are 1) dose rates (i.e., sources), 2) exposure times, 3) distances, and 4) shielding. Since the sources will be identical for the AT-400A and proposed SI processes, the determining factors are reduced to items 2 through 4 above.

All operations involving pits would be performed in a manner that minimizes radiological exposures to facility workers. However, the pit repackaging process would result in additional exposures at Pantex Plant. There is no historical dosimetry information available for the AT-400A process, but conservative dose estimates were made for purposes of the EIS. For 2,000 pit repackaging operations per year, it was estimated that an additional worker exposure of less than 30 person-rem would be incurred. Similarly, an additional worker exposure of less than 300 person-rem for the repackaging of 20,000 pits would be incurred. Using a normal operations dose-to-risk conversion factor of 4×10^{-4} excess cancer fatalities per rem, less than 0.12 excess cancer fatalities would be incurred in the workforce from the repackaging operation.

The AL-R8 SI process would produce personnel whole body doses less than the above AT-400A estimates because of the absence of several high dose operations; therefore, the boundaries of the EIS would be met. The total bare pit handling and close proximity operations time for the AT-400A was shown to be about 14 minutes. The majority of that exposure time (over 11 min.) is spent disassembling the AL-R8 holding fixture and assembling the CV holding fixture. These operations were the most significant dose contributors to the AT-400A process and are completely eliminated in the SI process design.

Whole body doses would be minimized in the SI process through the use of installed shielding when dose rates require it. Extremity doses will be minimized by the primary handling of the pit holding fixture and minimal contacts with the pit surfaces.

Regarding leak testing of pits prior to packaging, AT-400A required the direct handling of the bare pit to load and unload it from the leak test bell jar. The proposed pit leak test systems for the SI process would allow the pit to be loaded while still in the holding fixture in much that same manner as the pit and holding fixture would be loaded into the SI. Given that both the holding fixture remains attached and direct handling of the pit is avoided, the proposed SI system would be a significant improvement over the current pit leak test systems.

As the pit repackaging effort proceeds, DOE would use the experience gained from initial operations to further reduce worker exposures. No additional processes would be added to the pit repackaging operations that would be equivalent to or exceed the relatively higher dose operations of the AT-400A activity. The rate of repackaging would increase per year; therefore, management of the pit repackaging operations using the AL-R8 SI would be responsible for adding additional personnel, administrative, and engineering controls as necessary to keep the personnel doses within the boundaries of the EIS.

As stated earlier, the exposure times for the proposed SI would be less. Since the pit would remain in the holding fixture at all times, the source-to-target distances would be greater for the proposed SI process than with the AT-400A process approximately 80 percent of the time. The remaining 20 percent would account for the cleaning process which, as proposed, would be less rigorous than the AT-400A process. Finally, the proposed SI process would use installed shielding, eliminating the need for lead aprons in the majority of operations. Thus, the installed shielding would reduce both whole body exposures and physical stresses on the operators.

Additional Pit Cleaning Criteria

As stated earlier: "The total bare pit handling and close proximity operations time was shown to be about 14 minutes. The majority of that exposure time (over 11 min.) is spent disassembling the AT-400A fixture and assembling the CV holding fixture. These operations were the most significant dose contributors to the AT-400A process and are completely eliminated in the SI process."

The above statement refers to the majority of the handling and close proximity operation time — 11 minutes vs. 14 minutes — deals with disassembly and assembly operations. This statement acknowledges that approximately 3 minutes of contact or close proximity operations may still occur, although any contact would be minimized to the greatest extent possible and the majority of the 3 minute estimate would involve close proximity operations (not direct handling).

Time Motion Study Results

Time motion study results from the mechanical assembly procedure indicated that the mechanical assembly for the AT-400A equaled 11 minutes. A less intensive handling version of the AT-400A cleaning process would be used for the SI.

Regarding leak testing of pits prior to packaging, the AT-400A process required the direct handling of the bare pit to load and unload it from the leak test bell jar. The proposed pit leak test systems for the SI process would allow the pit to be loaded while still in the holding fixture in much that same manner as the pit and holding fixture would be loaded into the SI. Given that both the holding fixture remains attached and direct handling of the pit is avoided, this would be an improvement over the current pit leak test systems.

Procurement of 30 Containers for Qualification and Testing Phase

Thirty SIs would be procured for qualification testing. They would be used for thermal tests, drop tests, leak testing & purge/backfill and moisture test, safeguard measurements, vibration test, tooling tryout, and process prove-in.

Procurement of additional containers required for the completion of pit repackaging would follow success of the initial thirty testing containers.

CONCLUSIONS

According to the EIS background information, at the time the EIS was approved by DOE/AAO, the pits removed from weapons were being packaged in AL-R8 storage containers. Decisions made in the Record of Decision for the EIS prompted DOE to continue the evaluation of appropriate containers for pit storage activities. The AT-400A was in the development and testing stage for use in onsite and offsite transportation and long-term storage. Operating experience with the implementation of the AT-400A indicated that additional efficiencies may be gained by evaluating alternate containers that meet applicable requirements while simplifying the repackaging process. As a result, a systems analysis was performed to evaluate activities related to the pit storage. Subsequently, the DOE decided to evaluate modification of the AL-R8 container. Based upon review of the design specifications, DOE selected three container designs for further development. The selected AL-R8 SI and the AT-400A both meet required specifications for Pantex storage criteria. Comparisons of the AL-R8 SI and the AT-400A have been made, and certain attributes of the AL-R8 SI surpass those of the AT-400A. The AL-R8 SI container is reusable after physical/visual pit inspection. The AL-R8 SI container meets the design specifications to satisfy up to 30 years of Pantex storage criteria. It is expected that the seal replacement could extend the container storage life up to 30 additional years since the initial AL-R8 SI design specifications satisfy up to 30 years of Pantex storage criteria. The AL-R8 SI container process provides for a reduced overall processing time and no bare pit handling, except when more extensive pit cleaning is required. If the repackaging operations begin in FY99, it is anticipated that the repackaging operation using the AL-R8 SI could be completed sooner than using the AT-400A. The AL-R8 SI can be designed to handle multiple pit types using existing fixtures, and the AL-R8 SI container would not need to be removed from the Stage Right storage position treaty verification measurements.

TABLE 1. Comparison of Environmental Issues

ENV. ISSUES	AT-400A	AL-R8 SI	EIS Bounding Conditions
Air Emissions	Meets 40 CFR 61.92 for potential for radionuclide emissions. Potential exists for release of radionuclides during pit tube removal (crimp/weld) operations, although event is unlikely. Non-radiological emissions would be expected from isopropyl alcohol.	Meets 40 CFR 61.92 for potential for radionuclide emissions. There is no potential for release of radionuclides for the pit tube as the pit tube would not be removed. Non-radiological emissions would be expected from isopropyl alcohol and other approved solvents according to Environmental Protection Department requirements and the Pollution Prevention Plan.	Air emissions are bounded by Section 4.7.2.1, "Impacts of Continued Operations, Weapons-Related Activities," of the EIS.
Solid Waste	Solid waste would consist of trash and packaging materials normally associated with Pantex Plant weapons disassembly operations.	Solid waste would consist of trash and packaging materials normally associated with Pantex Plant weapons disassembly operations.	Waste operations are bounded by Section 4.13, "Waste Management," of the EIS.
Radioactive Waste/Soil	Radioactive waste may consist of HEPA filters, gloves, kimwipes, and swipes. Radioactive waste would be staged onsite until approval is received for shipping to an approved DOE disposal facility. The crimp and weld to remove the pit tubes has the potential to generate W-2 in off-normal operations if the tubes were not classified and would not require sanitization activities. Depending on classification, the removed part of the tube may be considered a weapon component rather than a waste.	Radioactive waste may consist of HEPA filters, gloves, kimwipes, and swipes. Radioactive waste would be staged onsite until approval is received for shipping to an approved DOE disposal facility. The crimp and weld process would not be required for the AL-R8 SI.	Waste operations are bounded by Section 4.13, "Waste Management," of the EIS.

TABLE 1. Comparison of Environmental Issues

ENV. ISSUES	AT-400A	AL-R8 SI	EIS Bounding Conditions
Chemical Storage/Use	Approved storage containers would be used for isopropyl alcohol and possibly vacuum grease.	Approved storage containers would be used for isopropyl alcohol and other approved solvents.	The use of the chemicals in the performance of certain Pantex Plant operations is bounded by Section 4.14.1.2, "Chemical Environment," in the EIS.
Radiation/Toxic Chemical Exposures	The Radiation Safety and Occupational Safety & Health Departments would approve operational procedures for PPE. Total bare pit handling and close proximity operations for the AT-400A total approximately 14 minutes. The majority of that exposure time (over 11 min.) is spent disassembling the AL-R8 holding fixture and assembling the CV holding fixture.	The Radiation Safety and Occupational Safety & Health Departments would approve operational procedures for PPE. Exposure time of 11 minutes from disassembling the AL-R8 holding fixture and assembling the CV holding fixture is eliminated. No additional process would be added to increase the dose rates.	Radiation/toxic chemical exposures are bounded by Section 4.14.1.1, "Radiation Environment," in the EIS.

TABLE 2. Comparison of Specific Characteristics

	AT-400A	AL-R8 SI
Reuse	The AT-400A containment vessel (CV) must be destroyed after physical/visual pit inspection.	The AL-R8 SI container is reusable after physical/visual pit inspection.
Life Expectancy	The AT-400A container meets the design specifications to satisfy 50-year Pantex storage criteria.	The AL-R8 SI container meets the design specifications to satisfy up to 30 years of Pantex storage criteria. It is expected that the seal replacement could extend the container storage life up to 30 additional years since the initial AL-R8 design specifications satisfy up to 30 years of Pantex storage criteria.
Life Cycle Dose	The AT-400A container process includes approximately 14 minutes of bare pit handling and close proximity operations. The dose would vary according to the sources of the process.	The AL-R8 SI container process provides for a reduced overall processing time and no bare pit handling, except when more extensive pit cleaning is required. The dose would vary according to the sources of the process.
Time Line	If the repackaging operations begin in FY99, the repackaging operation would be completed in FY10.	If the repackaging operations begin in FY99, it is anticipated that using the AL-R8 SI could be completed sooner than using the AT-400A.
Versatility	The AT-400A container fixtures were designed for one pit type.	The AL-R8 SI can be designed to handle multiple pit types using existing fixtures.
Treaty Verification Measurements	The AT-400A container would be removed from the Stage Right storage position for treaty verification measurements.	The AL-R8 SI container would not need to be removed from the Stage Right storage position for treaty verification measurements.

Supplement Analysis

Final Environmental Impact Statement for the Continued Operation of Pantex Plant and Associated Storage of Nuclear Weapon Components - AL-R8 Sealed Insert Container

Determination

Recently, the Department of Energy (DOE) evaluated the rate at which pits could be repackaged. An analysis, "Preliminary Systems Engineering Analysis of Pit Storage Container Issues for the Pantex Plant," was performed to assist in assessing whether pits should be packaged in the AT-400-A container, a modified AL-R8 container, or some combination of the two containers. Results indicated that both the AT-400A container and the modified AL-R8 container (AL-R8 Sealed Insert [SI] container) comply with the latest pit storage specifications to provide an improved storage environment for the pits and would be considered feasible solutions to long-term pit storage at Pantex Plant.

The DOE has analyzed these issues in its Supplement Analysis of the use of the AL-R8 SI containers in the Pantex Plant pit repackaging program. The conclusions of the Supplement Analysis indicate that the AL-R8 SI container meets the requirements of Pantex Plant pit storage within the parameters of the Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components.

Based on the analysis of the criteria presented in the Supplement Analysis of the AL-R8 SI pit storage container and with concurrence of counsel, I hereby determine that the use of the AL-R8 SI container does not constitute new circumstances or information or a substantial change in the proposed action relevant to environmental concerns; therefore, pursuant to 10 CFR 1021.314 (c), no supplement to the Final Environmental Impact Statement for the Continued Operation of the Pantex Plant and Associated Storage of Nuclear Weapon Components, no new Environmental Impact Statement, nor further National Environmental Policy Act documentation is required.

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