DOE/EA - 1060

**ENVIRONMENTAL ASSESSMENT
and
FINDING OF NO SIGNIFICANT IMPACT**

**Consolidation and Interim Storage
of Special Nuclear Material
at Rocky Flats
Environmental Technology Site**

**U.S. Department of Energy
Rocky Flats Field Office
Golden, Colorado**

June 1995

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**U.S. Department of Energy
Rocky Flats Field Office
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Reviewed for Classification/UCNI

By: JN CONYERS (U/NU)
Date: 6/1/95

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**U. S. DEPARTMENT OF ENERGY
FINDING OF NO SIGNIFICANT IMPACT
CONSOLIDATION AND INTERIM STORAGE OF SPECIAL NUCLEAR MATERIAL AT
ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE**

SUMMARY: The Department of Energy (DOE) has prepared an environmental assessment (EA), DOE/EA - 1060, for the consolidation, processing, and interim storage of Category I and II special nuclear material (SNM) in Building 371 at the Rocky Flats Environmental Technology Site (hereinafter referred to as Rocky Flats or Site), Golden, Colorado. The scope of the EA included alternatives for interim storage including the no action alternative, the construction of a new facility for interim storage at Rocky Flats, and shipment to other DOE facilities for interim storage.

The DOE has identified a need to improve the environmentally and physically safe, secure, and verifiable storage of Category I and II SNM until long-term disposition is determined and implemented. This is a direct result of the changed mission to manage waste and materials, and to clean up and convert Rocky Flats for beneficial use. Additionally, DOE has determined that by consolidating Category I and II SNM in Building 371, considerable cost savings will be realized because of reduced surveillance and safeguard requirements. Long-term storage and disposition of SNM are under analysis in the Programmatic Environmental Impact Statement (PEIS) for Storage and Disposition of Weapons-Usable Fissile Materials (DOE, 1994). The duration of interim storage at Rocky Flats is projected to be 10 to 15 years.

The DOE is seeking to enhance the safety of SNM management at Rocky Flats. Containment of radioactive releases is one of the key objectives of ensuring safe operations and is heavily dependent upon the structural integrity of the buildings in which the SNM is located. Several of the buildings at Rocky Flats were designed and constructed before current nuclear design requirements were developed. Building 371 was built to stringent nuclear design standards and represents the most structurally sound building at the Site for storage of SNM.

In parallel with consolidation, DOE is studying ways to enhance the safety of storing SNM in Building 371. The studies are in response to the Defense Nuclear Facilities Safety Board Recommendation 94-3. A number of the safety improvements under consideration are consistent with the proposed action of the EA (e.g., one improvement under consideration is to over-pack the double-nested containers under the proposed action with a third container to prevent further dispersal of material from a catastrophic accident condition). Some of the improvements, however, exceed the scope of the EA. If DOE decides to pursue these improvements, further review will be required to evaluate all potential environmental effects.

A public meeting was held on April 18, 1995 to discuss the scope and analyses in the EA. The public and State of Colorado were given 30 days to comment on the EA. Eighty-eight written

comments were received and subsequently were responded to in the final EA. Many of the comments expressed concerns about SNM consolidation in one building and about long-term storage of SNM at Rocky Flats. Others expressed concerns that additional alternatives should be considered. Complete documentation of these written comments and responses, as well as the proceedings of the public meeting held on April 18, 1995 are included in Appendix C of the EA.

PROPOSED ACTION: The proposed action consists of the consolidation, processing, and interim storage of Category I and II SNM (9.8 metric tons of plutonium and 6.7 metric tons of enriched uranium) in Building 371. The proposed action would involve the transfer of SNM from six buildings where it is currently stored to Building 371. Much of the SNM inventory is already located in Building 371. Activities that would be conducted when necessary to prepare the SNM prior to transfer to Building 371 include: reducing the size of metal pieces; packaging for transfer to Building 371; and transferring from current storage buildings to Building 371. Modifications in Building 371 to support the consolidation effort include: installation of SNM processing and packaging equipment; construction of a new vault; enhanced storage capacity in the central storage vault; and dock modifications to accept Safe, Secure Transports for offsite shipment of SNM.

Once the SNM is consolidated into Building 371, it would be processed for environmentally sound and physically safe storage. Activities performed in the proposed process line in Building 371 to prepare the SNM for safe storage include: removing plutonium oxide from the metal surface; reducing the size of metal pieces to accommodate the storage container; heating of the oxide to a range of 800°C to 1200°C in new furnaces within a glovebox to stabilize it; and placing the metal and oxide in an approved, inert-atmosphere, welded-seal storage container.

ALTERNATIVES CONSIDERED: DOE considered in detail the no action alternative which would continue the present practice of storing inventories of SNM in several existing buildings at Rocky Flats without regard to differences in structural integrity and resistance to release of airborne particulates under accident conditions. Current operating and management practices for SNM inventories require performance of inspections, processing of pyrophoric oxide into stable form, sampling, inventory/accountability, replacement of temporary packaging, and maintenance of facility safety systems. The no action alternative was considered unacceptable as it does not meet the DOE safety and risk reduction objectives for existing inventories of SNM.

Alternatives considered but eliminated from further analysis were construction of a new facility at Rocky Flats for interim storage and offsite shipment of SNM to other DOE facilities for interim storage. Neither of these alternatives were shown to meet the strategic or programmatic goals of reducing the risk and cost associated with interim storage of SNM until a permanent solution for storage within the DOE Weapons Complex becomes available.

ENVIRONMENTAL EFFECTS: Most activities associated with the proposed action and the no action alternative would take place inside existing buildings. As a result, neither of these alternatives would affect water or biological resources. An air quality assessment was conducted and no air quality impacts to the environment were anticipated. A small potential exists for acute worker exposure to radioactive materials from accidents. Chronic worker exposure to radiation would be limited to those levels accepted under federal regulation by adherence to standard practices under the "As Low As Reasonably Achievable" program. The cumulative effect of the proposed consolidation, processing to meet storage criteria, and interim storage in Building 371 at Rocky Flats would be to reduce the risks to both workers and the public over the long term. Other environmental effects would include a potential for a slight increase in annual emissions of radionuclides. However, these emissions would not be generated in quantities that would require a Colorado Department of Public Health and Environment Air Pollutant Emission Notice, new permit, or permit modification. The low-level and transuranic waste generated by consolidation activities would not result in any measurable environmental effects because of strict adherence to safety procedures and requirements for generating, storing, and shipping wastes at Rocky Flats.

FOR FURTHER INFORMATION ABOUT THIS ACTION, CONTACT:

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PUBLIC AVAILABILITY:

Copies of this EA or further information on the DOE NEPA process are available from:

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DETERMINATION: Based on the information and analyses in the EA, DOE has determined that the proposed consolidation, processing, and interim storage of Category I and II SNM in Building 371 at the Rocky Flats Environmental Technology Site does not constitute a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act of 1969, as amended. Therefore, an Environmental Impact Statement for the proposed action is not required.

Signed in Golden, Colorado, this 22^d day of June, 1995.

Mark N. Silverman

Manager

Rocky Flats Field Office

U. S. Department of Energy

DOE/EA - 1060

ENVIRONMENTAL ASSESSMENT

Consolidation and Interim Storage of Special Nuclear Material at Rocky Flats Environmental Technology Site

**U.S. Department of Energy
Rocky Flats Field Office
Golden, Colorado**

June 1995

Reviewed for Classification/UCNI

By: JN CONYERS (U/NU)
Date: 6/1/95

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LIST OF ACRONYMS AND ABBREVIATIONS

ACL	Administrative Control Level
ALARA	As Low As Reasonably Achievable
APEN	Air Pollutant Emission Notice
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
D & D	decontamination and decommissioning
°C	degrees centigrade
DOE	U. S. Department of Energy
DOT	U. S. Department of Transportation
EA	environmental assessment
EDE	effective dose equivalent
EPA	Environmental Protection Agency
FONSI	Finding of No Significant Impact
FSAR	final safety analysis report
FY	fiscal year
g	gram
HEPA	high efficiency particulate air
IAEA	International Atomic Energy Agency
ICRP	International Commission on Radiological Protection
kg	kilogram
LANL	Los Alamos National Laboratory
LS/DW	Life Safety /Disaster Warning
mrem	millirem
NCRP	National Committee on Radiation Protection
NRC	Nuclear Regulatory Commission

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

NTS	Nevada Test Site
OSHA	Occupational Safety and Health Act
PACS	Personnel Access Control System
PEIS	programmatic environmental impact statement
PIDAS	Perimeter Intrusion Detection and Assessment System
PM-10	particulate material less than 10 microns in size
RCRA	Resource Conservation and Recovery Act
rem	roentgen equivalent man (a unit of absorbed radiation dose in biological matter)
SAAM	selective alpha air monitor
SAR	Safety Analysis Report
SNM	Special Nuclear Material
SST	Safe, Secure Transport
TA	Technical Area
TSR	Technical Safety Requirements
TRU	transuranic
UPS	uninterruptible power supply
USCOE	U. S. Army Corps of Engineers
VSS	vital safety system
WIPP	Waste Isolation Pilot Plant

1.0 INTRODUCTION

The Department of Energy (DOE) is proposing the consolidation, processing, and interim storage of Category I and II special nuclear material (SNM) in Building 371 at the Rocky Flats Environmental Technology Site (hereinafter referred to as Rocky Flats or Site). Category I and II SNM is generally defined as quantities of nuclear material (plutonium and uranium) that pose an attractive theft or sabotage target, and thus require very stringent measures for secure management. Interim storage refers to the safe, controlled, verifiable storage facilities and conditions that would be established in the near term, approximately 10 to 15 years (DOE, 1994). The interim storage status would remain in effect until final disposition of the SNM is determined and implemented. This environmental assessment (EA) addresses the potential environmental effects resulting from the proposed action and the no action alternative.

Background Information

In 1989, all nuclear operations were halted at Rocky Flats. The SNM used in these operations was in various stages of production and located in several buildings when the work stopped. The material was placed in containers for temporary storage with the intent of resuming operations. However, in the State of the Union Address of January 1992, the President canceled production of the W88 warhead which was the primary mission at Rocky Flats. Subsequently, production activities at Rocky Flats were stopped, and the SNM used in those activities was stored in existing containers, awaiting further disposition. However, the available containers and facilities used during production were never intended for extended periods of storage. As a result of the change in mission to environmental restoration and cleanup, Rocky Flats must now place the SNM in suitable interim storage until final disposition is determined.

As part of the DOE's Openness Initiative, Secretary of Energy Hazel O'Leary announced in December 1993 that the total measured inventory of plutonium currently stored at Rocky Flats is 12.9 metric tons (approximately 28,400 pounds). In June 1994, Secretary O'Leary announced that the enriched uranium inventory at the Site is 6.7 metric tons (approximately 14,800 pounds). The scope of the SNM Consolidation and Interim Storage Program is limited to Category I and II SNM: 9.8 metric tons of plutonium in various forms and 6.7 metric tons of enriched uranium. The enriched uranium is anticipated to be shipped to the Y-12 facility in Oak Ridge, Tennessee. However, operations at the Y-12 facility are currently suspended. In the event that Y-12 does not resume operations, the enriched uranium would be consolidated in Building 371 and packaged for storage. The plutonium exists in various forms, including

weapons parts, metal and alloy, and oxide used in support of the former Rocky Flats mission of nuclear weapons component production. The remaining 3.1 metric tons of SNM are residues, which are not Category I or II SNM, and therefore are not addressed in this EA.

Characterization of SNM

The SNM included in the program scope is grouped into three types: metal, oxide, and pits. Pieces of SNM that weigh 50 grams or more are identified as metal and are generally raw materials such as buttons, ingots, and completed or semi-fabricated parts. The SNM oxide includes pure plutonium oxide, plutonium oxide mixtures, and plutonium/enriched uranium mixtures and metal pieces that weigh less than 50 grams. These oxides are by-products of weapons fabrication and plutonium processing and sometimes contain other substances including fluorides, greases, and other impurities. Pits are a component part of nuclear weapons and will not require any processing before being transferred and stored in Building 371.

2.0 PURPOSE AND NEED

The DOE has identified a need to improve the environmentally and physically safe, secure, and verifiable storage of Category I and II SNM until long-term disposition is determined and implemented. This is a direct result of the changed mission to manage waste and materials, and clean up and convert Rocky Flats to beneficial use. Long-term storage and disposition of SNM are under analysis in the Programmatic Environmental Impact Statement (PEIS) for Storage and Disposition of Weapons-Usable Fissile Materials (DOE, 1994). The duration of interim storage at Rocky Flats is projected to be 10 to 15 years.

The DOE is seeking to enhance the safety of SNM management at Rocky Flats. Containment of radioactive releases is one of the key objectives of ensuring safe operations and is heavily dependent upon the structural integrity of the buildings in which the SNM is located. Several of the buildings at Rocky Flats were designed and constructed before current nuclear design requirements were developed. Building 371 was built to stringent nuclear design standards and represents the most structurally sound building at the Site for storage of SNM.

In parallel with consolidation, DOE is studying ways to enhance the safety of storing SNM in Building 371. The studies are in response to the Defense Nuclear Facilities Safety Board Recommendation 94-3. A number of the safety improvements under consideration are consistent with the proposed action of the EA (e.g., one improvement under consideration is to over-pack the double-nested containers under the proposed action with a third container to prevent further dispersal of material from a catastrophic accident condition). Some of the improvements, however, exceed the scope of the EA. If DOE decides to pursue these improvements, further review will be required to evaluate all potential environmental effects.

3.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

3.1 Proposed Action

The proposed action consists of the consolidation, processing, and interim storage of Category I and II SNM (9.8 metric tons of plutonium and 6.7 metric tons of enriched uranium) in Building 371 (Figure 3-1). The proposed action would involve the transfer of SNM from Buildings 707, 771, 776/777, 779, and 991 (refer to section 4.2) to Building 371 and much of the SNM inventory is already located in Building 371. Buildings 707, 771, 776/777, 779, and 991 will hereinafter be referred to as "export buildings."

The following activities would be conducted when necessary to prepare the SNM prior to transfer to Building 371:

- reduce the size of metal pieces in Building 707
- package for transfer to Building 371
- transfer from export buildings to Building 371

The following minor modifications would be essential in Building 371 to support the consolidation effort:

- installation of SNM processing and packaging equipment
- construction of a new vault
- enhanced storage capacity in the central storage vault
- dock modifications to accept Safe, Secure Transports (SSTs) for offsite shipment of SNM

Figure 3-1. Proposed SNM Consolidation and Processing for Storage

Once the SNM is consolidated into Building 371, it would be processed for environmentally and physically safe storage. The following activities would be performed in the process line installed in Building 371 to prepare the SNM for safe storage:

- remove as much of the oxide from the metal surface as possible by brushing
- reduce the size of metal pieces to accommodate the storage container by breaking, cutting, sawing, pressing, etc.
- heat the oxide to a range of 800°C to 1200°C in new furnaces within a glovebox to stabilize it and to remove any water content
- place the metal and oxide in the approved, inert-atmosphere, storage container (refer to Section 3.1.5)

Thermal stabilization of plutonium oxides required for current fire safety purposes is addressed in the EA for Resumption of Thermal Stabilization of Plutonium Oxide in Building 707 (DOE, 1994a).

3.1.1 Selection of Building 371

Many factors were considered in the selection of Building 371 as the proposed location for consolidation and interim storage of Category I and II SNM. It is the only existing building at Rocky Flats that has the potential for meeting, without major modifications, the requirements for all aspects of SNM consolidation (EG&G, 1994). These requirements include health, environmental, and radiation safety protection, and the engineered capacity to withstand severe natural phenomena. The plutonium recovery area in Building 371 was designed to withstand a tornado with 300 mile-per-hour tangential winds; to maintain containment integrity through an earthquake with a 0.21 gravity surface acceleration (approximately 6.0 on the Richter scale); and to withstand forces greater than those anticipated from snowstorms and floods. The high efficiency particulate air (HEPA) filter-equipped exhaust stacks have isolation valves that close in less than 10 seconds to seal the building and protect it from both positive and negative pressures. The building was designed for fire prevention and has comprehensive fire detection and suppression systems. The building utilizes the safe-refuge concept of directed air flow and physical barriers to isolate areas of greater hazard, augmented by a short travel distance from a hazardous zone to a safer zone. These air flow and containment zones provide environmental integrity which is assured by a comprehensive monitoring program.

Building 371 is proposed for consolidation and interim storage of Category I and II SNM for other reasons as well. It is the only building with the capacity to store the entire Rocky Flats Category I and II SNM inventory, and it is already the single largest repository of SNM at the Site. This means that there would be less work involved in bringing the remainder of the SNM to Building 371 than there would be in taking its inventory to another onsite location.

3.1.2 SNM Preparation and Other Activities Performed in Export Buildings

SNM Preparation

Consolidation of SNM would be preceded by other actions required to prepare the SNM for safe transfer and storage. The 700 Area SNM Preparation Program is addressed in the EA for Resumption of Thermal Stabilization of Plutonium Oxide in Building 707 (DOE, 1994a). This program includes the removal of plastics from the inner storage containers and the oxide to be brushed from metal part surfaces. The brushed metal pieces are packaged and placed temporarily in secured storage areas. The oxide collected from brushing the metal, as well as other unstabilized oxide in the 700 area, is thermally stabilized, packaged, and placed temporarily in secured storage areas. Stabilized oxide from the Solution Stabilization Program, as proposed in the EA for Actinide Solution Processing at Rocky Flats Environmental Technology Site (DOE, 1995), would be consolidated into Building 371.

Metal pieces not already located in Building 371 that are too large to fit into SNM containers would be cut into smaller pieces in Building 707. They would then be packaged in 1-liter containers and returned to temporary secured storage. The metal pieces would be transferred between Building 707 and Buildings 771, 776/777, and 779 through connecting tunnels and enclosed passageways (Figure 3-2) on transfer carts designed specifically for moving SNM.

Figure 3-2. Proposed Onsite Movement for SNM Consolidation.

SNM Packaging and Transfer by Truck

Packaging of SNM for transfer to Building 371 would be performed in Buildings 707, 771, 776/777, and 779. All of the SNM being transferred to Building 371 would be packaged in transfer containers. The SNM would be transferred by truck from Buildings 707, 771, 776/777, and 991 to Building 371 (Figure 3-2). The SNM would be transported by the most direct route practicable which would be free of any construction or other hazards. The truck route would be closed to other Site traffic during the transfer.

3.1.3 Construction of a Storage Vault in Building 371

As part of the proposed action, Room 3337 in Building 371 would be modified to become a storage vault for SNM. This modification, along with the stacker/retriever maintenance and upgrade activities, would create secure capacity within Building 371 to support the requirements of the SNM Consolidation and Interim Storage Program.

Room 3337 originally contained tanks supporting plutonium processing operations. In the mid-1980s it was decommissioned and all of the interior tanks and piping were removed. The room currently contains no process or process-related equipment. It is now used as storage for 55-gallon drums containing residues and transuranic (TRU) waste. Under the proposed action, the residues and TRU waste would be relocated to another existing storage location, either within Building 371 or in another building at Rocky Flats. The relocation would comply with all regulatory requirements.

The room is constructed of 2-foot-thick, reinforced concrete walls. Essential modifications to the room would include the following:

- installation of two steel mezzanines, for a total of three storage levels (including the ground level)
- installation of individual bins for SNM storage with features for criticality prevention and radiological shielding
- installation or modification of safety systems such as selective alpha air monitors (SAAMs), criticality detectors, and heat detectors
- security fixture upgrades and remote monitoring equipment

3.1.4 The Central Storage Vault and Stacker/Retriever in Building 371

The central storage vault, Room 1206 in Building 371, is the single largest SNM repository at Rocky Flats. It features reinforced concrete walls, remote handling equipment (the stacker/retriever), and a nitrogen (inert) atmosphere. The stacker/retriever is a computer operated shuttle for moving SNM between the central storage vault and the input/output stations. The central storage vault is a compartment approximately 300 feet long, 15 feet wide, and 40 feet high. A total of 1,428 storage bins in steel tiers are mounted against the walls on either side of the compartment. There are currently 150 empty storage bins. Material pallets would be procured and placed into the central storage vault to increase storage capacity of SNM.

Currently, SNM is transferred on aluminum pallets about four feet square that hold four permanently attached, double-walled, lead-shielded receptacles. The proposed SNM containers (refer to Section 3.1.5) would be placed into the shielded receptacles. The stacker/retriever also handles approximately 100 flatbed pallets which have a lip around their edges to prevent materials from falling off. These pallets could be easily modified to become material pallets to further increase the SNM storage capacity of the central storage vault.

The building cannot receive new material pallets into the central storage vault. Input/Output Station No. 6 would have to be modified in order to receive the pallets. This modification would require cutting a hole in the input/output station large enough to move the pallets through it. A glovebox would be attached to this penetration and would incorporate lifting and handling equipment for moving the pallets. The glovebox would prevent the release of contamination and maintain the inert atmosphere within the central storage vault.

The stacker/retriever is a large and complex system which requires regular and frequent maintenance. Maintenance work would be performed in order to ensure the continued operability of the system. This would include activities such as lubrication, repair, and replacement of various stacker/retriever components.

3.1.5 SNM Processing in Building 371

In order to prepare SNM for safe storage, the requirements of the DOE Criteria for Safe Storage of Plutonium Metal and Oxide (DOE, 1994b) would be implemented. The requirements are as follows: 1) oxide is in a stabilized form; 2) both metal and oxide are free of plastics and stored in sealed, corrosion-resistant containers in an inert atmosphere that does not create a need for further processing; and 3) a minimum of two radiation barriers are present.

A process line would be installed in Room 3206 of Building 371 (Figures 3-3 and 3-4) to implement these criteria. The process line would interface with the stacker/retriever through Input/Output Station No. 6. Three new furnaces would be installed in the process line that would have the capability to thermally stabilize oxide within a range of 800°C to 1200°C. Thermal stabilization within this range would meet the DOE test criteria (Loss-On-Ignition) for removing moisture, completing the oxidation reaction, and eliminating any remaining potentially corrosive compounds. In addition, the dispersibility hazard would be reduced by increasing the oxide particle size. Enriched uranium oxide would not require thermal stabilization because of its chemical stability. The Loss-On-Ignition testing would be performed within the process line. Even oxides that were previously stabilized to render them nonpyrophoric would be subject to this stabilization process.

Within the process line, all plastics would be removed, metal pieces would be brushed to remove any oxide, and metal pieces too large to fit into the storage container would be reduced in size. The SNM content of each container would be as close as possible to, but not greater than 4.5 kg per container of metal; and as close as possible to, but not greater than 5.1 kg per container of oxide. Other equipment used to support the process line (e.g., heating, ventilation, and air conditioning equipment) may be installed on the second floor of the building.

Figure 3-3. Layout of Proposed Process Line in Building 371 (Room 3206).

Figure 3-4. Proposed Process Flow of SNM in Building 371.

Los Alamos National Laboratory (LANL) is developing corrosion-resistant, nested, welded storage containers (Figure 3-5). The requirement for a minimum of two radiation barriers would be met as follows:

- The nested (inner material container and outer boundary container) combination would be used for storage in vaults and vault-type rooms with normal air atmospheres.
- The material container alone would be used in the central storage vault because the shielded material pallets would serve as the second radiation barrier.

To meet the requirement that the SNM be stored in an inert atmosphere that would not create a need for further processing, both metal and oxide would be placed in material containers which would be filled with helium and then welded shut. The helium would serve as a means for leak checking the welded containers. The material containers to be stored in the shielded material pallets in the central storage vault would pass through the process line to Input/Output Station No. 6 and then into the central storage vault via the stacker/retriever.

As shown in Figure 3-4, the material containers to be stored in other vaults or vault-type rooms in Building 371 would undergo the following steps: 1) decontamination; 2) removal from the contaminated glovebox; 3) placement in a helium-filled, noncontaminated glovebox; 4) placement inside the boundary container; and 5) welded shut. The nested containers would be leak checked, removed from the process line, and moved to a secured storage area.

The existing glovebox line in Room 3206 would be utilized as practical and replaced where necessary (Figure 3-3). Laboratory and measurement equipment from other Rocky Flats buildings would be installed as needed and used in the process line. The process line would incorporate redundant systems for safety purposes so that downtime for individual systems within the process would not halt the entire operation. The capacity of the process line would average 11 kg/day. At this rate, the entire inventory of Category I and II SNM could be processed by fiscal year 2002.

Figure 3-5. Proposed Storage Containers

3.1.6 Measurement Equipment and Analytical Capabilities

In order to support the interim storage mission, the capability to analyze and characterize nuclear materials must be available in Building 371. This capability would support both the process line and nuclear material accountability requirements. Essential equipment likely would include package (drum or can) scanners, calorimeters, neutron detectors, gamma scanners, and other measurement equipment. Areas within Building 371 would be modified as necessary (e.g., equipment removals, drum relocation, power drops, etc.).

3.1.7 Refurbishment of Shipping Dock and Modifications to Accommodate SSTs

Shipping dock 18T in Building 371 would be modified to be compatible with SSTs used for offsite shipment of SNM. Modifications to the shipping dock would be fairly limited. A dock leveler would be installed; an enclosure would be built outside the dock to accommodate the dimensions of the SSTs; and various electrical, fire protection, and other safeguards and security upgrades would be undertaken as appropriate.

3.1.8 Waste Management

Low-level and transuranic (TRU) waste would be generated during the course of the proposed action activities. The waste would be assayed to determine how to categorize it. Low-level waste contains 100 nanocuries per gram or less of TRU elements and TRU waste exceeds this concentration.

Under the proposed action, approximately 130 cubic yards (approximately 9 fifty-five-gallon drums and 30 crates) of low-level waste and approximately 1,040 cubic yards (approximately 3,800 fifty-five-gallon drums) of TRU waste would be generated. There is no regulatory limit on the quantity of low-level or TRU waste that can be stored onsite; however, the low-level waste would be sent to an approved disposal facility. It is anticipated that there is adequate storage capacity at Rocky Flats for the low-level and TRU waste generated from the proposed action activities.

Approximately 100 cubic yards (374 fifty-five-gallon drums) of TRU waste currently is located in Room 3337 of Building 371. This room would be modified to become a storage vault for SNM under the proposed action, and the TRU waste would be moved to another approved storage location, either within Building 371 or in another storage location at Rocky Flats.

3.2 No Action Alternative

The no action alternative would continue the present practice of storing inventories of SNM in available nuclear materials buildings at Rocky Flats without regard to differences in structural integrity and resistance to release of airborne particulates under accident conditions. Under the no action alternative, material storage would continue in Buildings 371, 707, 771, 776/777, 779, and 991. Current operating and management practices for SNM inventories require performance of inspections, processing of pyrophoric oxide into stable form, sampling, inventory/accountability, replacement of temporary packaging, and maintenance of facility safety systems. The present practice requires that these activities be conducted in all facilities at Rocky Flats which store, process, and maintain SNM. Under the no action alternative, SNM storage and management activities would continue to be performed in many buildings throughout the Site. SNM would be managed in a total of 22 storage vaults as compared to 7 vaults (and vault-type rooms) which would be utilized under the proposed action in Building 371. This point is important because six workers are required in order to access one vault. The following activities would be conducted under the no action alternative:

- frequent surveillance of material in 22 vaults
- inventory of the material occurs bimonthly
- selective alpha air monitors (SAAMs) and criticality monitors must be inspected and maintained on a potential daily basis
- alarm testing must occur monthly and annually

The Rocky Flats Health and Safety Practices (EG&G, 1994) requirements would continue until final disposition of SNM is determined and implemented. These requirements include biannual inspection, weighing, and stabilization of the material. The biannual inspection may result in the following activities: 1) unpacking the current storage container, 2) brushing the metal, 3) repackaging the metal, 4) transferring unstabilized oxide to Building 707, 5) thermally stabilizing the oxide, and 6) repackaging the stabilized oxide.

Any future offsite transfer of SNM to a long-term storage facility would be severely impeded because the material would not be packaged in appropriate storage containers, and would be stored in many locations rather than in the proposed centralized storage area equipped with a transfer-ready shipping dock. In addition, the SNM would still require preparation and handling to ready it for final disposition.

3.3 Alternatives Considered But Not Further Analyzed

Alternatives to the proposed action and the no action alternative are described in the following sections. None of these alternatives have been shown to meet the strategic or programmatic goals of reducing the risk and cost associated with interim storage of SNM until a permanent solution for storage within the DOE Weapons Complex becomes available. The alternatives for interim storage other than the no action alternative include construction of a new facility for interim storage at Rocky Flats and shipment of SNM to other DOE facilities for interim storage.

3.3.1 Construction of a New Consolidation and Interim Storage Facility at Rocky Flats

This alternative would provide the capability to store SNM inventories safely after the facility is completed and qualified for use. The new storage facility would be located within the existing Protected Area in order to preserve current security and safety measures. This alternative may also require the demolition of existing building(s) before construction could begin. Siting of the facility outside of the existing Protected Area's Perimeter Intrusion Detection and Assessment System (PIDAS) security enclosure would result in a requirement for a new security enclosure with fences and sophisticated surveillance systems. Due to funding, design, permitting, and building requirements, the time required to complete consolidation of the SNM into the facility would be approximately 10 to 16 years.

This alternative would not meet the risk reduction objectives of consolidation and interim storage for several reasons. A new facility would have design and structural integrity characteristics similar to those already available with Building 371. Any reduction in risk to workers or the public would be delayed. The new facility would still be in the Denver metropolitan area and would not decrease safety or health risks by increasing distance from this population center.

The construction and operation of a new SNM storage facility potentially would result in environmental impacts that would not occur if consolidation and interim storage proceeds in the existing Building 371 facility. Construction of the facility in the Industrial Area would likely create a soil disturbance resulting in a potential for airborne radiological contamination. The new facility also would be very costly and would offer no additional risk reduction or improvement in environmental protection as compared to Building 371.

3.3.2 Shipment of SNM to Other DOE Facilities for Interim Storage

The alternative to ship SNM to other DOE facilities for interim storage would achieve long-term risk reduction to the public, but is not feasible over the next 10 to 15 years. There are currently several facilities around the DOE Weapons Complex which store and process relatively small quantities of SNM, but they have little or no excess capacity for SNM storage. In contrast, Rocky Flats is one of very few facilities with the capability to store large quantities of SNM.

No single offsite facility or combination of sites meets all of the requirements for storing the Rocky Flats SNM inventory. The DOE Weapons Complex facilities investigated for this purpose include Savannah River Site, Los Alamos National Laboratory, Pantex Plant, and the Hanford Site.

The Savannah River Site, located near Aiken, South Carolina, has five vaults with the capacity to store plutonium. However, these vaults cannot handle the powders, chunks, metal solids, and other compound forms of SNM currently stored at Rocky Flats. Two other vaults are currently being used to store SNM at Savannah River Site and do not have the capacity to store additional SNM from Rocky Flats.

Los Alamos National Laboratory (LANL) is located in Los Alamos, New Mexico. Pits and other forms of plutonium not sealed up in weapons have been stored in the Technical Area 41 (TA-41) and TA-55 facilities. The TA-55 facility is at approximately 90 percent capacity and over-committed for LANL pit storage needs. No additional capacity for inventories of SNM from Rocky Flats exists. The TA-41 facility is inactive because it does not meet current DOE requirements for environment, safety and health, security, and conduct of operations. The programmatic requirements at LANL did not justify the costs associated with the required changes at the TA-41 facility.

The Pantex Plant is located near Amarillo, Texas. Although Pantex is planning to increase its interim storage capacity for plutonium pits from its current inventory of 6,800 to 20,000, there are no plans to construct vaults for storing other forms of SNM. The type of steel magazine used for pit storage at Pantex is unsuitable for the safe and secure storage of other forms of SNM.

The Hanford Site is located in south-central Washington State, near the city of Richland. The primary mission at the site is environmental restoration. Hanford is not a candidate for additional storage due to prohibitive costs associated with the conversion of facilities, the termination of the site defense mission, and the commitment to clean up the site (DOE, 1994). As such, Hanford currently is not a viable choice for interim storage of inventories of SNM from Rocky Flats.

None of the individual DOE Weapons Complex sites meet all of the engineering criteria for consolidation and interim storage of the entire Rocky Flats SNM inventory. Although some quantities of the Rocky Flats inventory could be shipped to these sites, processing and packaging would still be required to ship even small quantities of SNM. The material shipped to offsite destinations would be shipped a second time once the long-term storage site is selected. This double shipping would result in increased risks to the environment and to public and worker health. Increased security risks would also result from the additional handling and transportation activities.

A long-term storage solution is being analyzed in the PEIS for Storage and Disposition of Weapons-Usable Fissile Materials (DOE, 1994); however, this solution will not be available for at least ten years. Due to this delay in the long-term storage decision and the other reasons discussed above, immediate shipment of SNM inventories from Rocky Flats is considered to be infeasible.

4.0 AFFECTED ENVIRONMENT

4.1 Natural Environment

Rocky Flats is located on 6,550 acres in rural northern Jefferson County, Colorado, 16 miles northwest of downtown Denver (Figure 4-1). The Rocky Flats Industrial Area occupies approximately 400 acres in the middle of the Site. The remaining 6,150 acres form a Buffer Zone around the active part of Rocky Flats. The Buffer Zone provides a distance of more than one mile between the developed portion of the Site and any public road or private property.

Rocky Flats is 6 miles from the nearest school and 10 miles from the nearest hospital. Approximately 291,000 people live within 10 miles of the Site, over 1,100,000 within 20 miles; while the entire metropolitan Denver area, with a population of over 2.1 million, is within 50 miles of the Site (EG&G,1994a). Population centers are generally to the northeast and southeast of the Site.

Rocky Flats is located on a broad alluvial terrace at the base of the Rocky Mountains at an elevation of about 6,000 feet. Underlying the Site is the Rocky Flats Alluvium, a soil composed of cobbles, coarse gravel, and sand over a largely claystone bedrock. Seismic activity in the area is low and the potential for landslides and subsidence is minimal. Adjacent land uses are agricultural to the west, agricultural with some industrial to the south, agricultural and very-low-density residential to the east, and agricultural/open space to the north.

The climate at Rocky Flats is mild, sunny, and semi-arid with an average of 15 inches of precipitation annually. Winds are generally out of the west and northwest with an average velocity of 8 to 9 miles per hour. Wind gusts exceeding 60 miles per hour occur frequently throughout the year, and gusts exceeding 100 miles per hour occur occasionally. Peak gusts are associated with the winter months.

Figure 4-1. Location of Rocky Flats Environmental Technology Site.

The air quality is generally better at Rocky Flats than in the urbanized portion of the Denver metropolitan area. However, the greater Denver area, including Rocky Flats, is a non-attainment area for carbon monoxide and PM-10 (particulate material less than 10 microns in size), and is in interim compliance for ozone (EPA, 1994). Air emissions from Rocky Flats are within permitted limits for all pollutants for which there are standards. Radionuclide emissions from Rocky Flats are limited by Clean Air Act regulations (40 CFR Part 61, Subpart H) to those amounts that would result in the public receiving a dose of 10 millirem (mrem) per year. The dose of radionuclide emission (point-specific and diffuse sources) to the public from Rocky Flats in 1993 was 0.0016 mrem (EG&G, 1994b). In comparison, the annual natural background radiation for the Denver area is approximately 350 mrem (NCRP, 1987).

Surface water drainage from Rocky Flats flows to the east. The developed area of the Site is drained by Woman and Walnut Creeks, while three other streams drain portions of the Buffer Zone. Ponds on Woman and Walnut Creeks store stormwater runoff from the Site and from the Rocky Flats sewage treatment plant. The contents of the ponds are analyzed to ensure they meet the standards of the Colorado Water Quality Control Commission prior to release downstream. Rocky Flats is not located within the 100-year floodplain as classified by the U.S. Army Corps of Engineers (USCOE, 1992).

Scattered wetlands exist throughout the Site including three small wetlands (combined area less than one acre) between Buildings 371 and 776/777 (ASI, 1990). None of these wetlands are located in the immediate area of the proposed action (Krause, 1994).

The Buffer Zone provides habitat potentially suitable for the Ute Ladies'-Tresses, an orchid listed by the U.S. Fish and Wildlife Service as "threatened." However, individuals of the species were not found in the first or second of three consecutive annual Site wide surveys (ESCO, 1993). A small community of a Colorado plant "species of concern," the forktip threeawn, has been identified along the railroad tracks that enter Rocky Flats from the west along the west access road. This area is over a mile from the location of the proposed action activities. No habitat suitable for either of these species has been documented within the area of the proposed action.

Habitat suitable for a federal Category 2 plant species (a species whose listing as "threatened" or "endangered" may be appropriate, but for which adequate data are not available), the Colorado Butterfly Weed, exists in the Buffer Zone, but no individual of the species has been

found in recent surveys (ESCO, 1993). The Preble's Meadow Jumping Mouse is a Colorado "species of concern" and a federal Category 2 species which DOE treats as an endangered species. It is a resident of many of the riparian areas at Rocky Flats, including those along Woman Creek. No threatened or endangered species, other species of concern, or migratory birds were found in a survey conducted in September 1994 in the undeveloped area east and north of Building 371 (Ryon, 1994).

4.2 Built Environment

The Rocky Flats built environment is the Industrial Area in which the majority of work activities occur and where most of the Site's workers are located. The locations of buildings at Rocky Flats are shown in Figure 4-2 (the buildings that play a role in the proposed Category I and II SNM Consolidation and Interim Storage Program are highlighted.) Buildings 371 and 707 would play the most active role in the proposed action while Buildings 771, 776/777, 779, and 991 would perform consolidation support functions.

The remainder of this section provides a description of these buildings. With the exception of Building 371, all of the buildings were built to commercial industrial standards. Building 371 was built to strict nuclear design standards.

4.2.1 Building 371

Building 371 was originally built to: 1) recover plutonium from residues generated by plutonium-related fabrication, assembly, and research activities throughout Rocky Flats; 2) convert the recovered plutonium into high-purity buttons; and 3) recover associated americium and convert it into americium dioxide, a saleable product. The building, completed in 1981, was built to stringent nuclear design standards and was intended to replace facilities in Building 771.

Building 371 currently stores Category I and II SNM and is proposed to be the primary SNM consolidation and interim storage facility until final disposition is determined and implemented. Portions of the Rocky Flats plutonium residues, TRU waste, and RCRA waste inventories

Figure 4-2. Buildings 371, 707, 771, 776/777, 779, and 991 at Rocky Flats Environmental Technology Site.

currently are stored in Building 371. The exterior walls of the building, both above and below grade, are cast-in-place reinforced concrete. The walls can withstand the forces imposed by a tornado or a design-basis earthquake of approximately Richter 6.0 and still provide an outer containment barrier for radioactive materials. Vaults have reinforced concrete walls that are 8 inches to 24 inches thick. Stairway and elevator walls are constructed of poured-in-place concrete. Walls divide process areas into compartments separated by wide access corridors. Additional walls within the compartments form tank vaults, process canyons, and control rooms. Canyon and tank vault walls are constructed of 2-foot-thick concrete to protect workers from any possible radiation emissions. Dispersal of airborne radioactivity within the building is minimized by "cascading" differential pressures from areas of low potential contamination to areas of high contamination. The differential pressure within each ventilation zone is maintained by redundant fans. The building has both normal and emergency power supplies and contains various types of fire detection/alarm and fire suppression systems. Other detection and alarm systems provide airborne radiation monitoring and criticality detection for the building.

The four-level facility has approximately 186,000 square feet of floor space and contains six plutonium storage vaults and vault-type rooms. The stacker/retriever moves radioactive materials between the central storage vault and the input/output stations. In addition to this transport capability, the central storage vault was designed for storage of Category I and II SNM.

4.2.2 Building 707

Building 707 was built as a manufacturing facility for casting, fabricating, assembling, and testing finished plutonium parts. Operations in the facility were divided into six categories: 1) metallurgy, 2) fabrication (machining), 3) assembly, 4) inspection, 5) nondestructive testing, and 6) support. The building was completed in 1969 and is the primary facility for metal brushing, size reduction of metal, and thermal stabilization activities.

Building 707 is a two-story facility with 74,240 square feet per floor. A single-story portion with 18,560 square feet comprises the east side of the building. The building contains ten modules in which various manufacturing activities have taken place in the past. Building 707 is connected directly, through other buildings or by tunnels, to Buildings 776/777, 771, 778, and 779.

4.2.3 Building 771

Building 771 was built in 1953, primarily for use in plutonium recovery, but it also has capabilities for chemical research, plutonium metallurgy, and analytical laboratory activities. The building once housed maintenance shops and a waste packaging facility. Three basic operations were conducted in the building: 1) chemical and physical processes for recovering and refining plutonium metal and americium oxide; 2) plutonium chemistry research; and 3) radiological analyses of samples for isotopic content, impurities, and trace elements. The principal operation was recovery of plutonium from residues generated during plutonium-related fabrication, assembly, and research operations throughout the Site.

Building 771 is a two-level facility with approximately 151,000 square feet of floor space and stores plutonium that requires stabilization. The building is connected by a tunnel to Building 776/777 which is directly connected to Buildings 779 and 707. The tunnel between Buildings 771 and 776 is concrete-lined and is equipped with a HEPA filtration ventilation system.

Calorimetry, a material balance process used to determine the quantity of plutonium in a storage container, is performed in Building 771 for the pyrophoric oxide that is stabilized in Building 707. Calorimetry has continued in Building 771 during curtailment of nuclear operations as part of ongoing plutonium management operations.

4.2.4 Building 776/777

Building 776/777 is comprised of two adjoining buildings and is considered as a single structure. Building 776/777 was originally built for six major categories of operations: 1) weapons production support; 2) site-return processing; 3) waste operations; 4) research and development; 5) special projects; and 6) support activities such as radiation monitoring, maintenance, and process materials support. Currently, Building 776/777 is used for waste operations such as drum storage and residue drum venting.

Building 776/777 is a two-story facility with approximately 156,200 square feet of floor space and contains SNM that requires stabilization. The building is connected to Building 779 by an enclosed hallway, to Building 771 by a tunnel, and to Building 707 via Building 778.

4.2.5 Building 779

Building 779 is a research and development facility originally built to support production and recovery processes. The facility was completed in 1965 and the external structure was subsequently upgraded to withstand an earthquake of 6.0 on the Richter scale.

Although production activities have been halted, research and nonnuclear production support activities such as liquid carbon dioxide cleaning, waste minimization/characterization, stockpile reliability evaluation, and surface analyses continue. The building consists of approximately 68,000 square feet of floor space on two floors with a small basement and contains SNM that requires stabilization. The building is connected by tunnel either directly, or through other buildings to Buildings 776/777, 707, and 771.

4.2.6 Building 991

Building 991 was built in 1952 and is used primarily for shipping SNM and other certified product materials (including nonnuclear materials). The facility and its associated underground tunnels and vaults are also used for storing SNM and other certified product materials.

Operations in the building are the standard warehousing functions of receiving, storing, and shipping these materials, both onsite and offsite. In the past, there were several operations involving nondestructive testing, machining, inspection, and final quality acceptance certification of nuclear and nonnuclear materials. Current operations in the building consist of nondestructive testing, a metrology laboratory, a surface laboratory, an alarms maintenance shop, various logistics activities, and storage of waste.

4.3 Safety Systems

Throughout the SNM Consolidation and Interim Storage Program, safety systems would be in place to protect workers, the public, and the environment. The systems include vital safety systems (VSSs) and design features such as gloveboxes, vaults, and other building systems.

Worker safety is further enhanced by personal protective equipment and other requirements in accordance with the Occupational Safety and Health Act (OSHA) and other applicable regulations. Administrative safety procedures also enhance the safe conduct of operations.

The VSSs prevent and mitigate potential accidents. These systems have surveillance testing requirements and limits for operations which are specified in the Operational Safety Requirements for the Building 371 Final Safety Analysis Report (FSAR) and in FSARs for the export buildings. Table 4-1 lists the VSSs in Building 371 and many of the export buildings that are designed to help ensure safe operation of the SNM consolidation and processing activities. Brief descriptions of these systems are provided below; more detailed descriptions can be found in each building's FSAR.

The SNM processing activities would be performed in gloveboxes. Gloveboxes are totally enclosed structures made of steel and leaded glass and are accessible through gloveports. Workers handle SNM through the gloveports so that there is no direct physical contact with the SNM. Gloveboxes used in association with SNM processing are equipped with an exhaust HEPA filter to prevent accumulation of SNM in exhaust ductwork.

Personal protective equipment is provided to enhance worker safety. Throughout the proposed action activities, operators would be equipped with appropriate protective clothing as determined by job reviews and documented on radiation work permits. Each operator is trained on the safety equipment required for each activity. Each person involved in an activity is required to read and follow the requirements of the radiation work permit. The normal equipment required for operations involving SNM is coveralls, external radiation dosimeters, safety glasses, and safety shoes. Many of the operations also require using two pairs of surgical gloves. Workers use alpha monitors to check for SNM contamination each time they exit a set of glovebox gloves. If contamination is found, work stops until the cause is identified and corrected.

Table 4-1. Vital Safety Systems in Building 371 and Export Buildings.

Vital Safety System	Description
Ventilation Systems	Maintains negative pressure in gloveboxes Filters all exhaust through stages of HEPA filters Provides some gloveboxes with inert atmospheres
Selective Alpha Air Monitors (SAAMs)	Monitors the modules and effluent exhaust for airborne contamination
Fire Protection Systems	Detects and suppresses fires in gloveboxes, plenums, and modules in Building 371 and the export buildings
Life Safety/Disaster Warning System	Transmits audio alarms and safety announcements through public address speakers
Criticality Alarm System	Detects and transmits alarms of any criticality
Emergency Power System	Emergency diesel generators back up normal and alternate utility electrical power supplies Uninterruptible power for sensitive electrical loads engage upon loss of normal and alternate power

Ventilation

Many of the SNM preparation activities described in Section 3.0 would be conducted within the confines of gloveboxes. Ventilation systems maintain the gloveboxes at a negative pressure. If any breach were to develop (e.g., a torn glove), the flow of air would be from the room to the gloveboxes, thus limiting the spread of contamination.

Exhaust air from gloveboxes must pass through four stages of HEPA filters prior to release to the atmosphere. Each stage of HEPA filters provides a removal efficiency of at least 99.8 percent. The multi-stage HEPA filters essentially prevent contamination from reaching the atmosphere. Only one stage of the HEPA filters is tested to verify efficiency in Buildings 771, 776/777, and 779; two stages are tested in Buildings 371 and 707.

Selective Alpha Air Monitors

Selective Alpha Air Monitors (SAAMs) monitor and detect the presence of airborne contamination in rooms, plenums, and modules. Upon the alarm of a SAAM, remedial actions are taken to prevent worker exposure and release of contamination to the environment.

Fire Protection

Fire protection VSSs provide fire detection and fire suppression in all buildings containing radioactive material. Gloveboxes and exhaust plenums are equipped with glovebox overheat detectors which sound an alarm should ambient temperature in the system rise. Alarm indication is provided both locally and to the fire department. Fire detection systems sound an alarm should a fault occur within the system.

Exhaust plenums are protected by a water deluge system that sprays water before the first stage of HEPA filters in the event of an overheated plenum. The water deluge system protects the integrity of the HEPA filters. Further fire suppression capability is provided by fire hoses and fire extinguishers.

Life Safety/Disaster Warning

The Life Safety/Disaster Warning (LS/DW) VSS provides a means for the audio transmission of alarms and safety announcements over public address speakers located in all buildings.

Criticality Alarm

The criticality alarm VSS detects any criticality event through the use of numerous detectors. The system provides audio and visual beacon alarms. A criticality event is extremely unlikely due to the small amounts of SNM being handled at any one time and the size and configuration of containers used for transportation and storage. Strict administrative controls called criticality safety limits are enforced in all buildings to control the amounts and forms of SNM in any given location.

Emergency Power

Normal and alternate power is supplied from the Public Service Company of Colorado to the VSSs. Emergency diesel generators provide backup power capabilities should normal and alternate power be lost. Uninterruptible power supply (UPS) systems would provide continuous power for sensitive components of VSS electrical loads upon loss of power. For example, fire detection panels, the LS/DW system, and the criticality alarm system all have their own backup batteries or UPS system.

5.0 ENVIRONMENTAL EFFECTS

It is DOE policy to conduct operations in compliance with all applicable federal, state, and local laws and regulations, and with all applicable DOE Orders. Environmental monitoring programs are implemented to identify and minimize environmental impacts from Site operations. The air, groundwater, and surface water in and around the Site are monitored routinely. Air emissions are monitored at all potential sources and at ambient air monitors located around the Site boundary and other offsite locations. Rocky Flats has comprehensive groundwater and surface water programs for monitoring and characterizing the water quality and flow patterns in the Site area. The annual Site Environmental Report for Rocky Flats (EG&G, 1994a) presents summary environmental data and a discussion of environmental monitoring and compliance programs at the Site. The report also includes an estimate of the impact of Site operations on human health and the environment.

The expectation is that neither the proposed action nor the no action alternative would cause any adverse environmental effect. Therefore, this EA focuses on the human health effects potentially resulting from radiological exposures associated with the proposed action and the no action alternative. The other alternatives described in Section 3.3 of this EA were determined to be infeasible and were not analyzed further.

A radiological risk comparison is depicted at different stages of the proposed action and the no action alternative for risk to the public (Figure 5-1) and risk to workers (Figure 5-2). The time period for these comparisons extends from the start of consolidation activities through the end of interim storage (approximately 10 to 15 years). The arbitrary risk dimension illustrates how risk increases or decreases with time (refer to Appendix A for information on risk assessment).

The risk analyses in this section use the conservative assumption that risk to the public is equal to that of the maximally exposed offsite individual (i.e., a hypothetical person who lives continuously at a point on the Site boundary where exposure to the public from accidents would be the highest).

Figure 5-1. Radiological Risk to the Public from the Proposed Action and the No Action Alternative.

Figure 5-2. Radiological Risk to Workers from the Proposed Action and the No Action Alternative.

5.1 Non-Radiological Environmental Effects

Most activities of both the proposed action and the no action alternative would take place inside existing buildings. As a result, neither of the alternatives would affect water or biological resources. A wetlands analysis was conducted and concluded that the small areas of wetlands within the Protected Area would not be impacted adversely (Krause, 1994). A review of the Site hydrologic analysis concluded that no floodplains would be affected (USCOE, 1992). An air quality assessment was conducted and no air quality impacts to the environment were anticipated (Putney, 1994).

5.2 Waste Management Environmental Effects

Proposed Action

Under the proposed action, approximately 130 cubic yards (approximately 9 fifty-five-gallon drums and 30 crates) of low-level waste and approximately 1,040 cubic yards (approximately 3,800 fifty-five-gallon drums) of TRU waste would be generated. There is no regulatory limit on the quantity of low-level or TRU waste that can be stored onsite; however, the low-level waste would be sent to an approved disposal facility. It is anticipated that there will be adequate storage capacity at Rocky Flats for the low-level and TRU waste generated from the proposed action activities.

Approximately 100 cubic yards (374 fifty-five-gallon drums) of TRU waste currently is located in Room 3337 of Building 371. This room would be modified to become a storage vault for SNM under the proposed action, and the TRU waste would be moved to another approved storage location, either within Building 371 or in another storage location at Rocky Flats.

The generation, relocation, and storage of this waste would not result in any measurable environmental effects because of strict adherence to safety procedures and requirements for managing waste at Rocky Flats.

No Action Alternative

Approximately 510 cubic yards (approximately 1,860 fifty-five-gallon drums) of TRU waste would be generated under the no action alternative by ongoing thermal stabilization and other SNM maintenance activities over the interim storage period. It is anticipated that there will be adequate storage capacity at Rocky Flats for the TRU waste generated from the no action alternative. The generation of this waste would not result in any measurable environmental effects because of strict adherence to safety procedures and requirements for managing waste at Rocky Flats.

5.3 Radiological Environmental Effects

Risk resulting from the proposed action or the no action alternative has two components: risk from normal operations and risk from accidents. For each component, risk results from exposure to ionizing radiation. The source of ionizing radiation at Rocky Flats is SNM. The amount of radiation a person may experience is called the radiation dose. An internal dose results from the SNM entering a person's body. An external dose results from a person being in proximity to penetrating radiation.

Analyses of radiation dose and its health effects rely on scientific assumptions to compensate for lack of understanding and data. For example, a risk estimate may assume the existence of effective mitigative action and protective measures in preparation for an accident or other unplanned event (refer to Appendix A for information on risk assessment).

5.3.1 Radiological Effects from Normal Operations

Normal operations are those that proceed according to a predetermined plan. Most normal operations are routine. For example, the Site routinely emits very low concentrations of radioactivity from its HEPA filtered ventilation stacks. The dose of radionuclide emission (point-specific and diffuse sources) to the public from Rocky Flats in 1993 was 0.0016 mrem (EG&G, 1994b). In comparison, the annual natural background radiation for the Denver area is approximately 350 mrem (NCRP, 1987).

5.3.1.1 Risk to the Public from Normal Operations

Proposed Action

The proposed action involves brushing metal, size reduction of metal, thermal stabilization of oxide, transportation, packaging, and interim storage of SNM. These activities would slightly increase the potential for radionuclide air emissions. Under the proposed action, approximately 5,300 kg of SNM in solid form would be reduced in size, approximately 4,000 kg of plutonium in solid form would be brushed, and approximately 3,100 kg of SNM oxide would be thermally stabilized. Because of its chemical stability, approximately 1,300 kg of enriched uranium would not require thermal stabilization or brushing prior to packaging.

The estimated atmospheric emission potential for the proposed action is 0.31 grams (or 0.02 curies) of plutonium 239/240 and was calculated using the emission and control factors in the 40 CFR Part 61, Appendix D protocol. Actual emissions would be lower than those estimated because of the very conservative assumptions used in the calculations. Modeling the calculated emission to the public with the CAP88-PC computer dispersion code results in an estimated annual dose of 0.055 mrem for the anticipated seven-year consolidation effort. The annual Site emission limit for dose to the public is 10 mrem. In comparison, the public living in the Denver-metropolitan area receives an annual dose of approximately 350 mrem from naturally occurring radiation (NCRP, 1987).

The annual dose to the public in 1989, the last year of weapons production at Rocky Flats, was 0.0002 mrem (as measured from point-specific sources). The annual dose based on monitored emissions since cessation of weapons production has decreased steadily ever since (the 1993 dose, as measured from point-specific sources, was 0.000017 mrem). These annual doses were based on actual emission measurements, while the proposed action and no action alternative doses are based on conservative calculations. Measured emissions and the resulting annual dose to the public from the proposed action is projected to be 0.055 mrem for seven years. This annual dose is higher than the 1989 dose, but still far below the annual Site emission limit of 10 mrem.

No Action Alternative

The annual dose for the no action alternative was estimated by combining the 1993 radionuclide air emission measurements with the calculated doses expected for the Building 707 Thermal Stabilization and the Building 371/771 Liquid Stabilization Programs. Measured emissions

and a resulting estimated annual dose of 0.0048 mrem for fifteen years compares closely with the 1989 dose, and is far below the annual Site emission limit of 10 mrem.

5.3.1.2 Risk to Workers from Normal Operations

Workers are exposed routinely to ionizing radiation at as low as reasonably achievable (ALARA) levels during normal operations at Rocky Flats. ALARA is an approach to radiation protection that minimizes and controls exposures to workers and the public to levels as low as reasonably achievable, taking into account social, technical, economic, and public policy considerations. Accordingly, worker doses are maintained below regulatory and contractual limits. Occupational Radiation Protection (10 CFR Part 835) regulatory limits apply to individual workers, and contractual limits with DOE for individual Rocky Flats workers are dramatically lower than these regulatory limits for individual workers in general.

Current regulatory limits are consistent with the 1987 National Council on Radiation Protection (NCRP) recommendations. The NCRP recommendations for occupational exposure have the intent of limiting radiation worker risk to a level that is reasonable and acceptable with respect to the value of the work being performed. The regulatory limit stated in 10 CFR Part 835 is 5.0 rem effective dose equivalent (EDE) annually. The contractual limit with DOE for individual Rocky Flats workers is 2.0 rem EDE annually. Rocky Flats has a far lower Administrative Control Level (ACL) of 0.75 rem EDE annually, and actual individual worker doses have been below the ACL. The ACL helps ensure that worker exposures are ALARA. Based on the radiogenic cancer assumptions in the 1987 NCRP recommendations, workers receiving the ACL dose experience an annual latent cancer fatality (LCF) risk of about one in ten thousand, which is the all-industry average.

Proposed Action

The proposed action would reduce radiological exposures for most Rocky Flats radiation workers by consolidating SNM into Building 371. Radiation sources would be relocated to areas where exposure to workers would be minimal. The central storage vault in Building 371 utilizes the fully automated stacker/retriever and shielded pallets to minimize worker interaction with SNM. Radiation workers would not need to enter the central storage vault during loading and inspection activities, further reducing radiological exposures.

The proposed SNM containers would require less frequent inventory inspection than the bimonthly inspections required in the export buildings because they provide for more stable storage than do the currently used containers. Although dose rates in the SNM consolidation vaults and vault-type rooms would be somewhat higher than in the export building vaults, an overall dose savings for the worker population would result from the reduced inspection frequency.

Dose is calculated as the dose rate multiplied times the length of exposure. For example, the SNM stored in the vault proposed for Room 3337 would produce dose rates in the range of 40 to 70 mrem per hour. In comparison, other vaults at the Site typically have dose rates less than 50 mrem per hour. However, the SNM consolidation effort reduces the frequency of inventory inspection by a factor of 24 from the current requirement. Thus, a dose savings would be realized for the workers performing the inventories. With the use of the stacker/retriever, the SNM could be inspected remotely inside the central storage vault which would further contribute to dose savings. Improved labeling of the interim storage containers would reduce the time required for inspection of a container, also contributing to dose savings.

The primary radiological risk to workers associated with the proposed SNM consolidation effort results from exposure in vaults and vault-type rooms. Collective exposure for the workers would be 43 person-rem EDE over a seven-year period; however, the annual dose of an individual worker would be less than the Site ACL.

Dose rates in rooms adjacent to the central storage vault would increase by less than 0.2 mrem per hour, and dose rates in the halls adjacent to other vaults and vault-type rooms in Building 371 would increase by less than 0.5 mrem per hour. The room adjacent to the central storage vault would have the highest occupancy rate at approximately six person-hours per day. Workers in that room would experience an annual collective dose increase of 0.3 person-rem EDE. The current median dose rate in the room is approximately 0.5 mrem per hour. Because the room occupancy rate is divided among several workers, an increase of 0.2 mrem per hour would not place workers in danger of exceeding the current ACL. These figures are based on the conservative assumption of maximum room occupation.

As consolidation efforts progress, worker activity unrelated to the storage of SNM is expected to decrease in Building 371. This would counterbalance the increased dose rates during consolidation activities. The occupancy of the halls around the SNM storage areas would be

small relative to that encountered in the same areas during loading, inspection, and surveillance activities. The estimated occupancy of these areas during consolidation activities is estimated at 170 person-hours per year. If the hall occupancy is also assumed to be 170 person-hours per year (a conservative assumption), a collective annual dose of less than 0.1 person-rem EDE would be received.

Dose rates in areas near the SNM storage vaults and vault-type rooms, including laboratories, could rise from current levels to more than the 0.5 mrem per hour, the design criterion for routine occupation. As SNM consolidation activities draw to conclusion, however, the tasks in the radiation areas would diminish. Design and job reviews would ensure that occupational exposures of workers in these areas remain ALARA.

The dose estimates for SNM consolidation conservatively assume that the plutonium is 75 years old and that it all is in oxide form. Over time, plutonium oxide produces additional neutrons and secondary photons, which results in higher potential dose rates than from SNM in metal form. Under the proposed action, most of the Rocky Flats worker population would avoid this dose rate increase because the SNM would be removed from the buildings in which they work.

No Action Alternative

Many of the safety systems in the older buildings require an inordinate amount of frequent preventative and corrective maintenance. Degradation of building vital safety systems (VSSs) increases the radiation exposure of the material handlers and support personnel. Maintenance of the VSSs under the no action alternative would require work on five buildings as compared to only one if the proposed action of consolidation of SNM in Building 371 is selected.

By leaving SNM stored in the export buildings, workers would realize a dose savings from not conducting consolidation activities. However, the additional dose from the current inventory inspection frequency and increased maintenance activities in radiation areas would be greater over time than from the initial dose savings. Radiological risk associated with the no action alternative is illustrated in Figure 5-2.

5.3.2 Exposure from Radiological Accidents

The following sections address risk to the public and workers from radiological accidents.

5.3.2.1 Risk to the Public from Accidents

Accidents may occur during the processing and movement of SNM that have the potential for exposure of the public to radiological contamination. The accidents considered include fires, explosions, spills, criticalities, and external events such as truck and airplane crashes, earthquakes, extreme winds, tornados, floods, snow loading, and lightning.

Public health effects from radiological contamination are derived from the number of grams of SNM that potentially could be released by a particular accident scenario. The health effects from uranium are orders of magnitude lower than those from plutonium; therefore, the following discussion focuses entirely on plutonium. Assumptions are made concerning the physical processes that can release plutonium from its container or enclosure, the amount of material that can become airborne, the fraction of this material that can enter and be retained by the body, and the atmospheric transport properties of the material. These assumptions are based on experimental data and engineering judgment. Systems and structures are credited for mitigation of consequences when it is considered appropriate to assume their availability during the accident. Similarly, accident probabilities are derived from equipment and human failure data.

Risk to the public from plutonium exposure is a combination of the probability and consequence of accidental release. Two different accidents may have the same overall risk, even though one has a high probability of occurrence but a small consequence, while the other accident may have a low probability of occurrence and a large consequence.

The estimates of risk to the public for SNM consolidation made use of safety analyses previously generated for similar operations, including those documented in the Final Environmental Impact Statement for Rocky Flats Plant Site (DOE, 1980) and Final Safety Analysis Reports (EG&G, 1980s). The safety analyses evaluated the probability of loss of confinement, potential pathways to the environment, and health effects resulting from those releases. The existing analyses required some adjustment of accident parameters to adapt them specifically to the proposed action and the no action alternative. The adaptations represent the entire range of

dominant accident possibilities for all facilities and constitute the relative public risk estimate for selected bounding accidents. This analysis is described in detail in Safety Analysis in Support of the Environmental Assessment for Consolidation and Interim Storage of SNM in Building 371 (EG&G, 1995).

Proposed Action

The proposed action would reduce the risk to the public in the long term. Figure 5-1 illustrates how activities necessary for consolidation and processing of SNM would cause an initial rise in risk to the public. These include size reduction of metal, brushing of metal, thermal stabilization of oxide, packaging, and transportation; all of which increase the probability of operational accidents during the seven-year duration of these activities. The risk to the public for the most severe accident of each type considered is presented in Table 5-1.

The probability of operational accidents would decrease after consolidation and processing of SNM. Interim storage of the material in Building 371 would involve minimal handling of SNM, particularly after the introduction of the proposed storage containers for oxide and metal. Once the proposed action is completed, the SNM stored at Rocky Flats would represent a lower risk to the public.

The probabilities for the occurrence of accident categories (related to the consequences to the public and workers) may be different because the bounding accidents and/or the dynamics of exposure may be different for the two groups.

A fire during size reduction of plutonium metal in Building 707 represents the bounding fire accident with the greatest release of plutonium into the environment (see Appendix A for an explanation of bounding accident scenarios). It was assumed conservatively that simultaneous loss of normal and alternate offsite electric power and the building's emergency diesel generator would occur, resulting in the loss of the Building 707 ventilation and HEPA filtration systems for gloveboxes and process rooms. It also was assumed that pyrophoric materials would spontaneously ignite and breach the glovebox. Without active ventilation, a portion of the release would migrate directly to the outside environment through a crack around personnel egress doors. This scenario has a probability of occurrence of 6×10^{-5} per year with a dose to the public of 1×10^{-2} rem EDE. The resultant latent cancer fatalities (LCFs) among the population within 50 miles from the Site for this accident scenario is 1×10^{-3} .

Table 5-1. Consequences to the Public* from Bounding Accidents.

Bounding Accident Category	Proposed Action: Probability of Occurrence (per year)	No Action Alternative: Probability of Occurrence (per year)	Proposed Action: No. of Latent Cancer Fatalities Among Population <50 miles from Site	No Action Alternative: No. of Latent Cancer Fatalities Among Population <50 miles from Site
Fire	6×10^{-5}	2×10^{-6}	1×10^{-3}	3×10^{-4}
Explosion	5×10^{-5}	5×10^{-5}	4×10^{-2}	4×10^{-2}
Spill	1×10^{-3}	1×10^{-4}	4×10^{-3}	5×10^{-4}
Criticality	1×10^{-4}	1×10^{-4}	6×10^{-4}	6×10^{-4}
Intra-Building Transfers	1×10^{-4}	1×10^{-4}	5×10^{-4}	5×10^{-4}
Onsite Truck Transportation	9×10^{-7}	9×10^{-8}	8×10^{-1}	5×10^{-2}
Natural Phenomena	1×10^{-3}	1×10^{-3}	1×10^{-1}	1×10^{-1}
Airplane Crash	4×10^{-8}	4×10^{-9}	5×10^0	5×10^0
Severe Accident Beyond Design Basis	8×10^{-4}	8×10^{-4}	6×10^{-1}	9×10^{-1}

- * Risk to the public is assumed conservatively as equal to that of a hypothetical person who lives continuously at a point on the Site boundary where exposure to the public from accidents would be the highest.

See Appendix B, Useful Information, for Examples of Scientific Notation Usage

The bounding explosion accident is the ignition of leaked acetylene from an oxy-acetylene welding operation with subsequent damage to a glovebox where metal items are being reduced in size. In Building 707, the force of the explosion was assumed to breach the building confinement systems by blowing open personnel egress doors. This would cause an unfiltered release of plutonium into the environment. The probability of this scenario occurring is 5×10^{-5} per year with a dose to the public of 4×10^{-1} rem EDE. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 4×10^{-2} . (The scenario for Building 371 is equivalent with the exception that all releases would be filtered and the resulting in doses would be orders of magnitude lower.)

The bounding spill accident results from a container of plutonium oxide being dropped from the loading/receiving dock which would cause an unfiltered release. Transfer containers are designed to withstand anticipated incidents such as being dropped from the dock or truck; however, it was assumed conservatively that the dropped container would have an improperly sealed lid as a result of human error. The dock doors were assumed to be open at the same time, allowing direct dispersal of plutonium into the environment. The probability of this scenario occurring is 1×10^{-3} per year with a dose to the public of 4×10^{-2} rem EDE. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 4×10^{-3} .

The Rocky Flats occurrence reporting data base has not documented one criticality accident in the 40-year history of operations. Criticality safety limits are strictly enforced and are very specific as to the quantity and mass of fissile material materials allowed in a given location. These measures have successfully prevented such an occurrence at Rocky Flats.

The bounding criticality accident assumed a violation of double contingency, allowing sufficient quantities of plutonium metal to be placed in a configuration that would initiate a criticality. (Double contingency is a practice of designing a process such that no single accident will result in a criticality.) The probability of this scenario occurring is 1×10^{-4} per year with a dose to the public of 3×10^{-2} rem EDE. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 6×10^{-4} . The risk from criticality accidents would decrease sharply after completion of consolidation efforts, reflecting the reduced frequency of handling these materials.

Movement of plutonium on carts was analyzed for accidents including fires inside and outside plutonium containers, explosions, spills, and criticalities. The bounding accident for intra-building transfers is a fire initiated by pyrophoric plutonium while moving carts in Building

778. The probability of this scenario occurring is 1×10^{-4} per year with a dose to the public of 5×10^{-3} rem EDE. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 5×10^{-4} .

The bounding accident for onsite truck transportation is a severe collision of a truck transporting plutonium oxide. The crash was assumed to breach the diesel fuel tank and ignite a fire which engulfs the entire truck. Half of the containers were assumed to be breached and release part of their contents into the environment. The probability of this scenario occurring is 9×10^{-7} per year with a dose to the public of 2×10^0 rem EDE. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 8×10^{-1} .

Natural phenomena events include earthquakes, extreme winds, and tornados. The bounding natural phenomena scenario is an earthquake of 0.14 gravity bedrock acceleration (approximately 6.0 on the Richter scale). This would result in the loss of offsite power and onsite emergency diesel power and portions of Building 707 would collapse. The probability of this scenario occurring is 1×10^{-3} per year with a dose to the public of 1×10^0 rem EDE. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 1×10^{-1} .

Over the long term, natural phenomena events dominate risk to the public. These events have a low probability of occurrence and a large consequence. Consolidation of SNM into Building 371 would lower the Site risk because the building meets the design basis requirements for these events. Therefore, risk to the public would be substantially reduced over the seven-year period as preliminary activities are completed and material is consolidated into Building 371.

Analyses were performed for the crash of an airplane into Building 707 (Module J) and into a new vault in Building 371. In the bounding accident, a small plane would penetrate some rooms on the main floor of either building. The accident involves plutonium metal and the analyses take no credit for sealed containers. The probability of this scenario occurring is 4×10^{-8} per year with a dose to the public of 2×10^1 rem EDE. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 5×10^0 .

A severe earthquake of 0.21 gravity bedrock acceleration (greater than 6.5 on the Richter scale) was analyzed which is beyond the design basis for the Site. This earthquake would collapse all of Building 707, while Building 371 would remain intact. The probability of this scenario occurring was estimated to be 8×10^{-4} per year with a dose to the public of 6×10^0 .

rem EDE from the collapse of Building 707. The resultant LCFs among the population within 50 miles from the Site for this accident scenario is 6×10^{-1} .

No Action Alternative

Under the no action alternative, there would be an ongoing need to move SNM, brush metal, and stabilize oxides. Dispersible forms of plutonium oxide would accumulate in unsealed containers while safety systems would continue to degrade. Risk to the public would be smaller initially for the no action alternative (as illustrated in Figure 5-2), but it rises to exceed the risk of the proposed action over time.

Risk from fire, explosion, and spill accidents associated with the no action alternative would be lower for operational accidents during the period of SNM consolidation and processing because the material would not be handled to the extent expected under the proposed action. The SNM stored in the export buildings are inside gloveboxes and would have a greater probability of being involved in a room fire or explosion than would material stored in the central storage vault in Building 371. Gloveboxes in the export buildings are susceptible to fires from a number of potential initiators.

The probability of a criticality accident occurring under the no action alternative would be similar to that of the proposed action. The SNM would continue to be handled on a regular basis as part of the ongoing Thermal Stabilization Program (DOE, 1994a).

The risk from onsite transport of plutonium metal and oxide would be somewhat lower initially under the no action alternative because fewer containers of pyrophoric oxide would be moved by truck from Building 371 to Building 707 for stabilization and packaging. This would reduce the probability of the material being involved in a truck fire. Although the probability of a truck fire is somewhat greater when carrying pyrophoric material than when carrying stabilized oxide, the overall risk is lower because the amount of pyrophoric material permitted in each container is only 1 kg as compared to 5 kg of stabilized material.

Natural phenomena events dominate risk to the public from the export buildings. These buildings are susceptible to natural phenomena such as high winds, tornados, and earthquakes. Various structural analyses have confirmed that the export buildings could collapse, causing plutonium to be released directly to the atmosphere. Building 371 is designed to withstand these natural forces. Plutonium released by an earthquake inside the intact Building 371

structure must pass through two stages of HEPA filters which would reduce public exposure by six orders of magnitude.

The risk due to an airplane crash is similar under both the proposed action and the no action alternative, partly because it was assumed that all containers were vulnerable during the ensuing fire. However, if test results for the proposed storage containers demonstrate that they can withstand a 30-minute fire, then public dose from this accident would be lower by two to three orders of magnitude for the proposed action.

Relative Risk to the Public

The total relative risk for each of the accidents described above is summed in Table 5-2 for the entire Site for both the proposed action and the no action alternative. Only the risk for those previously analyzed accidents of each type have been included in this total. Relative risk does not represent actual risk, but rather the relative risk for a specific accident sequence as it occurs in each building. The accidents in Table 5-2 do not fully account for potential additional doses from equipment degradation and accumulation of dispersible forms of plutonium oxide in unsealed containers in the export buildings. The relative risk is dominated over the long term by radiological releases from natural phenomena events. During the short term (i.e., the seven-year period of SNM consolidation and processing) the relative risk would be dominated by operational accidents such as spills of plutonium oxide.

5.3.2.2 Risk to Workers from Accidents

Physical and administrative radiological controls minimize the frequency of radiological accidents, and mitigation and detection systems minimize accident consequences. The mitigation and detection systems, together with radiological controls, minimize exposures from anticipated accidents, although large radiation doses and fatalities are possible during some accidents.

Proposed Action

Risk to the worker is assessed for the same accidents as for the public (refer to Section 5.3.2.1). The probabilities for such accidents in most cases are very similar for the worker and the public, but the consequences are substantially higher for workers because of their close proximity to an accident at the Site.

Table 5-2. Relative Risk to the Public* from Accidents.

Accident Category	Proposed Action: Relative Risk to the Public (rem/yr)	No Action Alternative: Relative Risk to the Public (rem/yr)
Fire	$<2 \times 10^{-6}$	$<2 \times 10^{-8}$
Explosion	2×10^{-5}	$<7 \times 10^{-5}$
Spill	2×10^{-4}	1×10^{-5}
Criticality	6×10^{-6}	2×10^{-5}
Transportation (Intra-Building & Onsite Truck)	3×10^{-6}	7×10^{-7}
Natural Phenomena	1×10^{-3}	3×10^{-3}
Airplane Crash	7×10^{-7}	9×10^{-7}
Severe Accident Beyond Design Basis	5×10^{-3}	3×10^{-2}
Composite Risk Total	6×10^{-3}	3×10^{-2}

- Risk to the public is assumed conservatively as equal to that of a hypothetical person who lives continuously at a point on the Site boundary where exposure to the public from accidents would be the highest.

See Appendix B, Useful Information, for Examples of Scientific Notation Usage

Radiation exposure from an accident would be greatest for workers in the immediate vicinity of the accident. Other Rocky Flats workers located away from the accident would receive exposures similar to, but greater than, exposure to the public. During the preparation and processing of SNM for consolidation, an increased work activity level in the presence of SNM and an increased SNM inventory in the consolidation areas would temporarily increase the risk from the proposed action.

Accidents could release radioactive material directly into the environment of the immediate workers, making the material available for inhalation as an aerosol. Accidents are most likely to occur during and prior to SNM repackaging and would present the greatest risk for the worker population.

Radiological controls, including gloveboxes and other secondary containments, minimize the probability of release to the workers' environment. Selective alpha air monitors (SAAMs) and room air ventilation are required detection and mitigation systems, respectively. SAAM alarms notify workers when airborne radioactive material is present, and process areas in Building 371 are ventilated with eight room-air volumes per hour.

Radiation exposure events have a low probability of occurrence and their expected contribution to the total dose of the worker population is minimal. During consolidation activities, the probability and consequence of accidents involving SNM would increase from current levels. The consequences to workers from bounding accidents under the proposed action are shown in Table 5-3.

A dose of 400 to 500 rem received within 24 hours is normally considered fatal in 50 percent of the population. However, plutonium gives a very small daily exposure. An overall high dose results from the tendency of plutonium to localize in the bone, providing dose over a lifetime, but with very little received during any 24-hour period.

The bounding fire accident with the most serious worker consequences is from a dock fire in Building 707 which is initiated by maintenance activities such as welding or by an electrical short. The probability of occurrence is 2×10^{-4} per year and the dose to a worker in the immediate vicinity is 3×10^2 rem EDE. The resultant LCFs among Rocky Flats workers for this accident scenario is 6×10^{-1} .

The bounding explosion accident is the ignition of leaked acetylene from an oxy-acetylene welding operation with subsequent damage to a glovebox where metal items are being reduced in size. This accident has a probability of occurrence of 5×10^{-5} per year and would result in fatalities to workers in the immediate vicinity due to shrapnel and a shock wave accompanying the explosion.

Accidents involving the spill of plutonium oxide dominate risk to the worker due to inhalation of aerosolized plutonium. This type of accident has a relatively high probability of occurrence because of the need to handle the material on a regular basis in order to perform the proposed brushing of metal, size reduction of metal, thermal stabilization of oxide, and packaging activities. However, the bounding spill accident for worker risk assumed the discharge of a weapon by a security guard inside a vault. The probability of this scenario occurring is 9×10^{-3} per year. The projectile is assumed to rupture a container of plutonium oxide, providing a dose to the worker of 8×10^2 rem EDE. The resultant LCFs among Rocky Flats workers for this accident scenario is 2×10^0 .

The Rocky Flats occurrence reporting data base has not documented one criticality accident in the 40-year history of operations. Criticality safety limits are strictly enforced and are very specific as to the quantity and mass of fissile material materials allowed in a given location. These measures have successfully prevented such an occurrence at Rocky Flats.

The bounding criticality accident assumed a violation of double contingency, allowing sufficient quantities of plutonium metal to be placed in a configuration that would initiate a criticality. (Double contingency is a practice of designing a process such that no single accident will result in a criticality.) The criticality would result in lethal doses of prompt gamma and neutron radiation to workers in the immediate vicinity of the criticality. The probability of this scenario occurring is 1×10^{-4} per year. The risk from criticality accidents would decrease sharply after completion of consolidation efforts, reflecting the reduced frequency of handling these materials.

Movement of plutonium on carts was analyzed for accidents including fires inside and outside plutonium containers, explosions, spills, and criticalities. The bounding accident for intra-building transfers is a fire initiated by pyrophoric plutonium while moving carts in Building 778. The probability of this scenario occurring is 1×10^{-4} per year and would result in a worker dose of 9×10^0 rem EDE. The resultant LCFs among Rocky Flats workers for this accident scenario is 3×10^{-2} .

Table 5-3. Consequences to Workers from Bounding Accidents.

Bounding Accident Category	Proposed Action: Probability of Occurrence (per year)	No Action Alternative: Probability of Occurrence (per year)	Proposed Action: No. of Latent Cancer Fatalities Among Workers	No Action Alternative: No. of Latent Cancer Fatalities Among Workers
Fire	2×10^{-4}	2×10^{-4}	6×10^{-1}	1×10^{-1}
Explosion	5×10^{-5}	5×10^{-5}	Fatalities to Workers in Immediate Vicinity	Fatalities to Workers in Immediate Vicinity
Spill	9×10^{-3}	9×10^{-3}	2×10^0	1×10^0
Criticality	1×10^{-4}	1×10^{-4}	Fatalities to Workers in Immediate Vicinity	Fatalities to Workers in Immediate Vicinity
Intra-Building Transfers	1×10^{-4}	1×10^{-4}	3×10^{-2}	3×10^{-2}
Onsite Truck Transportation	9×10^{-7}	9×10^{-8}	7×10^{-1}	2×10^0
Natural Phenomena	1×10^{-3}	1×10^{-3}	Fatalities from Building Collapse and Radiation	Fatalities from Building Collapse and Radiation
Airplane Crash	4×10^{-8}	4×10^{-9}	Fatalities from Falling Debris, Radiation, and Fire	Fatalities from Falling Debris, Radiation and Fire
Severe Accident Beyond Design Basis	8×10^{-4}	8×10^{-4}	Fatalities from Falling Debris	Fatalities from Falling Debris

See Appendix B, Useful Information, for Examples of Scientific Notation Usage

The bounding accident for onsite truck transportation is a severe collision of a truck transporting plutonium oxide. The crash was assumed to breach the diesel fuel tank and ignite a fire which engulfs the entire truck. Half of the containers were assumed to be breached and release part of their contents into the environment. This accident has a probability of occurrence of 9×10^{-7} per year and would result in a worker dose of 2×10^3 rem EDE. The driver of the truck also could be killed in such a violent collision, although the short distances involved and the presence of escort vehicles should preclude the attainment of the necessary high speeds. The resultant LCFs among Rocky Flats workers for this accident scenario is 7×10^{-1} .

Natural phenomenon events include earthquakes, extreme winds, and tornados. The bounding natural phenomena scenario is an earthquake of 0.14 gravity bedrock acceleration (approximately 6.0 on the Richter scale) and has a 1×10^{-3} per year probability of occurrence. Building 371 was designed to withstand an earthquake of greater than 6.0 on the Richter scale. However, office areas were not constructed to the same criteria and some workers are located in office areas that would be expected to collapse. Fatalities would occur from falling debris and exposure to radiation. Workers in the process area of Building 371 are well protected from falling debris, and the ventilation systems are designed to remain operable during and after a design basis earthquake.

The airplane crash accident analysis was prepared as an emergency planning tool and does not detail potential worker risks. Workers in the immediate vicinity of the accident would experience no radiation exposure from such an event because most vaults are not routinely occupied. Fatalities would occur from falling debris, burning fuel, and exposure to radiation. The probability of this scenario occurring is 4×10^{-8} per year.

A severe earthquake of 0.21 gravity bedrock acceleration was analyzed and represents the bounding severe accident beyond design basis for workers. This earthquake would collapse all of Building 707, while Building 371 would remain intact. The probability of this scenario occurring is 8×10^{-4} per year. Radiation exposures to workers were not calculated since these consequences would be eclipsed by fatalities caused by falling debris.

No Action Alternative

Under the no action alternative, there would be an ongoing need to move SNM, brush metal, and stabilize oxides. Dispersible forms of SNM would accumulate in unsealed containers while safety systems would continue to degrade. Workers in the immediate vicinity of an accident generally would receive the highest dose. Workers at the Site who are not involved in the activity would experience potentially larger doses than the general public.

Possible accidents would release radioactive material directly into the immediate worker's environment, and the resulting SNM aerosol would be available for inhalation. The greatest risk to the worker population would involve release during inspection and surveillance of the SNM.

This analysis does not quantify the risk for each of the operational accidents associated with the no action alternative over the duration of interim storage period. Therefore, trends are qualitatively assessed by comparing the results of existing safety analyses. The comparison shows that the risk of radiological accidents would be greatest for the workers inspecting SNM in the current storage areas while other workers, not in the SNM storage areas, would experience an accident probability similar to the general public but with higher doses.

Over time, the degradation of safety systems and accumulation of dispersible forms of SNM in unsealed containers would lead to an increase in risk from fires, spills, and explosions. The anticipated failure of the current SNM storage containers would lead to an increased probability of accidents. The consequences of natural phenomena events also would increase because a larger fraction of the inventory would have been converted to oxide and contained in vulnerable containers.

The scenarios with the greatest consequences are natural phenomena events such as high winds, tornados, and earthquakes. Under the no action alternative, SNM would remain for many years in facilities which were not built to withstand these events; therefore, worker risk would increase with time. The probability of worker fatalities also would be greater in future years under the no action alternative because workers would continue to be required onsite to conduct the ongoing inspection and stabilization activities in many different buildings.

5.4 Cumulative Effects

The cumulative effect of the proposed consolidation and interim storage of SNM in Building 371 at Rocky Flats would be to reduce the risks to both workers and the public over the long term. Other effects would include a potential for a slight initial increase in annual emissions of radionuclides. These emissions would be far below the allowable Site emission limit. An estimated 1,040 cubic yards of TRU waste and 130 cubic yards of low-level waste would be generated as a result of the proposed action activities. Storage space for this waste, over the 10 to 15 year period considered for the proposed action, would continue to diminish.

Individual worker radiation exposure would not only remain well within DOE requirements of 5 rem EDE annually, but also within the more stringent Rocky Flats ACL of 0.75 rem EDE annually. Effects due to normal operations on the public, expressed in terms of an increase in the probability of dying from cancer, are essentially zero (less than 1.5 chances in one trillion).

5.5 Summary of Effects

The proposed action would require only minimal exterior construction activities, and most facility modifications would be inside an existing building. Therefore, impacts upon the natural environment would be minimal. Under normal operating conditions, there would be minor releases of non-radiological air pollutants associated with local transportation. There would be no adverse effects on water resources, floodplains, wetlands, threatened or endangered species, cultural resources, or other Site features. The low-level and TRU waste generated by the proposed action activities are not expected to result in any measurable environmental effects because of strict adherence to safety procedures and requirements for storing waste at Rocky Flats. A summary comparison of environmental effects resulting from the proposed action and no action alternative is found in Table 5-4.

Initially, the radiological risk from the proposed action during its implementation period is greater than from the no action alternative. After this initial increase in risk, the level of risk decreases below that of the no action alternative for the remainder of the interim storage period. Actual adverse effects upon human health are unlikely to result from implementation of either the proposed action or the no action alternative.

Table 5-4. Summary of Environmental Effects from the Proposed Action and the No Action Alternative.

Alternative	Worker Exposure from Normal Operations	Public Exposure from Normal Operations	Accident Risk	Waste Generated	Effects On Wetlands, Floodplains, and Threatened & Endangered Species
Proposed Action	Dose would increase in short term; decrease after consolidation (Figures 5-1 and 5-2)	0.055 mrem annual dose for 7 years	Risk would increase in short term; decrease after consolidation (Figures 5-1 and 5-2)	1,040 cu. yds. TRU waste and 130 cu. yds. of low-level waste generated	None
No Action	Dose would increase relative to increased level of maintenance and SNM inventory	0.0048 mrem annual dose for 15 years	Risk is lower initially, increasing over time (Figures 5-1 and 5-2)	510 cu. yds. TRU waste generated due to normal, ongoing activities	None

6.0 AGENCIES AND PERSONS CONSULTED

None.

7.0 REFERENCES

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Glossary

GLOSSARY

This Glossary is provided to aid in the understanding of technical terms used in this Environmental Assessment. Alternate definitions may exist that are not applicable to the intended usage in this document. Also provided are conversions from Scientific International units to the American units to aid in understanding various units of measure.

aerosolize. To disperse as a suspension of fine solid or liquid particles.

air pollutant. Any fume, smoke, particulate matter, vapor, gas, or combination thereof that is emitted into or otherwise enters the atmosphere, including, but not limited to, any physical, chemical, biological, radioactive (including source material, special nuclear material, and by-product materials) substance, or material, but does not include water vapor or steam condensate.

ALARA. An approach to radiation protection to minimize and control exposures to workers and the public to "as low as reasonably achievable," taking into account social, technical, economic, and public policy considerations.

alpha particle. A positively charged particle emitted from the nucleus of an atom having the same charge and mass as that of a helium nucleus (2 protons, 2 neutrons).

beta particle. A negatively charged particle emitted from the nucleus of an atom having a mass and charge equal to that of an electron.

bounding accident (scenario). In general, the bounding accident is the event that results in the release of the largest quantity of radioactive or chemically hazardous material.

calorimetry. The measurement of the quantity of heat involved in various processes, such as chemical reactions, changes of state, and formations of solutions, or in the determination of the heat capacities of substances.

canyon. A large, enclosed, heavily shielded room used for processing or storing radioactive materials.

Category I and II SNM. SNM is defined as plutonium, uranium-233, and uranium enriched in the isotopes uranium-233 or uranium-235. Category is defined by DOE Order as a designation (Category I, II, III, or IV) of a quantity of SNM based on the "attractiveness level" of the material and the amount of material present. Attractiveness level is defined as a categorization of SNM types and compositions which reflect the difficulty of processing and handling required to convert material to a nuclear explosive device. Attractiveness is further defined as the material's desirability in light of its potential unauthorized use.

Attractiveness Levels and Safeguards Categories from DOE Order 5633.31

Type of Material	Attractiveness Level	Safeguards Category (I = greatest concern) Versus Quantity of Contained Material (kg)							
		Pu or U-233				U-235			
		I	II	III	IV	I	II	III	IV
Weapons ^a	A	Any quantity is Category I				Any quantity is Category I			
Pure Products ^b	B	>2	0.4-2	0.2-0.4	<0.2	>5	1-5	0.4-1	<0.4
High-grade materials ^c	C	>6	2-6	0.4-2	<0.4	>20	6-20	2-6	<2
Low-grade materials ^d	D	NA	>16	3-16	<3	NA	>50	8-50	<8
All other materials ^e	E	Any reportable quantity is Category IV				Any reportable quantity is Category IV			

NOTE: Reportable quantities are 1 g of Pu-239 to Pu-242 and enriched uranium, 0.1 g of Pu-238, NA = not applicable.

^aAssembled weapons and test devices.

^bPits, major components, buttons, ingots, recastable metal, directly convertible materials.

^cCarbides, oxides, solutions of >25 g/L, nitrates, etc., fuel elements and assemblies, alloys and mixtures, UF₄ or UF₆ at 50% or more enrichment.

^dSolutions of 1-25 g/L, process residues requiring extensive reprocessing, moderately irradiated material. Pu-238 (except in waste), UF₄ or UF₆ at 20-50% enrichment.

^eHighly irradiated forms, solutions of <1 g/L, uranium in any form and quantity containing greater than 20% U-235.

concentration. The amount of a specified substance or amount of radioactivity in a given volume or mass.

contamination. The deposition of unwanted radioactive or hazardous material on the surfaces of structures, areas, objects, or personnel.

criticality. An accidental, self-sustained atomic chain reaction.

curie (Ci). The traditional unit for measurement of radioactivity based on the rate of radioactive disintegration. One curie is defined as 3.7×10^{10} (37 billion) disintegrations per second. Several fractions and multiples of the curie are in common usage.

millicurie (mCi). 10^{-3} Ci, one-thousandth of a curie; 3.7×10^7 disintegrations per second.

microcurie (μ Ci). 10^{-6} Ci, one-millionth of a curie; 3.7×10^4 disintegrations per second.

nanocurie (nCi). 10^{-9} Ci, one-billionth of a curie; 37 disintegrations per second.

picocurie (pCi). 10^{-12} Ci, one-trillionth of a curie; 3.7×10^{-2} disintegrations per second.

decay, radioactive. The spontaneous transformation of one radionuclide into a different radioactive or nonradioactive nuclide, or into a different energy state of the same radionuclide.

decontamination. The removal of unwanted material from the surface or within another material.

dose. Refers to the radiation protection concepts of dose equivalent and effective dose equivalent.

dose, absorbed. The amount of energy deposited by radiation in a given mass of material. The unit of absorbed dose is the rad or the gray (1 gray = 100 rad).

dose commitment. The total radiation dose projected to be received from an exposure to radiation or intake of radioactive material throughout the specified remaining lifetime of an individual. In theoretical calculations, this specified lifetime is usually assumed to be 50 years.

dose equivalent. A modification to absorbed dose that expresses the biological effects of all types of radiation (e.g., alpha, beta, gamma) on a common scale. The unit of dose equivalent is the rem or the sievert (1 sievert = 100 rem).

enriched uranium. Uranium in which the amount of one or more fissionable isotopes has been increased above that occurring in nature.

effective dose equivalent (EDE). A calculated value used to allow comparisons of total health risk, based on cancer mortality and genetic damage, from exposure of different types of ionizing radiation to different body organs. It is calculated by first calculating the dose equivalent to those organs receiving significant exposures, multiplying each organ dose equivalent by a health risk weighting factor, and then summing those products. One millirem EDE from natural background radiation would have the same health risk as one millirem EDE from an artificially produced source of radiation.

exposure. A measure of the ionization produced in air by X-ray or gamma radiation. The unit of exposure is the roentgen.

gamma ray. High-energy, short-wavelength electromagnetic radiation emitted from the nucleus of an atom. Gamma radiation frequently accompanies the emission of alpha or beta particles. Gamma rays are identical to X-rays except for the source of the emission.

glovebox. A sealed system that provides containment of radioactive materials, in which workers, using gloves attached to and passing through openings in the box, can handle radioactive materials safely from the outside.

half-life, radioactive. The time required for a given amount of a radionuclide to lose half of its activity by radioactive decay. Each radionuclide has a unique half-life.

health effects. For radiation exposure, health effects are the excess cancer deaths above background expected to occur from the exposure of a population.

HEPA filter. High-efficiency particulate air filter that removes minute particles from the air stream; used in the plenums filtering exhaust air from buildings where radioactive or toxic material is present. HEPA filters are capable of a particulate removal efficiency of no less than 99.97 percent for 0.3 micron particles.

inert atmosphere. A chemically nonreactive atmosphere (nitrogen with less than 5 percent oxygen); one incapable of supporting combustion.

interim storage. The temporary holding of material when disposal space is not available. Monitoring and human control are provided, and subsequent action involving treatment, transportation, or final disposition is expected.

ionizing radiation. Radiation capable of removing one or more electrons from atoms, leaving positively charged particles such as alpha and beta, and nonparticulate forms such as X-rays and gamma radiation.

low-level waste. Material having a concentration of ≤ 100 nanocuries of alpha activity from transuranic elements per gram of waste. Transuranic elements have atomic numbers greater than 92 and half lives greater than 20 years.

maximally exposed offsite individual. A hypothetical person who lives continuously at a point on the Site boundary where the concentration of radionuclides in the air at ground level would be the highest.

natural phenomena. Earthquakes, tornados, floods, high winds, lightning, meteorites, or any other natural occurring event.

natural radiation. Radiation arising from cosmic sources and from naturally occurring radionuclides (such as radon) present in the human environment.

neutron. An uncharged particle of a slightly greater mass than a proton; a constituent of atomic nuclei (except hydrogen) able to penetrate extreme thicknesses of certain materials.

order of magnitude. A range of magnitude extending from some value to ten times that value.

parts per billion (ppb). Concentration unit approximately equivalent to micrograms per liter.

parts per million (ppm). Concentration unit approximately equivalent to milligrams per liter.

pathway. Potential route for exposure to radioactive or hazardous materials.

person-rem. The traditional unit of collective dose to a population group. For example, a dose of 1 rem to 10 individuals results in a collective dose of 10 person-rem.

plenum. A chamber in a ventilation system generally housing banks of filters.

plutonium (Pu). A heavy, radioactive, man made, metallic element with an atomic number of 94, produced by neutron irradiation of uranium-238. Its most important isotope is fissile Pu-239. It is used for reactor fuel and in nuclear weapons.

protected area. An area encompassed by physical barriers, such as walls or fences, to which access is controlled, and that contains Category I and II SNM or surrounds a material access area or a vital area.

radiation. The electromagnetic energy or particles emitted from atoms as a result of a nuclear transformation. The term includes alpha and beta particles, gamma radiation, X-rays, neutrons, and cosmic radiation. Nuclear radiation is that emitted from atomic nuclei in various nuclear reactions.

radioactivity. The spontaneous emission of radiation, generally alpha or beta particles, often accompanied by gamma rays from the unstable nucleus of an atom.

radiological. That which involves radioactive or nuclear materials.

radionuclide. An atom having an unstable ratio of neutrons to protons so that it will tend toward stability by undergoing radioactive decay. A radioactive nuclide.

release. The discharge of contaminants, usually airborne, into the atmosphere.

rem (roentgen equivalent man). The traditional unit of dose equivalent. Dose equivalent is frequently reported in units of millirem (mrem), which is one-thousandth of a rem. The International System of Units unit of dose equivalent is the sievert (1 sievert = 100 rem).

residues. A variety of solid industrial materials used in process and fabrication operations at Rocky Flats that become contaminated with nuclear materials and are not considered waste.

Richter magnitude scale. A logarithmic scale expressing the magnitude of an earthquake by recording the energy it releases as seismic waves.

risk. Risk is an expression of the probability of a negative or unwanted consequence. Mathematically, it can be expressed as the probability of an undesirable event occurring in an interval of time multiplied by the consequences of the event.

safeguards. Precautionary measures to prevent the unwanted or unauthorized diversion of nuclear materials.

seismicity. The relative magnitude, frequency, and distribution of earthquakes.

sievert (Sv). International System of Units unit for radiation dose (1 sievert = 100 rem).

Site boundary. The perimeter of the government-owned land on which the Rocky Flats Environmental Technology Site is located.

special nuclear material (SNM). Plutonium, uranium enriched in the isotope 233 or in the isotope 235, and any other material which is determined to be SNM, pursuant to section 51 of the Atomic Energy Act of 1954, but does not include source material, or any material artificially enriched by any of the foregoing.

special nuclear material (SNM) vault. A penetration-resistant, windowless enclosure which has: (a) walls, floor, and ceiling substantially constructed of materials which afford forced penetration resistance at least equivalent to that of 8-inch thick reinforced concrete; (b) any openings greater than 96 square inches in area and over 6 inches in the smallest dimension protected by imbedded steel bars at least 5/8 inch in diameter on 6-inch centers both horizontally and vertically; (c) a built-in combination locked steel door which in existing structures is at least 1-inch thick exclusive of bolt work and locking devices and which for new structures meets the Class 5 standards set forth in Federal Specification AA-O-5008 of the Federal Specifications and Standards, cited in Title 41 CFR Part 101.

standards. Acceptable limits established by recognized authorities.

surface acceleration. Any ground movement caused by an earthquake motion.

trace. An extremely small but detectable quantity of a substance.

transuranic (TRU) waste. Solid radioactive waste containing primarily alpha emitters of elements heavier than uranium, in an amount producing 100 nanocuries per gram or more of alpha activity.

transuranic. Those elements on the chemical periodic chart that have element numbers higher than that of uranium. These elements include plutonium and americium.

uranium (U). A radioactive element with the atomic number 92 found in naturally occurring ores. It has an average atomic weight of approximately 238. The two principal natural isotopes are U-235 (0.7 percent by weight of natural uranium), which is fissile, and U-238 (99.3 percent by weight of natural uranium), which is fertile. Natural uranium also contains a minute amount of U-234.

vault-type room. A DOE-approved room having a combination-locked door(s) and protected by a Departmental-approved intrusion alarm system activated by any penetration of walls, floor, ceiling, or openings, or by motion within the room.

vital safety system. A system that is relied upon to detect or mitigate the radiological consequences of an accident, including criticality.

waste. A term applied to any source or SNM which is no longer useful and uneconomical or infeasible to recover, including that which has become radioactive to the extent that the material itself exhibits radioactivity of such a level that it must be handled and disposed of by special methods in order to protect the general public.

APPENDIX A

INTRODUCTION TO RISK ASSESSMENT

INTRODUCTION TO RISK ASSESSMENT

Risk assessment is the practice of estimating the chance of injury or loss resulting from a particular course of action. It allows a comparison of the potential of adverse effects for different contemplated actions. Risk assessment in this EA focuses on cancer and loss of life. However, risk estimates have an inherent element of uncertainty. A determinate methodology for comparing alternative actions for public and worker safety is used in Section 5 to reduce this uncertainty.

In order to understand the concept of risk, we must trace how injury occurs. Risk is a consequence of a hazard. A hazard is either a source of energy that can do harm or a condition that does not sustain life. Hazards are present in many forms. For example, the electric energy in a copper wire can harm a person, as can the potential energy in a coiled steel spring and the kinetic energy from moving machinery. Pure nitrogen gas cannot sustain life; a working space filled with nitrogen gas is another example of a hazard. The chemical energy in a toxic substance, and the ionizing energies in nuclear radiation are less obvious. Their injury to the microscopic cells of our body can cause later development of a cancer.

All hazards must interact with the human body to cause harm. Safety barriers between hazards and people prevent this interaction. Safety shields around radiation sources stop the radiation, and workers wear respirators to protect them from toxic dust in the air. Nevertheless, as with anything that is man-made, there remains always a chance of barrier failure. Risk assessors include this chance in estimating risk.

Sometimes a barrier may fail, but the hazard does not always interact with a person. For example, a toxic gas may escape from a leaking container, but the wind blows it away harmlessly. The question risk assessors ask is "what is the probability that the wind would have carried the gas to a nearby person instead?" Pathway analysis evaluates the probability of a hazard interacting with a person. Accordingly, it is a method for answering the above question.

Chemical and radioactive hazards must enter our body before they can interact. Four possible entryways are inhalation, ingestion, absorption through the skin, and injection. Before entering the body, harmful material may exist as a contaminant in a person's breathing air, drinking water, or food. A fifth possible entryway is radiation; damaging gamma radiation from outside the body can penetrate like a physician's X-ray.

The amount of toxin and radiation that enters the body is the dose. The dose depends on a person's exposure, physical characteristics, and level of activity. Exposure describes the duration and circumstance of contact with the hazard. The resulting injury depends on the dose and the hazard's toxicity and radioactivity. The ratio of the dose and the severity of the resulting health effect is the dose-effect relationship. This relationship is different for each substance.

The kinetic energy of an oncoming garbage truck would surely kill us if we were to remain in its pathway. In contrast, the injury from a small dose of toxin or radiation is not as certain. The same dose may harm one person, but not another. Likewise, it may affect the same person at one instance, but be of no consequence at another time. We can never know if or when a particular person would develop a cancer from a small amount of toxin or radiation. Probability is a way of dealing with this kind of uncertainty. For example, the dose-effect relationship is a stochastic, or random, phenomenon. We may know that, on the average, ten people out of a thousand get a cancer from a certain dose. We would conclude there is a 10/1000 or 1% probability for any particular individual to develop a cancer as a result of this particular dose.

Hazard, barrier, pathway, exposure, dose, and dose-effect are all stochastic constituents of risk. Accordingly, evaluation of risk depends on answers to the following questions:

- What is the hazard?
- What is the toxicity and radioactivity associated with the hazard?
- When will the hazard enter the environment?
- How will the hazard travel through the environment?
- When will people come into contact with the hazard?
- What will the form, duration, and concentration of exposure be?
- What dose will result?
- What health effects will result from the dose?

Although these questions are central to the assessment of risk, they have no precise answers. Only statistical estimates of probability are possible. For example, no one can predict if or when a hazard barrier will fail. Pathway analysis of contaminants requires an understanding of the flow of air, water, and food through the human environment, potential contamination, and the location and behavior of people. However, elements like the wind are changeable, and are always dependent on complex local conditions.

Dose-effect relationships for small doses are particularly difficult because it is not possible to experiment on people. Scientific understanding of small doses relies therefore on animal experimentation. Experiments with small doses are often inconclusive; therefore, effects from large doses are generally studied. Some scientists contend that different species of mammals respond very differently to comparable doses. According to them, scientific conclusions of human response to small doses reflect not more than conjecture and opinion. This shows the role of opinion in scientific risk analysis.

Risk analysts use computer models to study complex stochastic (i.e., random or probabilistic) phenomena. However, many risk aspects are not measurable or predictable. Even if they were, it is not possible to include all complexities in computer models. For example, no model can accommodate all local conditions of geology, hydrology, and meteorology. Therefore, risk analysts rely on conservative assumptions when using computer models to compensate for uncertain accuracy.

The risk of an infrequent accident is impossible to verify by experiment. Scientific uncertainty makes it impossible to pinpoint a single numerical value of risk. To compensate for this actuality, risk assessors resort to statistical estimates of risk. A statistical risk estimate contains three elements: (1) a level of confidence, (2) a range of consequences resulting from an action or situation, and (3) a range of probability. For example, a risk estimate may read, "It is 90 percent certain that the probability of having at least 1 but not more than 10 latent cancer fatalities is between 0.01 and 3 percent." This means we can be 95 percent confident that the probability is less than 3 percent, and equally sure that it is greater than 0.01 percent. (Leaving 5 percent out at either side of the confidence range leaves 90 percent inside, hence 90 percent confidence.) The range between 0.01 and 3 percent expresses our uncertainty range. The highest probability in the range, 3 percent in the example, is the 'bounding' probability or "upper bound."

Confidence is the chance that the estimate itself is correct. The uncertainty range of probability always widens for a high confidence level and becomes more narrow for a low confidence. For latent cancer fatality risk, the uncertainty range can span a factor of 1000 or more at the 95 percent confidence level. A narrower uncertainty range (improving it) would lower the confidence level and make the estimate useless.

Comparing health risk is problematic because risk estimates of health effects will always be very uncertain. However, according to the mathematics of statistics, the uncertainty of comparison is always larger than that of the individual risks. This makes health risk a poor discriminator of alternative actions. In addition, comparison of statistical risk estimates is beyond the scope and resources of this EA. It would require a large investment without necessarily becoming a basis for different management decisions.

It is not the intent of an EA to address the scientific analysis of health risk. Instead, the goal is to provide information to enable informed decision making by management. The safety aspect of this goal is addressed in Section 5.0. Safety comparison is more telling than risk comparison because the discriminators can be practicable and precise.

The accident scenarios considered in Section 5.0 conservatively substituted exposure at the Site boundary for exposure of the public. Likewise, exposure in the immediate vicinity of an accident was substituted for actual worker exposure. Dose at the Site boundary was substituted for public dose from normal Site operation. The analysis in Section 5.0 uses the term "risk" for the arithmetic product of exposure and a multiplier. These products are compared without reporting an uncertainty range or confidence level. Information regarding compliance with safety regulations is also provided.

APPENDIX B

USEFUL INFORMATION

SCIENTIFIC NOTATION USAGE

YEARLY PROBABILITY

A probability of 1×10^{-3} per year means that each year there is a chance of one in a thousand that a specified event could occur. The same odds apply for each successive year. The statement does not mean that the event will happen once in a thousand years. For example, the event could happen not a single time, or it could occur multiple times during that period.

1×10^0 per year	=	the yearly odds of occurrence are 1 in 1
1×10^{-1} per year	=	the yearly odds of occurrence are 1 in 10
1×10^{-2} per year	=	the yearly odds of occurrence are 1 in 100
3.2×10^{-3} per year	=	the yearly odds of occurrence are 3.2 in 1,000
7×10^{-4} per year	=	the yearly odds of occurrence are 7 in 10,000
5.6×10^{-5} per year	=	the yearly odds of occurrence are 5.6 in 100,000
1×10^{-6} per year	=	the yearly odds of occurrence are 1 in a million
1×10^{-9} per year	=	the yearly odds of occurrence are 1 in a billion

1×10^{-3} rem	=	0.001 rem	=	one thousandth of a rem
1×10^{-2} rem	=	0.01 rem	=	one hundredth of a rem
1×10^{-1} rem	=	0.1 rem	=	one tenth of a rem
1×10^0 rem	=	1 rem		
1×10^1 rem	=	10 rem		
1×10^2 rem	=	100 rem		
1×10^3 rem	=	1,000 rem		

CONVERSIONS

liters to gallons: One liter of liquid equals 0.2642 of a gallon; each liter is about one quart.

grams to ounces: There are 28.35 grams per ounce; there are 16 ounces per pound.

kilograms to pounds: One kilogram (kg) equals 2.2046 pounds.

metric tons to tons: One metric ton equals 1.1023 tons.

degrees Celsius to degrees Fahrenheit: $^{\circ}\text{C} = ^{\circ}\text{F} - 32 \times 5/9$.

SYMBOLS

< means "less than"

> means "greater than"

< or > means either "less than or equal to" or "greater than or equal to"

APPENDIX C

Questions and Comments from the Public

This appendix is divided into two parts. The first part is a public meeting verbatim transcript of the Rocky Flats Citizens Advisory Board Plutonium and Special Nuclear Material Committee presentation and public comment on the Draft EA for SNM Consolidation and Interim Storage of SNM at Rocky Flats. The second part is the written questions and comments received from the public. Responses from Rocky Flats' officials are provided in both parts.

Part 1: ROCKY FLATS CITIZENS ADVISORY BOARD

PLUTONIUM AND SPECIAL NUCLEAR MATERIALS COMMITTEE

PRESENTATION AND PUBLIC COMMENT ON THE DRAFT EA

FOR CONSOLIDATION AND INTERIM STORAGE OF SNM AT ROCKY FLATS

Westminster City Hall
Lower Level Multi-purpose Room
Westminster, Colorado

Tuesday, April 18, 1995

PARTICIPANTS:

Carl Sykes - Department of Energy

Bob Leonard - EG&G Rocky Flats

Tom Wollard - EG&G Rocky Flats

Edd Kray - Colorado Department of Public Health and Environment

Greg Nishimoto - Department of Energy

PROCEEDINGS*

UNIDENTIFIED SPEAKER: (Inaudible) normal time for our CAB (inaudible). We were asked by the Department of Energy if they could utilize the first part of our meeting to have a comment session on the environmental assessment for consolidation of (inaudible). So the first part of tonight is not the CAB meeting, it is the Department of Energy's piece. The agenda, you should have a copy of the agenda. If not, are there some out there?

UNIDENTIFIED SPEAKER: There's some back there.

UNIDENTIFIED SPEAKER: This is scheduled--the comment session is scheduled to go for an hour, but if comments go longer than that, that's fine, we'll just move--push the meeting time back, and we welcome everybody to stay and participate in the meeting. Todd, did you want to--

MR. WOLLARD: Yeah, just a few process notes. As Tom said, this portion is our official public comment period for the EA. For those of you who don't have copies, there are a few in the back. If those are exhausted, there's a sign-up sheet and we can mail some out to you. The comment period officially closes May 2nd. Comments can be submitted to myself or to Carl Sykes, and (inaudible) available to you as well.

The first part, we're going to--Carl's going to give a short introduction to the EA, what it's about, just kind of a brief overview, and then we're going to open it up for comments. When you give your comments, please step up to the microphone and state your name and then make your comments and that will benefit our court reporter so that they are documented. And again, we're going to kind of keep this informal tonight. We're not going to hold anybody to any time limits. But, you know, if we've got a few--quite a few people who want to comment, we ask that you please be brief and to the point so everybody has an opportunity to speak. I think that's about it. Carl?

MR. SYKES: Good evening, I am Carl Sykes from the Department of Energy. The first thing I'd like to say is that people are welcome to come sit at the table if you'd like. This will be very informal tonight. I'm going to give a brief introduction, but I don't plan on talking very long. This is your chance to ask questions pertaining to the Environmental Assessment and to give us some comments. As Todd mentioned, our comment period runs through May 3rd. You can submit comments to us in writing. We expect to have a decision on either a finding of no significant impact, FONSI, or a decision to perform an Environmental Impact Statement probably by the first part of June.

Basically, this Environmental Assessment looks at some plutonium management activities. There's two parts. The first part is to consolidate the plutonium into Building 371. The second part deals with repackaging of plutonium to meet the DOE standard, which is sometimes referred to as the 50-year can. Repackaging also includes thermally stabilizing material, resizing it and then putting it into the 50-year can.

At this point, I think I'm going to stop talking and just have people come ask questions or give comments. And so whoever has a question or comment, please start now.

MR. GOLDFIELD: First, I have to start by admitting I did not read the Environmental Impact Statement.

UNIDENTIFIED SPEAKER: Well, could you state your name, please?

MR. GOLDFIELD: Oh, Joe Goldfield. I'm a member of the Plutonium Committee. I'm a member of other activist groups that have been trying to watch DOE and keep them honest, with great difficulty. It's getting a little better now, but it's still--it's better than it was, but that was such a low level that we're not there yet by a long shot.

***NOTE: Supplementary responses prepared subsequent to the public meeting for purposes of clarification are shown in bold type.**

I have to admit that I didn't read the Environmental Impact Statement. And the reason is that I'm--they have very good mailing lists and I get hundreds of pages of material to read every month. And it's just physically impossible to read all the garbage that is sent. A lot of it is so esoteric that even after I've read it, if I haven't studied it and taken notes, I've forgotten.

But in any case, there are a number of things with --about consolidation that have bugged me. Whenever dangerous materials are considered and how do you handle them safely--take, for example, explosives. A manufacturer never puts all his explosives into one box or into one building. Scandia, down in Texas, that has probably the largest store of nuclear materials in the form of warheads or whatever they--form they are, stores limited numbers of them in bunkers that are sealed up very carefully and separated from all the others. How come here, where we have one of the largest stores of plutonium in the world, it's safe to take it all and pile it together in one building? That bugs me. Putting plutonium closer and closer together in larger and larger piles introduces many, many dangers: the dangers of criticalities, the danger of the building failing. Now, you say, "Well, this building is better than any other of the buildings." Well, that's maybe not saying much.

For years I've been asking what wind loads the buildings could take, and now I know. All the buildings can't take much of a wind load, but 371 can. I also asked are the buildings designed for earthquake, and I never got an answer. Now I know that they weren't. So that doesn't lend confidence. In all these years, buildings--and it was obvious to any prudent person that earthquakes and winds could easily develop that could rupture the buildings--the plutonium's been stored unsafely.

Well, now we're going to put it into 371. Well, the earthquakes in California showed that no matter how well designed many of the structures were against earthquakes, many of the structures failed. So that you're putting it into 371, which is supposed to be the best design possible, but who's going to write the guarantee that it can't fail in case of an earthquake? And 300 mile an hour winds--I've heard of even higher winds in tornados. This area does have tornados.

So there's a question of many types. First is the safety of 371. Secondly, the prudence of putting larger and larger piles of plutonium into the building.

Now let me give you one example of things that I see that don't sound prudent. You mentioned in your talk there that you were putting in a 50-year can. One of your write-ups has a description of the 50-year can. It's a can of a certain dimension made out of 16 gauge stainless, 1/16th inch thick stainless, and the can is all welded. Well, I don't know who designed the can, but anybody that's worked with metal, sheet metal, knows that 16 gauge metal is a hell of a thing to weld. And yet those welds have to be absolutely leak tight. If somebody who had more knowledge of metal fabrication was working on it, my question would be, why don't you use 10 gauge stainless? Ten gauge is far easier to weld, you'll have many many fewer rejects, and the labor of welding will probably pay for the extra cost of the stainless.

So here you're doing something to make a package safe and some of the most elementary engineering principles are violated. You use a material that's extremely difficult to weld and you weld it to make it a leak tight container to be leak tight for 50 years. Doesn't sound smart or prudent. Plus the fact deterioration of plutonium in the cans can generate incredible pressures. One write-up indicated that it can go up to 2,000 pounds per square inch. A 10 gauge metal can will take far more pressure than a 16 gauge metal can.

MR. SYKES: Well, I'll respond to some of those, and then I think I may ask for some help here from some of the people that have come.

Basically, when you do read the Environmental Assessment, the Environmental Effects Section does go into the risks associated with moving the plutonium into Building 371. Overall, the EA concludes in the risk assessment part that there is a composite reduction in risk by moving the material into 371. There is more source when you put all the plutonium into 371; however, the chances of some of the accidents from happening because you move it to 371 do go down. And, of course, you noted that Building 371 is the--one of the newer facilities, or it is the newest plutonium facility. For instance, the earthquake that--Building 371 is the one facility that will be most likely to withstand any earthquake.

Related to earthquakes, Defense Board Recommendation 94-3, which we will be working with the Citizens Advisory Board reviewing it, will be performing a number of studies over the next six months that will look at the seismic adequacy of Building 371. We know from this EA that moving the plutonium into 371 will reduce the seismic risk. What 94-3 will do will be to look at the seismic adequacy and see if there are some upgrades that we can make to 371 to make it safer.

But essentially, we can't lose sight that this action is to put the plutonium into Building 371 for a period of approximately fifteen years and then, in conjunction with the Defense Program Programmatic EIS, Rocky Flats is not the ultimate repository for this plutonium. The preferred alternative under the DPPIS will be to move the plutonium off the site.

I know there were several points. I don't know if anyone wants to jump in or not and elaborate here.

MR. LEONARD: I'm Bob Leonard. I work for the benefactor of Rocky Flats. You mentioned that the can adequacy may be in question. We hold your same concerns. We want to make sure that the can that we are going to install will contain plutonium under the design basic accidents and worst case accidents that it can experience. In all cases there will be two boundaries containing the metal itself, plutonium, and the outside. In some cases where it's in an open air vault will be two of these same stainless steel type containers. The containers will be leak checked.

We have are doing analysis done at Los Alamos National Laboratories for pressure that can build up within these cans due to the moisture content of the plutonium oxide and these type of things. They strongly believe and are going to have empirical data for us to analyze to show that these cans cannot experience a pressure that will burst these cans. And before we actually ever do that, we will have that data to verify it.

MR. GOLDFIELD: I asked a simple question. Why is it made out of 16 gauge stainless instead of 10 gauge?

MR. LEONARD: There's a couple considerations. Weight of the cans--as you nest these cans one on top of another, they keep adding weight. It gets harder and harder for the person to handle them. And right now, that's the--the analysis says that's the best size for these cans for the pressure that they can experience and the handleability of the can itself. We'll look at it; we have looked at it in the past. It's probably a good concern. But right now, they believe that this is more than adequate.

Again, most of these items will have two full containers of sixteen-inch containers around them in case of a single point failure. The two containers will cover that problem.

MR. GOLDFIELD: Did anybody look at the difference in welding possibilities on 16 gauge and 10 gauge?

MR. LEONARD: Yeah, they're looking at the fixturing down in Los Alamos right now. Los Alamos is doing the whole 50-year container development for the Department of Energy on a complex wide, and we're going to basically utilize the information that they come up with. And they're looking at the welding tools and the fixtures that would be required to use the can, which there is a little write-up, not very effective, but a little bit of a write-up in the Environmental Assessment on--about the philosophy of that type of a can. So Los Alamos is looking at it, and DOE headquarters will approve the final configuration of the packaging.

MR. GOLDFIELD: Well, you have me confused now. I thought this was a can based on break study and all kinds of conferences held and final conclusions made, and now you're telling me it's still not finished design.

MR. LEONARD: Oh, well, you're right, there has been a lot of study on this can. What hasn't really happened yet is the actual data associated with it. Build the can, do some drop testing, put it in fires, drop test it, see what kind of hold up it can do against the pressures. And also they're doing some analysis with the material inside the can itself on how much moisture content will be experienced as you heat the plutonium oxide up to a certain temperature and this type of thing.

MR. GOLDFIELD: Why don't you ask a welder at Rocky Flats instead of these (inaudible) committees that probably don't know much about fabrication? Ask a welder at Rocky Flats whether it's easier to weld 10 gauge than to weld 16 gauge and could he guarantee less damage in 10 gauge and could he guarantee more leak tightness in 10 gauge than he could in 16 gauge? Why don't you ask a welder himself?

MR. LEONARD: I probably know the answer to that, and the--he'd rather use black iron than stainless steel, too, because that's a lot easier to handle.

MR. GOLDFIELD: I didn't ask that question.

MR. LEONARD: I understand. It just--but they--at this time--you're probably right, it might--some of the usability of this can might be bound to be hard to use when they actually tried to do this. But they are going to do the whole mockup. They're doing this at Los Alamos. They're going to have hands-on

experience with the can, and if they experience this difficulty, they may come back with another recommendation.

MR. WOLLARD: If I can make an interjection for a minute, we're kind of deviating from the purpose of this meeting. Your comments will be formally responded to in more detail, Joe, as we get all the comments compiled after the comments session, okay? So there will be another opportunity to respond to your comments, all right? And I'd like to get back onto the formal comment period if we could.

MR. BOLAN: I'm Ralph Bolan (phonetic), member of CAB.

MR. WOLLARD: Could I have you--I ask you to stand at a mike so our reporter can get it down for me? Thanks.

MR. BOLAN: My comment and question is very brief. I was just wondering how soon they expect to have these cans tested and ready to actually put materials in them.

MR. LEONARD: The process line in Building 371 at Rocky Flats is expected to be completed the end of Fiscal Year '97, which is October of 1997 time frame, I believe. It would not actually be brought into production until about the March--and please don't hold me with these dates, I'm trying to do these off of memory, and anyone can correct me in the back if they'd like--about the March time frame of 1998. So the first time that we'd ever used the DOE standard 50-year can as Carl called it would be spring of 1998 time frame.

MR. BOLAN: So there won't be actually moving of plutonium probably to '98 or '99, that time frame?

MR. SYKES: Well, actually, consolidation is a separate activity from the reprocessing and the repackaging, so we hope to, if we go forward with the proposed action of consolidation, we will start before '98 to move material into Building 371. We won't be complete with consolidation under that schedule. We'll start basically processing and consolidating in parallel.

MR. BOLAN: So you'll be processing and consolidating at the same time?

MR. SYKES: Correct.

MR. BOLAN: Some of it will actually be done in Building 371, then, huh?

MR. SYKES: Right.

MR. BOLAN: Thank you. (Pause.)

MR. WOLLARD: Anyone else?

MR. MARSHALL: My name's Tom Marshall. I'm with the Rocky Mountain Peace Center and a member of this Plutonium and Special Nuclear Materials Committee of the CAB. Ralph was kind of asking questions in the same vein of what I am going to be asking. And I just want to clarify a few things. You said that the 50-year can will not be ready until March of 1998, is that right?

MR. SYKES: That's when we'll be ready to start processing under the current schedule.

MR. MARSHALL: And there's actually been no testing on an actual can as of yet, it's all been modeling.

MR. NISHIMOTO: No, in Los Alamos they're currently testing the design of the can currently. They have data--they receive data back, and as Bobby Leonard said, they are looking at the material and the physical properties of it, the moisture and all that. Los Alamos is the first, I guess, complex or site that will start canning the material.

They plan to start--right now the current plans is in June of this year to start canning it.

Los Alamos National Laboratory (LANL) has completed finite element analysis and process weld development of the 0.065 wall, 304 stainless steel containers. Qualification proof testing has shown these containers meet the requirements of the DOE Standard 3013-94, Criteria for Safe Storage of Plutonium Metals and Oxides.

MR. MARSHALL: To start canning--

MR. NISHIMOTO: Plutonium in the 50-year container.

MR. MARSHALL: At Rocky Flats or--

MR. NISHIMOTO: No, no, at Los Alamos.

MR. MARSHALL: Uh-huh. So they'll be--

MR. NISHIMOTO: So they'll be used at Los Alamos before Rocky Flats uses it.

MR. MARSHALL: So they'll run through full tests this year with it.

MR. NISHIMOTO: Right.

MR. MARSHALL: Okay. And will those tests be complete before this EA is completed?

MR. SYKES: No, I do not believe so. The EA will be completed before that.

The storage container used at Rocky Flats will be tested and approved for use prior to processing and repackaging activities. LANL plans to begin processing and repackaging plutonium metal and oxide in June 1995 using containers which have passed qualification proof testing to meet the DOE Standard 3013-94.

MR. MARSHALL: Okay. You also have mentioned that your plans are not to finish stabilizing or repacking plutonium--repackaging plutonium before you move it into Building 371, is that right?

MR. SYKES: What we plan on doing is start consolidating into 371 as soon as we can. And to do that, we're going to have to do some vault modifications and some modifications to the stacker/retriever. As soon as--and we're going to keep consolidating as soon as we can. In parallel with this, we will be putting in the processing line for the --for the 50-year can. That includes thermal stabilization ovens. Roughly sometime in '98 we should be able to start processing. Some of that material that we're going to process will already have been moved from other buildings into 371, they just won't be in the 50-year can, you know, before we start processing it.

SNM will be consolidated into Building 371 only when it is in compliance with the Health and Safety Practice (HSP) Manual, Section 31.11 requirements. These requirements ensure that SNM is safe for transportation and short-term (approximately 2 years) storage. SNM that is not in compliance with HSP Manual, Section 31.11 will be processed and packaged in Building 707 under the Thermal Stabilization Program. Once the SNM has been consolidated into Building 371, it will be processed and repackaged into the 50-year container for interim storage.

MR. MARSHALL: Um-hum. One of my concerns is that the plutonium vulnerability assessment identified a number of concerns. You're addressing one at this point by moving plutonium out of buildings that are not as safe as they could be and that have failing safety systems. However, you're moving packages that have vulnerabilities and were identified as vulnerabilities into this building; is that correct?

MR. SYKES: The vulnerability study as well as Defense Board Recommendation 94-1 recognized that our packaging that we have at Rocky Flats, which was never designed for long-term storage, is less than optimum and it does have vulnerabilities. That is why we are pursuing this 50-year can, as that is a much more safer way to store plutonium for a longer time period. But until we have that capability process, it's still safer, from a facility aspect, to move plutonium from those other facilities to Building 371. There are shipping containers that we have on site that can reduce the risk while we are moving it.

MR. MARSHALL: Okay.

MR. NISHIMOTO: Tom, maybe I can answer your question a little bit better. I think you're talking about the out-of-compliance items and moving this that are pyrophoric in nature and all that. There's a program ongoing right now, and that's where the Building 707 plays a part, the thermal stabilization. There is some oxide that is pyrophoric that we stabilize. All the material--there is a near term action that's not inside this EA right now. We stabilize the material basically before we move it, and that's mainly oxides.

MR. MARSHALL: But you will--what about containers with plastic, etc., at this point?

MR. NISHIMOTO: It's being repackaged and it's in the--

MR. MARSHALL: Before it moves to 371?

MR. NISHIMOTO: Right. The plastic one is completed--planned to be completed by October of this year.

MR. MARSHALL: Okay.

MR. NISHIMOTO: So the noncompliance items will be fully in compliance with an interim storage standard by October of '96.

MR. MARSHALL: Okay. And the processes that you'll be--the sort of industrial processes that will happen in 371 in terms of processing plutonium, what would they be?

MR. SYKES: Well, to meet the standard. Basically we have to, in some cases, resize large plutonium parts, which we can also do that in 707 ahead of time. We have to brush any oxide that may have generated in the interim period from metal and then store the metal in the standard can. Any oxide that we collect we would then have to stabilize at 1000 degrees. And then we have three tons of oxide that we currently have. And by that point, all that will have been stabilized either in the past or by October '96 at 800 degrees, but that doesn't meet the standard. We need to stabilize it at 1000 degrees, and so all the oxide we have will undergo that 1000-degree stabilization and then be put into the standard can.

The process will include thermal stabilization of the oxides at 1000°C. The material will be put in approved containers which will be sealed by welding and leak tested to DOE Standard 3013-94. The process for the metal will be brushing the loose oxide and sealing the metal in approved containers by welding. The oxide will go through the 1000°C thermal stabilization cycle.

MR. MARSHALL: I wonder about the wisdom of storing all of the Rocky--all of the plutonium at Rocky Flats in the same building that you'll be running these processes in. When we look at the number of fires that have happened there, I'm hoping that you're analyzing whether that is a wise thing to do and whether that maybe should be located somewhere else away from the large stores of plutonium.

Processing the materials is considered safest when performed in the same facility as storage because of elimination of transportation and handling accidents outside a facility. Therefore, in the unlikely event that a spill, fire, or other loss of confinement accident occurs, the location of the accident is protected by a structure which contains HEPA filtration protection. Thus, the size or spread of a fire would be minimal.

Another question that I have has to do with your time frame, your assumption for storage, ten to fifteen years. And I understand, Carl, that you're looking at what headquarters is doing with the disposition PEIS and their assumption that Rocky Flats will not be a permanent repository. However, we've heard for a long time the WIPP's going to open and take the waste, and that hasn't happened and may never happen. We have a very hard time finding places to take our low-level waste. And I'm worried that perhaps in this Environmental Assessment you're being a little too optimistic with the time frame in which plutonium may leave Rocky Flats, and it's my opinion that we should be planning for the best possible storage. If we have to store this stuff, it needs to be in state-of-the-art storage. And my hope is that we're not looking at cost as a driver, that we're looking at health and safety factors as the primary driver.

MR. SYKES: Well, you are right in identifying that there will be cost savings associated with consolidation. However, as the EA points out in the risk part, there is a fairly dramatic reduction in risk from consolidating into 371. Certainly for the putting the plutonium in the DOE standard, there's also a big safety factor there. I share the concern you have that we certainly can't control what happens with the DPPEIS and where a facility would be. The preferred alternative is going to be to build a facility at an assisting site or a--or facilities at assisting sites not including Rocky Flats to store the plutonium. We certainly understand there can be political opposition to that wherever these sites would be identified. However, there is some optimism in that the people that are performing the DPPEIS have identified that it will--putting plutonium, all the DOE plutonium at one site or a few sites will give dramatic cost savings to the Department of Energy, so there--in one sense there will be another driver besides just our problem in making the DPPEIS turn into reality.

Storage vaults in Building 371 are not adjacent to the process area, nor are significant quantities of combustibles permitted in SNM process or storage areas.

MR. MARSHALL: Uh-huh. But let me ask you, if this EA goes ahead and you just happen to pull FONSI out on it and then the plutonium ends up staying at Rocky Flats for longer than fifteen years, what then?

MR. SYKES: Well, it's basically going to--what we're going to have to do is if we start going down the path and we realize that plutonium is not going to leave the site in the time period we envision, we're going to have to relook at things we may have to do to 371. This is kind of in parallel with Defense Board Recommendation 94-3. It's primarily worried about seismic concerns with Building 371, but it's going to take a look at what kind of upgrades you could do so that Building 371 would be even more robust against a seismic event. If it becomes apparent that plutonium will not leave this site, then some of the upgrades that might be too costly for a short time period might be more realistic for a longer time period. One thing 94-3 is going to look at is the possibility of making a new facility on Rocky Flats that would be state of the art to hold the plutonium.

MR. MARSHALL: And what would you see about the--what would be the benefits of that in your opinion?

MR. SYKES: The benefits of--

MR. MARSHALL: If you were to build a new facility.

MR. SYKES: The benefits of building a new facility on the site would be that you would--you could make it state of the art, and if you were going to keep the plutonium at Rocky Flats, you could make it better than if you stored it in 371 alone. The problem with that is you can never make it good enough to eliminate all the risk from storing plutonium, and as long as we have plutonium on site, there's going to be some amount of risk to the public. Seeing that Rocky Flats is within sixteen miles of such a major population center, that is why the Defense Program's Programmatic EIS is looking at relocating it away from such a large population source.

MR. MARSHALL: It's also why we should be looking at the very best storage we can have while it's there on site. Thanks a lot.

MR. KRAY: Tom, just a response to that. The thing that concerns me is number one, if you make the best possible storage you could have at Rocky Flats, that will give some individuals reason to say that it's safe to keep the materials at Rocky Flats, all right. The best possible storage is going to be the location where the material is isolated from a major population center.

MR. MARSHALL: Certainly you're not suggesting that until we--it can move somewhere else that we have anything other than the best storage we can have.

MR. KRAY: Well, we want the best storage--we want the best storage we can have at Rocky Flats while still considering the possibility of the fact that the best storage is not going to be at Rocky Flats, the absolutely best storage.

MR. LEONARD: Could I have a little input on that exact same comment? We feel exactly as you do. We, for the next ten years, would like to have the best possible storage for the special nuclear material at Rocky Flats. And to be quite honest, to build a new storage facility in ten years is probably very optimistic. We believe that if you started right now we're ten years away from opening the doors to a new storage facility. Therefore, the best storage location and methodology for plutonium in that future, which is why this is a ten- to fifteen-year EA, is to put it in Building 371 in a new container.

MR. KRAY: A point there also is obviously someone is going to have to use resources, taxpayer dollars, to construct the best possible storage. And why should they use those resources for a temporary situation at Rocky Flats when they can use it for a permanent storage situation in the best possible location?

MR. MARSHALL: All right. As I said, I think that it should be health and safety factors that are the driver, not cost factors that are the driver. And I don't have the same confidence that others may have that DOE is going to find a permanent repository any time soon. I'm worried that too often we've made decisions for the short term with these promises that something else is going to happen and that doesn't follow through, and you're stuck then with a facility that is perhaps not the best. And it deserves, I think, to be looked at further for this process.

MR. GOLDFIELD: This discussion raises in my mind another question. In repackaging this plutonium is being borne in mind that a lot of this plutonium is in forms that can't be shipped. They are considered too dangerous to ship. Also, they're considered in quantities too dangerous to ship. In other

words, there are many factors involved. The GAO report on residues goes into detail on this. And according to them, it was going to take years to repackage the materials so that they could be shipped. In the repackaging is shipment, but my feeling is, like yours, too, is that we've got to get the plutonium the hell out of here. But it's got to be in containers and in forms that can be shipped. Now, is that being borne in mind when all this stuff is repackaged?

MR. SYKES: Well, this EA specifically only talks about metals and oxides. The residues, the 3.1 tons of residues, are being addressed by the residue program. They haven't identified all the different things they want to do to all the different types of residues. Some of their treatments may give--may separate plutonium and would give it to us, but at that point it would be fairly pure. It would be in the form of metal or oxide. You cannot ship pyrophoric oxides except in very, very, very small amounts. But when we stabilize it and repackage it, we will be able to ship that. So the residues is a problem, but that's not under the scope of this Environmental Assessment.

MR. GOLDFIELD: In other words, all the packages you're redoing now will be suitable for shipment.

MR. SYKES: Right. Correct. Right.

After the material is repackaged by the process line in Building 371, it will meet the requirements for shipment.

MR. GOLDFIELD: If a repository can be found.

MR. SYKES: Right.

MS. HARLOW: I have a question. I'm Mary Harlow, and I'm a member of this committee. I would like to know what assurances you have this is truly a 50-year can. I understand plutonium has not been studied as to how well it's going to store. This is one of those gray areas that we developed the plutonium metal, the so-called metal from hell, but we don't know how it's going to react in storage, so how do we know we may not have to open those containers in a few years and do some more stabilization? And it's like Joe says, if this is a 16 gauge can, it's hard to weld, it's going to be hard to open, too.

MR. LEONARD: Good question. We--we're not going to just put it in these vaults and not look at it again and keep the doors closed. We are going to have a very strict surveillance program with the metal and the oxides and--which entails weighing the container, doing some testing and things like that. Which brings us back to another point of what Tom brought up, why are you putting the processing in the same building that we're storing, is because we do anticipate some package failures. Even if you have a one percent failure rate, which is pretty good--you know, a pretty sturdy can, you're still going to have 1,000 cans go--or 100 cans go bad over a year or two. So we're still going to have to have a capability to maintain this plutonium and being able to cut the container open, look at the material, restabilize it, repackage it and put it back on the shelf so it's safe. And our surveillance program will pick that type of program up if those cans are going bad. Is this can going to last 50 years? We're going to have a very good confidence level that yes, it is, but we're also going to be looking at better methods along the way to keep this material in storage.

MR. SYKES: As Bob was saying, we will be developing surveillance programs. I think it's important to point out that the reason we're doing this can repackaging program is we know the types of containers we now have the plutonium in are not suitable for the longer term storage and we know they don't work. For instance, when you keep plutonium metal in a slip lid can, oxygen can get to it and it can oxidize and then therefore regenerate this oxide which can be pyrophoric. When we put the metal into the 50-year can, it's going to be in an inert atmosphere. You remove the chance when you weld it of oxygen getting to it, and therefore there should be no more oxide generated in the future.

Metal will actually be fairly easy for surveillance. We can just weigh the can. If the can gains weight, then you know the plutonium became plutonium oxide and it gained weight. Oxide's a little bit tougher. But again, in a slip lid can like we now store it, Pu oxides can reabsorb moisture and can form pyrophoric hydrides. When we stabilize at 1000 degrees, the higher temperature than what we stabilized in the past makes larger particles, makes it less likely to absorb moisture. And again, when we seal it in

a can in an inert atmosphere, we're--that will make it less likely for it to absorb moisture. Surveilling oxide's going to be a little bit more difficult and it won't generate pressure.

But again, this--the whole reason we're doing this is because we know keep it in a vintage slip lid type can like we do now, we'll just continually have to reprocess and reprocess and reprocess over and over and again. And by putting it in a 50-year can what we're trying to do is prevent us from having to reprocess it so many times over and over again.

MR. MARSHALL: I just want to follow up on that. How many--you were talking about failures or percentage or numbers.

MR. LEONARD: Yeah, I messed up. We have about 10,000 containers that we're looking at consolidating in the building. One percent of 10,000 is 100, not 1,000, so I kind of messed up on that.

MR. MARSHALL: Are you suggesting that there be 1,000 failed packages a year?

MR. LEONARD: No, 100. I said--I took a number right out of the air. I never suggested that. Los Alamos has no numbers right now. Oh, did I step into that one. I'm sorry. Los Alamos has no numbers that they've released on possible failure rates of the can. They will give us that kind of information before we actually put the plutonium in the can. But I just took a number out of the air. The point is, is that no matter how good we make this can, there is going to be a failure rate associated with them. It might be very minimal, but even if it's one, you still have to have a capability to process that one can, and that's why we're putting a processing capability in that building that we are storing the material in.

The proposed 50-year storage container will be seal-welded and inspected using standards similar to those that were used for pit assembly at Rocky Flats. A surveillance plan will be used that are similar to the shelf study surveillance plans used for pits which have been very successful. As a result, we do not expect a 10% failure rate that was arbitrarily suggested by Mr. Leonard.

MR. SYKES: And the standard is a living document, so to speak. If we identify areas where the canning process needs to be improved, the standard will be improved also. But what I can say for certain is that the standard right now is a dramatic improvement over storing oxides and metals in slip lid cans.

MR. GOLDFIELD: What is the experience up to now? What is the longest period in time materials--plutonium, these oxides and the pure metal, has been stored without the formation of hydrides and oxides and all the other good--and hydrogen and all the other good things?

MR. SYKES: This basically is the longest time period. In the historical past, these types of materials never did--never were stored for long time periods. That's why we have the type of containers we do. Oxides would have been sent down to 771 and reprocessed and turned back into plutonium metal for use in weapons manufacture. When we stopped operations in '89, that's why we have all the metal in cans and oxides in cans. Things just stood still, so right now we're at the longest point we've ever been where material has just sat like it is.

MR. LEONARD: Could I follow up on that a little bit? We do have very good empirical data on how long a pit, which is what our end product used to be out there, can be stored. We've had these things in the field for a long time. You lend mention to Pantex (phonetic) down in Texas that stores the pits in bunkers down there. Outside of containment areas, by the way, without heat filtration and this type of thing, in relatively--in stainless steel shells, and that is showing us in that when we do weld the stainless steel boundary around the plutonium, very little corrosion of that plutonium takes place. It's a very good sealing and storage mechanism.

MR. SYKES: That's where the number of 50 years comes in, for your information. It's based on the experience the Department has with pits, pit storage.

MR. GOLDFIELD: Well, there's a new avenue. How many failures have they had?

MR. LEONARD: Well, going to that, to be quite honest, I really don't know, but very minimal actually. We have a number of pits at Rocky Flats that we monitor and Pantex has literally thousands of them, and the failure rate is very low. I mean, would be less than one a year in my opinion as far as I know, because I have not heard of many. So--and when we do have those kind of problems, we see

lessons learned and safety flyers come up through the DOE complex to verify that kind of--that we don't have the same problem as they're having. And so our pit storage has very good surveillance history associated with it.

MR. WOLLARD: Hold on just a minute, Greg. Do you need to change your tape?

THE REPORTER: It's still a little too early. In about ten minutes or so.

MR. WOLLARD: Okay. Go ahead.

MR. MARSH: Well, this shouldn't take ten minutes. My name is Greg Marsh, and about five years ago--five years--I don't know, a long time ago--we had a study of--again, pardon my lateness. I was about fifteen minutes late, and I don't know if you people have addressed this issue or not. We've all heard it before, but I do want to reiterate it. About five years ago, we had a calculation of a scenario of a huge airplane dripping with JP-4 smashing into the plant, having a gigantic fireball and all that crap--you heard it all--and it would just burst, you know, three milligrams of plutonium in Denver's air, some ludicrously low level of plutonium that nobody believed, and it was one of the big chunks of information that led to the total lack of credibility of the government and its contractors. Now, some wise ass in the audience got up and said, "Well, if it's going to be three milligrams with a 747 dripping with JP-4, how about a Piper Cobb (phonetic) loaded with high explosives driven by a religious fanatic--and there's plenty of those in the world--and deliberately targeting the buildings?" Now we have--five years later we have GPS. We can target three coordinates, east-west and north and south and up and down within three meters. And so we have an airplane here loaded with high explosives flown by an idiot who is bent on destroying it. And I--the person mentioned what is the--did you calculate this in and what is this risk? And that risk was many, many, many orders of magnitude more likely than an airliner, scheduled airliner, accidentally crashing into the plant. And of course if you think about it, that makes sense.

Now the next question is, what if there were two of these idiots in a row, kind of like the double whammy bomb we dropped on the population center in Baghdad a couple years ago before GPS was as well organized and developed as it is now. Well, the question is, okay, we're talking about 16 gauge cans and 10 gauge cans and all that, and we're talking about the ability of the can to contain its rather toxic contents without bombs or whatever. At the summit meeting, I sat with the president of EG&G Rocky Flats and a couple of other influential people, and they said they want to park all of the plutonium on the site at the same place, which means that you're going to have quite a few tons in one particular location, which in theory could be a pretty good way of helping out a terrorist or two.

So the question now is (inaudible) doing these studies, where does deliberate sabotage factor in? Has anybody looked at that in the equation of a 10 gauge can or a 16 gauge can? And what--what does that do for the numbers and all that we're talking about tonight? Thank you.

MR. LEONARD: I'll give a shot at it. Security vulnerabilities are analyzed at Rocky Flats, and because the guy with the Piper Cobb and a lot of other things, we don't want to give people ideas on what we can and cannot protect against. Therefore, we can't really say what we can and can't do out there. But we have analyzed what we consider worst case scenarios associated with plane crashes and less significant things such as earthquakes, which is pretty significant, and at some point the risk is to a point that it is very difficult to quantify what it is. Because can we protect a Piper Cobb loaded with 400 pounds of C-4? Well, maybe yes. Can we--what if you put 600 pounds and 800 pounds? The "what if" questions keep rolling up.

We analyzed both with security and safety the most credible scenarios associated with risk accidents and we also analyzed incredible scenarios, such as magnitude of orders, bigger earthquakes than what we should or could experience around this area. We analyzed those type of things to see what kind of major release problems we'd have on the plant site. We believe that the risk of credible scenarios with both safety and security risks are acceptable with the safety analysis report that had been done in Building 371.

We can give a lot of the data to you for the natural phenomena and the incredible scenarios associated with fires, earthquakes and other things. Like I said, in this form, we really can't tell you what some of the credible and incredible scenarios we've looked at for sabotage because we don't really want to give the terrorist person out there the level of protection that we have in place.

MR. SYKES: And I'll expand on that a little bit. If you look at the hazards to the public from the plutonium we have on site, primarily you're talking about releases, especially that of oxides. When you

look at a terrorist type attack on a building containing plutonium, that's still the main hazard, if you have a release due to a failure of containers. So if you look at the EA, we did look at beyond design based accidents. It wasn't from terrorist attack, it was from natural phenomena, but it's still the same type of hazard, you're releasing plutonium from the site. And you can kind of parallel what the EA says, you can--although we don't talk about security, it's very similar analysis.

There's a few other points we should consider. First of all, 371 is already the largest repository of plutonium on site, so the act of moving the rest of the plutonium on site perhaps increases the--making 371 a target, but it already should be a high target if you are a terrorist.

And again, looking at the EA, when we move plutonium all into one building, you do increase the source term from something like a terrorist attack or a severe natural phenomena accident, but the fact is you moved it into the most secure building. It's the one building that will most likely survive any type of event. And you've also lowered the chances from the number of buildings that are vulnerable so that if this person flying an airplane is a bad shot, right now he might be aiming at 371 but he might land in 707 and get lucky. So, you know, you have less chances of getting the right target when you move it into 371. So those are a few other points to consider.

MR. MARSH: Well, is this figured into this can thing at all? Is this part of the can design picture?

MR. SYKES: The can was not designed to withstand--or it was not--preventing terrorist attack was not a design basis for the can, it was the safety of storing plutonium.

MS. HARLOW: I have one more comment. This is from the Conway report to Congress in February of '95. It said one of the big criticisms at Rocky Flats was the lack of adequate plans in the whole systems approach. "Risk is more serious than appears to be recognized by DOE. There needs to be a systems approach to solving safety, technical and managerial problems. This lack causes increased cost, delays, inferior solutions to problems and inability to solve some problems." Now, I know we have a new management team at Rocky Flats, and I'm wondering if this team is going to simplify the management out there, get rid of some of these layers and get some direct line to the line managers so that there is not this delay in coherent management at the Flats.

MR. SYKES: I don't know if I'm smart enough at this point to brief anybody on the new contractor. Obviously the--exactly what you said is one of the reasons we were hoping that a new contractor will do a better job. I don't know if any--I don't know if there's anyone here that can really talk about the new contractor at this point.

MS. HARLOW: Well, I think it becomes a concern when you're talking about, you know, storing all this plutonium and all these houses that are out there. Certainly we're going to be at a bigger risk when all this is going on, and if we don't have the right management in place, then that's an even bigger source of risk.

MR. WOLLARD: I don't know that these gentlemen are able to answer that question, but we will respond to that.

The Kaiser-Hill team was selected in large part due to their past successes in environmental cleanup and nuclear projects. Far from being unaware of the problems faced at Rocky Flats, the Kaiser-Hill team has demonstrated competence in similar situations. The new contract is structured to reward Kaiser-Hill for progress and success. This combination of past experience and contract structure is expected to result in dramatic improvement in the way problems are managed at Rocky Flats.

MR. COLE: My name is Sam Cole. I'm with the Colorado Chapter of Physicians for Social Responsibility. I came in a few minutes late and put something in the back that anybody in this room is welcome to take. It's a new booklet put together by the League of Women Voters called "Your Role at Rocky Flats." Feel free to take a copy.

My comments--I'd like to make several comments about the draft EA, although I haven't read it, I've just looked over some briefing information on it. I, too--I, too, share a concern about moving or planning for the movement of plutonium off site. I think we need to err on the side of caution and assume that this stuff is going to be here for much longer than just a couple decades. And I think we need to take--when we talk of moving it off site, we have to take into account risks of transportation and the risks to future generations when we bury it out of sight, out of mind in some far off place.

I think when we're coming back to the site and storage at the site, what we want--and the information I just read said that we're looking at proliferation resistant storage at Rocky Flats--I don't see how when you keep plutonium at Rocky Flats in weapons usable form, whether it be in the 50-year can or not, how that is helping the issue of nuclear proliferation. Right now, in New York City, there are negotiations going on on the Nuclear Nonproliferation Treaty. I think it--I think it sends a bad message to those negotiators when we here at Rocky Flats are planning to keep this plutonium in weapons usable form. I believe that's one problem with what I'm seeing so far with the draft EA.

When President Clinton spoke to the United Nation's General Assembly in September 1993, he offered to place the United States' excess defense nuclear material under the authority of the International Atomic Energy Agency (IAEA) before the next Nonproliferation Extension Conference. A negotiated amount of material would be relinquished to the IAEA who would in turn ensure that this material would never be used for any weapons production. Three of the Department of Energy's sites were impacted, one of them being Rocky Flats. A suitable storage vault within Building 371 was selected to be turned over to the IAEA. A portion of the oxide inventory was released to the IAEA of which they will have complete safeguards responsibility. More of the Rocky Flats inventory may be released to the IAEA at a later date.

We also want to make sure we keep it stable for as long as possible. Fifty-year can, hopefully you're saying we can keep it stable within the 50-year can and nothing out of the ordinary will happen. I'd like to go longer than that, and I think we all would. We also want to keep worker exposure low. And I think therefore we need to look at alternatives to the 50-year can, and I haven't heard much talk tonight about alternatives. And I would like to keep the scope of this EA open to more alternatives than what I've seen so far and I would like to see more discussion around vitrification issues in regards to storage. And I believe that's all I have. Thank you.

MR. SYKES: I think I'll answer--or comment on a couple of those. We referred again to--I'm going to refer again to the Defense Program Programmatic EIS. It will be covering not only where the plutonium ultimately will be stored but what kind of things will be done to the plutonium, and it's going to be looking at--and none of the operations will be performed here. They're assuming that the plutonium received at the ultimate site will be packaged per the DOE standard, the 50-year can.

Some of the things that I saw them looking at, though, was--vitrification was one option they're going to look at under the DPPEIS, as is transforming it somehow for reactor type use. The DPPEIS, the draft is due out by the end of '95 and will be something we can look at a little more in detail then. But at this point, we're just going to store--we plan on storing the plutonium per the standard and then allowing DP per their PEIS to handle it at that point. (Pause.)

MR. MARSHALL: That's a good example of how DOE accomplishes things on time. That PEIS, we were supposed to have a look at that this spring already. Obviously that hasn't happened and they have pushed it way back. This is supposed to be their new EIS format. They were going to fast track it, and I guess that's not happening.

Maybe you've seen something I haven't seen, Carl. I don't know how far along they are on that EIS, but I do know that there has been a suggestion from a number of people that the Department of Energy consider small scale pilot vitrification plants. Not large ones that would handle all of the plutonium in the complex, but very small ones that would be site specific.

I'm wondering if your program at Rocky Flats is open to looking at longer term methods of dealing with and storing the plutonium other than the 50-year can.

MR. SYKES: At this point, we're not--I'm not saying that that can't happen as we go along here.

MR. MARSHALL: What would be the method to begin that conversation at Rocky Flats DOE if not through this NEPA process?

MR. SYKES: I would think through the CAB committee meetings we can start looking at ways to--how we can do that. Off the top of my head, I don't think I can give you a good answer.

MR. MARSHALL: But you don't think that other methods of storage other than the 50-year can are credible to consider within the scope of this NEPA process?

MR. SYKES: Not at this point, because again, the reason we're doing both of these actions or proposing them is to reduce the risk, and part of the problem we've had with a lot of the projects at Rocky Flats, such as the (inaudible) restoration, is that we've done a lot of analyses but no actual work. We know there's--under this proposed action there's a few things we can do here that will definitely result in risk reduction, and that's why we want to take the action in this time period we lay out in the EA. Once we get things more safely stored, certainly is open for discussion on what we should do for the long term.

MR. MARSHALL: But not at this point. One of my concerns is that every time you pop a can you increase dangers, particularly to workers. And if we can simplify and reduce the number of times we need to handle that plutonium, it's worth--it's worth considering.

MR. SYKES: Well, I agree, and again, that's one reason why the--a can that could hold plutonium for 50 years or so would be a good step in that direction that we won't have to process that plutonium for a very long time period.

MR. MARSHALL: What other storage options have been looked at as far as the EA?

MR. SYKES: The EA primarily looked at--on the storage part--actually, alternatively we looked at shipping the plutonium off site, we looked at building a new facility, and we also looked at the no action, which is to manage the plutonium as we do up to now. Other than that, no other--you know, no other alternatives were looked at. Our proposed action is to repackage to meet the standard.

The EA proposes to consolidate SNM into Building 371 and repackage plutonium to the DOE Standard 3013-94. Building 371 is the most robust building onsite. Repackaging to meet the DOE Standard meets a programmatic objective throughout the DOE Weapons Complex to safely and consistently store plutonium.

MR. MARSHALL: Was that simply because you don't find other options to be credible?

MR. LEONARD: Well, a couple other options we're looking at the combination of buildings, seeing as we know we have some building problems and we'd like to be able to fix the buildings that we actually store the material in and be able to spend our resources towards those. We looked at different buildings storing all the material, we looked at a combination of more than one building storing material, separating one building on one side of the plant and one on the other side of the plant. Those very fast became not a very credible--or didn't increase or improve the safety configuration of the material as much as this one alternative did.

MR. MARSHALL: Are those all analyzed in the EA?

MR. LEONARD: I'm not so sure the more than one facility was analyzed in the EA. I think that was part of the preliminary cut before the EA.

MR. MARSHALL: Thanks.

MR. WOLLARD: If I could just take a moment. It's five minutes after 8 by my watch. Can I get a show of hands of anyone else who wishes to comment tonight to give us an idea of if we need to go on? (Pause.)

MR. WOLLARD: Is that going to be it? All right. Anyone else have a comment? (No response.)

MR. WOLLARD: I'd just like to reitify (sic) that all of the comments that have been made here tonight will be responded to in a formal fashion as part of the EA when it starts its final form, and then we will make that available both in the public reading rooms, we'll make it available at the CAB office and the (inaudible) office as well as calling our office at the site.

UNIDENTIFIED SPEAKER: Todd, where should comments be sent to?

MR. WOLLARD: Comments can be sent to myself, and I have office--business cards out in the back. I can also be reached at 966-6232. They can be faxed to my office at 966-6153. Carl Sykes is also accepting comments, as well as the DOE Office of Communications. And again, comments will be accepted through May 3rd.

UNIDENTIFIED SPEAKER: Thank you all for coming and listening, and as Tom said, you're welcome to stick around. Thank you.

(Whereupon, the public comments portion of the meeting was concluded.)

Part 2: WRITTEN QUESTIONS AND RESPONSES ON THE EA FOR THE CONSOLIDATION AND INTERIM STORAGE OF SNM AT ROCKY FLATS

The following are written comments/questions received from Mr. Joe Goldfield.

1. Question Are there no added dangers with the consolidation of the SNM, 9.8 metric tons of plutonium and 6.7 metric tons of enriched uranium, in Building 371?

Response There are no added dangers and the overall public risk from Rocky Flats actually decreases about six fold.

Comment a. When explosives such as TNT and ammunition are stored by manufacturers and the US Army, they are generally segregated into relatively small stores, in secure bunkers, separated from one another.

Response a. The contemplated conditions in Building 371 are not analogous to this example. Plutonium is very different from an explosive material or ammunition because it does not exhibit the static electricity or drop-height percussion sensitivity problem of explosives. However, for purposes of criticality safety, it will be placed inside sealed containers, each with a small, subcritical quantity of the material. The internal configuration inside the containers is such that no critical array of containers is possible. A criticality typically occurs when too many neutrons are generated during the radioactive decay process. A criticality produces little facility damage because the main result is production of more ionizing and penetrating radiation. The accompanying reaction then immediately disassembles any critical configuration of SNM, ending the reaction. In comparison, if an accident were to occur with explosives, propagation through the entire inventory and destruction of the facility would typically occur. Therefore, explosives must comply with military "quantity-distance" specifications. The segregation and separation of SNM would not yield a similar benefit.

Comment b. Dangerous chemicals are also stored in secure areas and often the maximum quantities that may be stored in one area are limited. Methyl isocyanate--stored in a tank in Bhopal, India (about 30 tons) was released into the city killing over 5,000 people and injuring 200,000 others. It is generally conceded that the disaster would have been more limited if the material had been stored in much smaller quantities.

Response b. The conditions in Building 371 are not analogous to this example. Plutonium is very different from a chemical explosive, and does not have stored chemical energy associated with explosives. For example, plutonium oxide is just about the most thermodynamically stable compound known to man. There are no chemical explosives, associated with plutonium storage at Rocky Flats, and storage of SNM in smaller quantities would not yield a similar benefit.

Comment c. At Pantex, the largest repository of plutonium triggers, thousands of these devices are stored not in one building but in relatively small, highly secure bunkers, separated from one another. The plutonium in these triggers is considered to be in far safer configurations and forms than most of the configurations and forms of the plutonium at Rocky Flats.

Response c. The specific storage arrangement of material at Pantex is required by the presence of chemical high-explosives that have both static electrical discharge and drop-height sensitivity percussion properties. The arrangements must comply with military "quantity-distance" specifications due to the dangers posed by the high explosives in the assemblies.

2. Question What is the time frame for each step of the proposed process for consolidating the plutonium in Building 371?

Question a. When will shipment to Building 371 start?

Response a. Material transfers governed by the EA are proposed to begin in the fall of 1995.

Question b. Will shipment start of plutonium forms and packages that have not been stabilized and made safe for interim storage?

Response b. No, material transfers will only involve material in compliance with the Health and Safety Practices (HSP) Manual, Section 31.11 requirements which ensure that material is safe for transportation and short storage durations (approximately 2 years).

Question c. How long does it take to complete treatment of the plutonium to make it safe for storage?

Response c. With the current proposal, the treatment of the plutonium to bring it into compliance with the DOE Standard 3013-94, Criteria for Safe Storage of Plutonium Metals and Oxides will be completed in 2002.

Question d. When will all plutonium (9.8 tons) be stored in Building 371?

Response d. Current plans propose completion of consolidation in late 1999.

3. Question What is the danger of operating reprocessing lines in Building 371 where such large stores of plutonium will exist?

Response Almost all plutonium will reside inside vaults and vault-type rooms. These locations are free of combustible materials, and they are continuously monitored by fire and intrusion detection equipment. Access to the vaults is carefully controlled for both security and safety reasons. Processing the materials is considered safest when performed in the same facility as storage because of elimination of transportation and handling accidents outside of the facility. Therefore, in the unlikely event that a spill, fire or other loss of confinement accident occurs, the location of the accident is protected by a structure which contains a HEPA filtration system. Thus, the size or spread of a fire would be minimal. Processing and repackaging activities are considered to be routine activities. The room for the process line will not be used for storage. Storage will be in the enhanced SNM Storage Vaults or the central storage vault. This is not considered to be a safety issue since the processing and repackaging operations are in rooms separate from the storage areas.

4. Question If only metal and oxide are to be transferred to Building 371, why is so much processing and repackaging required? If the forms of metal and oxide are so unstable, is it advisable to ship them (especially before treatment and stabilization) to Building 371? (p. 1-2)

Response SNM will be consolidated into Building 371 only when it is in compliance with the HSP Manual, Section 31.11 requirements. These requirements ensure that SNM is safe for transportation and short term (approximately 2 years) storage. SNM that is not in compliance with the HSP Manual, Section 31.11 will be processed in Building 707 under the Thermal Stabilization Program before being transferred to Building 371.

5. Question How are oxide particle size increased? (p. 3-8)

Response Particle size is increased by heating the oxide particles to temperatures greater than 500°C, which causes the smaller particles to stick together.

6. Question It is proposed that 4.5 to 5.1 kilograms of plutonium be installed in each container. Isn't that a dangerous configuration that invites criticalities?

Response Plutonium mass values have been used for planning purposes only. Criticality Safety Engineering will conduct rigorous and formal evaluations to determine specific plutonium masses which can be safely used in these activities. Operations or activities may not be conducted until such time as approved Nuclear Materials Safety Limits have been established and issued for use. It should be noted that approved plutonium mass limits may actually be lower than those used for planning purposes.

7. Question After oxides are stabilized, how is moisture and oxygen prevented from coming in contact with the materials? What is the maximum allowable moisture content of gases that can be tolerated in contact with the stabilized oxides before moisture absorption becomes a problem?

Response The oxides are stored in a helium environment in welded containers. Helium does not react with plutonium. We will use gas with less than 500 ppm of moisture, therefore moisture absorption will not be a problem. The Los Alamos National Laboratory (LANL) experimental results indicates that 2,000 parts per million (ppm) to 3,000 ppm moisture is the maximum allowable.

8. Question Will vents be installed on sealed containers to prevent pressurizations? If so, under what conditions?

Response Vents will not be installed. Plutonium metal and oxides will be processed to meet the DOE Standard 3013-94, thereby significantly reducing any potential pressurization. The storage containers have been tested and shown to be strong enough to withstand any potential pressurization.

9. Question Why are 50-year containers made of 16 gauge stainless steel instead of 10 gauge stainless steel? 16 gauge steel is far more difficult to weld without injuring the sheet steel than 10 gauge. It is more difficult to ensure leak-tight welds in 16 gauge than 10 gauge? 10 gauge is twice as thick and will tolerate double the pressure buildup without failing as the 16 gauge.

Response The storage containers designed and tested at LANL meet the requirements of the DOE Standard 3013-94. This container was designed to be light weight and simple to weld in a glovebox environment using conventional gas tungsten arc welding processes and fixturing. Initial designs of the storage container considered using commercially available pipe and tubing in the gauge thickness you suggest but were abandoned when the added weight and limitations of handling in the glovebox was considered. It is more difficult to ensure leak-tight welds in thinner materials and a thicker material would survive higher pressures. However, a weld process for the storage containers has been developed that is repeatable and can be controlled by an approved quality assurance program. The advantages of using 0.065 inch thick material outweigh those of a thicker (10 gauge) material.

10. Question How can we be sure that the proposed package is safe for 50 years? Have such packages been tested for that period of time? Does the strength of stainless steel deteriorate with time due to radioactive bombardment? What type of stainless steel is proposed? Not all types of stainless are equally suitable to resist corrosion (e.g., type 304 stainless is nowhere near as resistant to chloride attack as 319).

Response The weapons complex has almost 40 years of experience surveying pits containing plutonium which were constructed from stainless steel. The DOE Standard 3013-94 recommends using type 304L stainless steel which is commercially available. This alloy has good resistance properties to stress corrosion in the as-welded condition. Moisture will have been removed from the plutonium metal and oxide at the time of repackaging so any chlorides present will not contribute to container failure. Type 319 stainless steel is not a standard alloy and would be more difficult to procure.

11. Question Isn't there a limit on quantity of TRU waste set by the Colorado Department of Health and Environment (CDPHE) of 1,600 cubic yards total?

Response No, there is not a limit on the quantity of transuranic (TRU) waste that can be stored at Rocky Flats. However, there is a limit on the interim status capacity for TRU-mixed waste that was set by Compliance Order 89-07-10-01. This limit will change as the individual storage rooms under the interim status limit are permitted. Also, as other rooms are permitted, the overall capacity for TRU-mixed waste may also change. Currently, the Site's interim status limit for TRU-mixed waste is 1,419 cubic yards and the permitted limit is 1,248 cubic yards (mainly due to the permitting of 21 mixed-residue storage areas).

12. Question What does "buildings were built to commercial standards" mean? What wind loads were they designed to take? What earthquake level can they resist? What other features make them relatively unsafe for plutonium processing and storage? (p. 4-4)

Response In general the term "commercial standards" means the present "Uniform Building Code" or its equivalent at the time of design. While the wind loading and earthquake strengths may not be described, the facility is expected to survive "normal" winds and low energy earthquakes, but is not expected to survive without damage a low probability event such as a direct tornado path or a high energy earthquake for the area. The "commercial standard" winds and earthquake magnitudes are typically less than those used for the design of Building 371.

Wind loading and earthquake resistance are the only design features that differ from building to building that could affect external plutonium releases and the subsequent offsite consequences.

13. Question Building 371 is described as a 4-level facility with 186,000 square feet. Does that mean that there are about 46,000 square feet on each level? Are all six plutonium storage vaults on one level? What is the spacing between vaults? Aren't there safety regulations dealing with the maximum quantity and form of plutonium to be stored in one vault and the minimum space allowable between vaults? If such safety regulations exist, what are they? If they don't, shouldn't such regulations be developed before we pounce into plutonium storage in Building 371?

Response The floor area of Building 371 is about 186,000 square feet, with the majority of this being on the ground floor and attic. The basement level is somewhat smaller than the ground floor, and the sub-basement level smaller still. The plutonium storage areas are located on the ground floor, basement, and sub-basement levels. There are no safety regulations that stipulate distance between storage rooms, but Criticality Safety Engineering performs calculations per DOE Orders to generate Nuclear Material Safety Limits for all areas that contain nuclear material to ensure that the materials do not interact and cause criticalities.

14. Question What is a metrology lab? Is that a typo? Should it be meteorology? (p. 4-5)

Response The field of metrology is concerned with measurement, and the metrology lab is where measurement instruments are calibrated and operated.

15. Question How are ducts designed in Building 371? Will plutonium buildup in ducts become as large a problem as in other buildings where fallout of plutonium is almost impossible to remove? Are there ways to design ducts so that drop out of solids is minimized? Do engineers at Rocky Flats apply such design methods?

Response An engineering and safety assessment of the Building 371 glovebox exhaust system indicates that the duct material in Building 371 is not a significant safety hazard. A majority of the gloveboxes already contain filters which ensure that no additional accumulations of plutonium will be added to the ducts. Future operations in all buildings will be assessed to ensure that proper controls are in place to minimize any further duct accumulations.

The following are written comments/questions received from the Rocky Mountain Peace Center.

16. Comment The environmental assessment (EA) says the scope of the consolidation and interim storage project is limited to 9.8 metric tons of plutonium and 6.7 metric tons of enriched uranium.

Question a. What about the 2.1 metric tons of plutonium acknowledged to be onsite? What is the breakdown according to characterization? Is it all residue? Since much of this material is now located in Building 371, where precisely will it be relocated? Where will it be stored as not to interfere with processing and storage contemplated in this EA? What processing is expected for this material and where will it occur? Where and for how long will it be stored onsite?

Response a. Additional SNM at Rocky Flats (primarily residues and liquids) are not addressed by this EA. However, plans are currently underway to stabilize these materials in areas not interfering with consolidation and storage. Any SNM concentrate resulting from the stabilization of residues and liquids would be consolidated into Building 371. Residue drums currently in areas planned to be used for consolidation will be moved to locations onsite when it becomes necessary.

Question b. Similar questions need to be posed regarding holdup SNM? According to the best estimates, where is it located, what processing will be required to deal with it, where will this processing take place, what processing will be required to deal with it, where will this processing take place, where and for how long will the material be stored onsite? These questions need to be answered so the public has a sense of the real magnitude of the SNM problem at Rocky Flats.

Response b. Equipment cleanup activities planned to take place in parallel to the proposed consolidation activities described in this EA are to identify all equipment where holdup can be found, to analyze the holdup material to determine composition, and once the composition of the holdup is known then appropriate processing will be performed. Holdup material that is determined to be Category I or II SNM will be thermally stabilized and packaged in the 50-year containers.

17. Question a. As I understand the text of the EA, not only will all Category I and II SNM storage be concentrated in Building 371 but also most processing of this material will occur in Building 371. Is this correct? Please specify precisely the amounts of material expected to be processed in Building 371.

Response a. The present strategy is to perform the processing of these materials in Building 371. Approximately three metric tons of plutonium oxide and four metric tons of metal will be processed.

Question b. The EA refers to the Building 707 thermal stabilization operations (p. 3-4). What is the amount to be stabilized in Building 707? In Building 371? What is the time table respectively for these operations? Since DOE, at the urging of the Defense Nuclear Facilities Safety Board (DNFSB), is now talking about thermal stabilization of plutonium at higher temperatures than possible in Building 707 (new furnaces will be built in Building 371, p. 3-8), does this mean that plutonium stabilization in Building 707 will be stabilized additionally at the higher temperature after it is moved to Building 371?

Response b. Approximately 100 kilograms of material are currently scheduled to be thermally stabilized in Building 707 during 1995, 1996, and 1997. Approximately 16 kilograms of that material have been thermally stabilized at 500°C. The balance of material will be thermally stabilized at 800°C, the maximum temperature currently attainable with the furnaces in Building 707. Thermal stabilization will not begin in Building 371 until April 1998. The amount of oxide that will be thermally stabilized in Building 371 is approximately three metric tons. The thermal stabilization process in Building 707 renders the material non-pyrophoric and therefore safe to store for the near-term, the material will be required to be processed again in Building 371 in order to meet the long-term storage criteria.

Question c. Where will the Actinide Solution processing occur, with what amounts, according to what timetable?

Response c. An environmental assessment was prepared for the Actinide Solution Project, DOE/EA -1039. The information you are requesting can be found in local reading rooms. Please call Todd Wollard at 966-6232 for locations. Currently a site-wide EIS is in preparation, a draft is expected to be completed by November 1996. The Site Wide EIS (SWEIS) will help describe the cumulative impacts of activities at Rocky Flats.

Question d. Have those planning plutonium processing at Rocky Flats been in conversation with their counterparts at Hanford? What alternatives to processing are being considered or developed at Hanford? What is the relevance of their work to expected activity at Rocky Flats? If they can avoid all or some of the processing they originally expected, can the same happen at Rocky Flats?

Response d. Hanford and other agencies such as LANL and Savannah River have been contacted. In all of these DOE sites the processing is being developed to meet the DOE Standard 3013-94. All sites are using similar processing technology. Rocky Flats is using the LANL process as its baseline.

Comment e. The most unsatisfactory area of this EA is the division of processing operations into discrete parts, as if they were not going to happen simultaneously, with simultaneous impacts. On this basis alone, a complete EIS should be performed so that the public has ample opportunity to know about and to comment on the full effects of the total SNM processing anticipated at Rocky Flats. This should be included as well as any Category III and IV SNM (e.g., residues and holdups). Otherwise, we lack a true picture of what to expect.

Response e. The processing operations described in the EA are divided into discrete parts to clarify, and help the reader understand, the activities. Many of the processing activities are sequential and will not initially happen simultaneously (e.g., size reduction and transfer from the export buildings must happen before the SNM is thermally stabilized in Building 371).

Simultaneous impacts were analyzed in terms of worker exposure to radiological sources during normal operations, in the analysis of accident probability, and in air emissions calculations. An EIS would be required if a significant impact to the environment is demonstrated as a result of this EA process. Cumulative effects from other Rocky Flats projects (e.g., residue processing) and programs will be addressed in the SWEIS which is currently under preparation. Ample opportunity has been and will continue to be offered by DOE for public comment to the SWEIS process.

18. Question Why is the vitrification option not considered? Research at Oak Ridge suggests that some forms of plutonium scrap or waste can be vitrified directly, bypassing processing that is being planned at Rocky Flats. An EIS on SNM consolidation needs to include a thorough discussion of the vitrification option for Rocky Flats, including assessment of this option and of whether it makes sense to construct a vitrification pilot plant at Rocky Flats.

Response Vitrification was not analyzed as an alternative under this EA. This EA only covers the Rocky Flats interim action to store plutonium per the DOE Standard 3013-94. Repackaging plutonium to the DOE Standard 3013-94 enables the later selection and implementation of any long-term option. Vitrification is one of several final disposition options for plutonium that is being considered under the Long-Term Storage and Disposition of Weapons-Usable Fissile Materials Programmatic Environmental Impact Statement (PEIS). The draft PEIS is due out in December 1995. Other options include use as mixed oxide fuel in reactors, other immobilization techniques, and emplacement in deep bore holes. Rocky Flats is not pursuing processing for any of these long-term disposition options since any one option could preclude implementation of the preferred alternative of the PEIS. Actual implementation of the preferred alternative is expected to occur in 10 to 15 years. The proposed action of the EA covers the interim period until the preferred alternative is implemented.

19. Question The DNFSB has criticized DOE for not conducting research into ventilated storage containers versus sealed containers. What is the basis of this criticism? What are the merits of ventilated versus sealed containers?

Response We are not aware of the basis of this criticism. Vented containers would allow any pressure to escape if it does not become clogged. However, venting would also allow air and moisture to enter the container and if plutonium metal is being stored, excessive oxidation would occur and the container would fail.

20. Question Danger from natural occurrences: a) The plutonium recovery area of Building 371 "was designed to withstand a tornado with 300 mph tangential winds" (p. 3-3). Is this sufficiently strong? Aren't tornado winds at 500 mph relatively common? What independent verification exists for the windstorm stability of Building 371? b) What independent verification exist for seismic stability of Building 371?

Response According to Pam Daale, meteorologist at TV Channel 7, recorded measurements of the highest tangential wind speeds of a tornado range up to 300 mph. There is no independent verification of the windstorm resistance of Building 371. The seismic stability of Building 371 is now being independently reanalyzed with new techniques and data developed in the last decade.

21. Question a. A number is provided (p. 4-3) for 1993 release of radionuclides into the atmosphere. How relevant is this figure, given the fact that in 1993 operations were essentially shut down? What total release levels are projected from all SNM operations underway simultaneously? Is there an independent assessment of the 0.055 mrem number given on page 5-6? This number evidently refers only to releases from consolidation and storage related

activities, not to all expected SNM activities at Rocky Flats. An EIS needs to provide full details regarded all possible sources of releases.

Response a. Doses to the public from Rocky Flats radioactive air emissions were provided for two years (p 5-6) in the EA. "The annual dose to the public in 1989, the last year of weapons production at Rocky Flats, was 0.0002 mrem. The annual dose based on monitored emissions since cessation of weapons production has decreased steadily ever since (the 1993 dose was 0.0016 mrem)." The 1989 emissions are primarily attributed to SNM weapon operations at the Site and provide a good comparison to calculated emissions for the proposed action. The 1993 dose to the public was provided to show a current baseline of air emissions to the environment. The annual dose for the no action alternative (0.0048 mrem) was estimated by combining the 1993 radionuclide air emission measurements with the calculated doses expected for the Building 707 Thermal Stabilization and the Building 371/771 Liquid Stabilization Programs. The no action alternative was provided as an estimate of the future dose baseline once these programs are underway. The thermal stabilization and liquid stabilization programs were the only significant actinide processing programs planned at the time of this EA. A peer review of the radionuclide air emission assessments was performed.

Comment b. Meteorologists W. Gale Biggs has often criticized the air monitoring at Rocky Flats, contending that the devices used are poorly located and do not measure all particles, the result being that the public is exposed to more radiation than officially reported. A full EIS needs to include a detailed response to his criticisms.

Response b. Mr. Gale Biggs has repeatedly criticized the ambient air monitoring program. The SNM EA was partially based on data from the air effluent monitoring program. The effluent monitoring program meets the protocol mandated by the EPA. Radioactive air emissions from the Site, as measured by the air effluent monitoring program, are verified by the ambient air monitoring program. In addition, potential radioactive air emissions to the environment from the proposed action are based on EPA approved emission calculations and not environmental monitoring.

22. Question The description of Building 371 (pp. 4-4/4-6) includes nothing about contamination of the building shortly after its opening in 1981. What, in detail happened? Why was the building essentially shut down or not used for the purposes for which it is intended? Subsequently, when DOE sought funding to upgrade the building (PRMP), the request for additional funding was defeated in Congress. What improvements have already been made to bring this facility up to the standards required for the projected consolidation and interim storage? If changes are made, when will they be made? What was the cost? How was it budgeted? What new work must be done to meet operation standards? An EIS needs to provide detailed analysis of the internal safety of a building known in the past to have been contaminated.

Response The contamination incidents of the building shortly after its opening in 1981 were leaks due to the use of carbon steel, monel and nickel components in nitric acid systems, particularly at threaded joints and swage lock tube fitting connections that were not found during water systems operation testing. The nitric acid did not contain plutonium. In later years, it was discovered that ion exchange column resins did not operate as well as expected, resulting in very low efficiency of the process and huge quantities of discharge water with residual feed constituents still present. This led to pursuit of a different, more efficient PRMP process, whose funding was terminated. This process is not needed for the activities proposed in this EA. Maintenance has been and will continue to be performed within Building 371 to ensure that it operates at optimal conditions. The maintenance costs are budgeted through the building baseline. The fiscal year 1995 baseline budget for Building 371 is \$39M. A program has been initiated in response to DNFSB Recommendation 94-3 to review the facility for any seismic upgrades needs. This program will continue for many years.

23. Question What is the maximum credible effort of a terrorist attack on Building 371 with either a) conventional explosives or b) a nuclear device? Why is this kind of analysis omitted from the EA? Doesn't the Oklahoma City bombing suggest the need for including a detailed discussion of this topic? Might considerations of this topic suggest the wisdom of course different than consolidation of so large a quantity of SNM in one building?

Response This question was partially answered by Mr. Sykes first response on page 14 of the public meeting verbatim transcript. The consolidation will not affect the Material Control and Accountability in other scenarios. What also must be taken into account is that the protective force guarding our nuclear material will have a smaller, more compact area to protect against sabotage.

The following are written comments/questions received from Ms. Mary Harlow.

24. Question Is the fact that Building 371 was built of reinforced concrete to seismic conditions for a 6.0 earthquake on the Richter scale the reason it was selected for interim storage?

Response Building 371 was selected as the location for SNM Consolidation at Rocky Flats for several reasons. The building is the most structurally robust at the Site; it is large enough to store the necessary amount of material (no other building is); a significant portion of the material (approximately half) is already there (less effort, cost, exposure, etc. will be incurred by moving the material to the building rather than away from it); it is conveniently located to support reduction of the Protected Area; and it can support the associated processing and packaging operations.

25. Question The solutions in Building 371 will be treated in the caustic waste treatment system which is hydroxide precipitation process. The solutions are scheduled to be stabilized by June 1999. Is it prudent to begin additional storage of plutonium in a building where such hazardous solutions are being treated and stabilized? Isn't there a possibility of multiple coincidence events occurring? Worker error? We have already seen this happen in Building 771 with tank drainage.

Response The caustic waste treatment system is an architectural feature which was designed into the facility in a manner which separates its failure modes and effects from other facility processes. The original facility design and intent of operation was to use this process on a continuous basis through the life of the facility in parallel to large scale storage of 17 metric tons of plutonium in the central storage vault, which is isolated by several concrete canyon walls. The proposed storage of plutonium will raise the current on-board inventory to the 10 to 12 metric ton range, well below the design capacity of the facility. The caustic waste treatment system operation cannot affect the storage areas of the facility even under worker error or accident conditions because of physical isolation of the scrubber operations from storage areas. The unique facility design for Building 371 prevents common cause accidents from occurring.

26. Question Instrumental monitoring of packages in vaults and on line inventory system reduce worker exposure and cost of verification and inspection. Has thought been given to this type of monitoring given the fact that there will be a lot of radiation in this building after consolidation?

Response The container surveillance plan will dictate the instrumentation monitoring technique. By using the approved 50-year storage containers, less handling will be required, which will reduce the radiation exposure to the workers.

27. Question Building 371 must have the capability to analyze and characterize nuclear materials. Essential equipment would include scanners, calorimeters, neutron detectors, gamma scanners and other measurement equipment (p. 3-13). Has any of this equipment been installed to date? If not, are there plans to install it?

Response Rocky Flats, and Building 371 in particular, currently operates numerous types of nuclear material analysis and characterization equipment, such as calorimeters and gamma scanners. To support the ongoing mission of SNM Consolidation, additional equipment will be procured over the next several years.

28. Question Rocky Flats has been criticized for not having a combustible load limit in plutonium facilities. Has such a load limit been developed for Building 371?

Response A building-wide, detailed combustible load limit has not been established in Building 371. However, the Building 371 Final Safety Analysis Report (FSAR), Chapter 8 indicates that a combustible load of 3,000 to 5,000 Btu/ft² due to building construction materials for all process rooms surveyed at the time of preparation of the report. Additionally, the design of the fire suppression systems in the building also determines an inherent combustible loading. The automatic sprinkler systems that cover portions of the building are designed to a minimum of Ordinary Hazard classification per National Fire Protection Association (NFPA) 13, Standard for the Installation of Sprinkler Systems. By designing the sprinkler system to an Ordinary Hazard classification, an assumed level of combustibles was anticipated. If the combustible loading is beyond that assumed by the engineer in the design of the sprinkler system, the capabilities of the suppression system would be exceeded. Therefore, controls are in place to ensure that combustible loading does not exceed the level that can be controlled by the automatic sprinkler system. Control is achieved through monthly building inspections by the Fire Prevention Bureau and yearly building surveys by Fire Protection Engineering during the preparation of Fire Hazards Analyses, which are currently required by DOE Order 5480.7A, Fire Protection.

29. Question There is a potential for leakage of radioactive material through the exhaust of the HEPA filter system. Has this issue been addressed?

Response There is indeed a potential for bypass leakage at the HEPA filters. Accordingly, periodic chemical smoke (dop) tests of the individual filter banks confirm the integrity of their seals. There are also radiation detectors downstream of the filters. These instruments are dedicated to continuous monitoring of the building exhaust air.

30. Question A new processing line is required to place metal and oxide in a form that meets the metal and oxide storage standard for interim storage is scheduled to be operational by 1998 in Building 371. The DOE has set the priority for plutonium storage as plutonium solutions highest priority, then chemically reactive scrap, residues and repackaging of plutonium in contact with plastics or other organics. Again, is it prudent to construct and stabilize metals and oxides in a building that is receiving plutonium for storage. Doesn't this increase the risk if there is human error?

Response The potential of operational accidents represents a small increment to overall building risk during the time such operations take place. However, operations will occur only during a relatively small portion of the interim storage period. Processing the materials is considered safest when performed in the same facility as storage because of elimination of transportation and handling accidents outside of the facility. Therefore, in the unlikely event that a spill, fire, or other loss of confinement accident occurs, the location of the accident is protected by a structure which contains a HEPA filtration system. Thus, the size or spread of a fire would be minimal. The room for the thermal stabilization line will not be used for storage. Storage will be in the enhanced SNM storage vaults or the central storage vault. This is not considered to be a safety issue since the processing and packaging operations are in rooms separate from the storage areas.

31. Question LANL is developing the double encapsulated stainless steel containment system for long-term storage of plutonium metal/oxide. Welding parameters are being refined. Peer review of the process was scheduled for April 1995. Containers are not available nor is there any mention of when they will be finished or production will begin on them, or where it will begin? Rocky Flats is repackaging plutonium for interim storage and final disposition. However, if the containers are not available, this places an additional cost and risk to workers because suitable long term containers are not available?

Response The storage container to be used at Rocky Flats is scheduled to be approved for use by November 1996. Procurement of the first lot of storage containers will be made shortly thereafter. Rocky Flats is currently scheduled to begin using these storage containers in April 1998. In the meantime, repackaging activities using two sealed, low-cost produce cans, which will not require reopening until repackaging in the long-term storage containers, will be used.

32. Question Effects of humidity and time on water uptake of calcined oxide are being studied, research is continuing on nuclear material container compatibility. It does not seem that DOE has done the proper research on effects of plutonium in storage. How can material be prepared for long-term storage and transportation to a final long-term location when there is no present storage containers that can contain plutonium properly?

Response Storage containers designed and soon to be put into use at LANL meet the current DOE Standard 3013-94. Concurrently, studies to evaluate effects of long-term storage will continue at LANL, including the use of special containers having additional surveillance features capable of providing early detection of any anomalies which may arise. In addition, a surveillance plan will be implemented once repackaging begins.

33. Question It has been observed that plutonium stored in sealed sources such as welded metal results in pressurization, leaks, and loss which in turn leads to worker exposure and environmental contamination. Radiation breaks down the elastomer seal of produce cans letting in air and moisture which causes oxidation and swelling. Plutonium materials react with air, moisture, organics, or other materials inside the cans causing pressurization or swelling of plutonium material and consequent bulging and failure. DOE expects a 10% failure rate of welded cans. The DOE Implementation Plan for DNFSB Recommendation 94 Feb 28, 1995, states that oxides and metal will be put in produce cans and stored safely until the capability exists to meet DOE storage standards. Are we not creating a nightmare by putting all this plutonium in one building in unstable containers? How do you locate a leaking container when you have so much to monitor? Aren't we creating a smaller version of Chernobyl?

Response Plutonium metal and oxide that is being repackaged for interim storage to meet the HSP Manual, Section 31.11 uses commercially available steel produce cans. The produce type cans are being used for near-term packaging of plutonium metal. That process was developed and used extensively at the Hanford Site for storing plutonium metal. The small amounts of moisture or oxygen in the can when it is sealed will combine with the plutonium and not result in pressurization of the can. The produce cans will then minimize any further oxidation of the metal for the near-term by providing an elastomer seal to in-leakage of air. The elastomer seal on the produce cans is only effective for a few years, and therefore not adequate for long-term storage of plutonium. Produce cans will be inspected at least biennially for pressurization, which can be detected by bulging lids or excessive weight gain. These produce cans will be monitored until the time the material inside can be repackaged in the 50-year storage container. The proposed 50-year storage container will be seal-welded and inspected using standards similar to those that were used for pit assembly at Rocky Flats. A surveillance plan will be used that is similar to the shelf study surveillance plans used for pits which have been very successful. As a result, we do not expect a 10% failure rate as suggested.

34. Question Oxide should receive priority over metal for storage in robust vaults due to its higher potential for dispersal in an accident. Plutonium is sufficiently radioactive that it subjects its surroundings to significant hydrolytic attack. Has a priority schedule been developed for where in Building 371 the various forms of plutonium should be stored based on their chemical properties?

Response Yes. All storage locations and plans containing pre- and post-interim processing have addressed both oxide and metal.

35. Question At the December 13, 1994 meeting of the Plutonium and Special Nuclear Materials Committee meeting, Mr. Bill Rask of DOE presented an overview of the stainless steel containers that would be used for long-term storage. A Rocky Flats worker questioned Mr. Rask about the radiation levels of the containers. Mr. Rask indicated that he did not know. The worker stated that the levels of radiation had tripled on steel drums within five weeks. The worker's question was, "how are you going to transport hot containers for permanent storage?" This is essentially the question . . .

Response Containers that will be transported do contain quantities of radioactive materials that must be reviewed for worker exposure prior to handling. Radiological Engineering performs pre-job surveys and analyses of all material prior to the issuance of a Radiation Work Permit (RWP) which details specific requirements for handling (e.g., protective devices such as lead aprons and gloves). Exposure time and distance is also controlled by the RWP process. Workers also wear additional dosimeters to monitor exposure on a daily basis. If an unusually radioactive ("hot") container is encountered, specific additional controls will be implemented to protect the worker.

36. Question Has anyone considered the radiation buildup in Building 371 from storage of all this plutonium? Would workers be able to enter the building for longer than a few minutes after a few years?

Response The increase of Building 371 dose rates due to the proposed SNM consolidation and interim storage activities was analyzed. The results of the analysis are presented in Section 5.3.1.2 of the EA. Discussion of the applied method of analysis is in the Technical Support Document prepared by Rocky Flats. Based on the analysis, the dose rates in routinely occupied areas adjacent to the central storage vault will increase by less than 0.2 mrem per hour, due to the proposed activity. Dose rates at some workstations will exceed the design objective dose rate of 0.5 mrem per hour. Any exposures received during work in Building 371 following SNM consolidation will be reviewed by Radiological Engineering in which the benefits of the work will have to be justified.

37. Question Plutonium scrap has never been reviewed for long term storage. Safety can be temporarily improved by repackaging but there is no current prospect that repackaging, overpacking or improved monitoring methods will make scrap safe for long term storage. Has any thought been given to placing scrap in another building? (p. 13, April 94 Plutonium Storage Safety DNFSB).

Response Current standards do address the "scrap". The HSP Manual, Section 31.11 requirements adequately address this material. However, periodic servicing is required to maintain compliance at a considerable cost, not only in dollars but in personnel exposure and waste generation. Therefore the long-term package is a better solution. The material would be protected by a more robust container, and would be processed to prevent further oxidation or pressure build-up, which ultimately will reduce personnel exposure due to surveillance and processing to meet the HSP Manual, Section 31.11 requirements.

38. Question Have any of these storage options been evaluated by DOE/Rocky Flats Management?

1. Acid soaked rags (particularly unstable for scrap) - Hanford is leaching the scrap in a divalent solution of silver ions and precipitating the plutonium as a sulfate salt, which could be safely placed for interim storage.
2. An ion exchange process could be used for plutonium extraction - polishing of supernates or other waste waters from hydroxide precipitation.
3. Plutonium precipitation from nitrate solution can be directly converted by U2(?) by heating in air. This is called direct denitration and avoids a separate process step to extract plutonium for solution before converting it to oxygen.
4. Los Alamos is developing method for plutonium and Americium removal that involved melting salts, sparging with oxygen to convert plutonium to oxide and vacuum-distilling the salts.
5. Storing plutonium oxide as sintered pellets. They do not have to meet the tight dimensional specifications or be of perfectly uniform density. Place the oxide into a less dispersible form with a lower specific surface area. It would reduce the potential health consequences of future accidents and would reduce problem of gas generation by radiolysis and absorption.
6. Storing plutonium metal as a corrosion resistant alloy. Delta phase plutonium alloys are more resistant to corrosion than alpha phase (corrosion of stored metal is undesirable - corrosion converts plutonium to a more dispersible form, expanding oxides may rupture.)
7. Using vented containers for some materials; vented containers could not pressurize when gasses are generated. Air flow - pyrophoric reaction products could not accumulate. Pressurization and accumulation of pyrophorics would be alleviated. Long-term safety problems with sealed containers. Vented containers easier to design. They do not require inert atmosphere or leak testing. Packaging would be simple. Vented containers would be more attractive if plutonium were in the form of pressed pellets or corrosion resistant metal.

Response Yes, meetings were held and options were considered. The result is the DOE Standard 3013-94, Criteria for Safe Storage of Plutonium Metals and Oxides.

The following are written comments/questions received from Mr. Tom Marshall.

39. Comment The storage proposed for Building 371 is termed interim. This is defined as 10 to 15 years, or until final disposition of SNM is determined and implemented (decision process is begun in DPEIS - draft due December 1995).

Question What is the likelihood that the 10 to 15 year time frame will be met? If "interim" is longer than 10 to 15 years; how much longer might we be looking at? What is the maximum amount of time? Is it possible that "interim" storage might in fact become in "long-term" storage?

Response There can be no absolute guarantee that the timetable of 10 to 15 years as estimated by the implementation plan of the Long-Term Storage and Disposition of Weapons-Usable Fissile Materials PEIS will be met. A number of hurdles, including political opposition, must first be cleared prior to implementing the preferred alternative. Still, there are a number of factors which will help drive the preferred alternative. Most notably, significant reductions in risk to the public and in operating costs would be realized upon reducing the number of locations that store plutonium. Upon processing the plutonium per the long term disposition, even further reduction in risk and costs would be realized. Thus, although there are a number of hurdles to clear (all outside the control of Rocky Flats), the preferred alternative of the PEIS will have significant advantages that will help drive it to realization.

40. Question The EA states that Building 371 is the most structurally sound building at Rocky Flats, particularly the plutonium recovery area. How does the rest of the building compare with the plutonium recovery area in terms of safety? For what length of time will Building 371 remain

structurally sound. After 15 years is there a decline in the safety of the building? What would be different if a brand new facility (or facilities) were designed for the purpose of storing SNM at Rocky Flats?

Response The nonplutonium recovery area portions of Building 371 are generally offices, administration areas, locker rooms, a cafeteria, etc. Since these areas do not contain plutonium, they are not as robust as those areas that do, simply because there is no need for them to be. In the stable climate that Building 371 is in, it is not unreasonable to expect the physical integrity of the building to continue for at least 50 years, and most likely long after that. It will be necessary to maintain safety systems within the building, and doing so will ensure that there will be no decline in the safety of the building. A brand new facility would have the advantage of being designed specifically for the interim storage role, rather than being retrofit for it; building layout would be different, but not appreciably safer.

41. Question The EA states that SNM in Building 371 will be located in seven vaults or vault-type rooms, and that the central storage vault was designed for storage of Category I and II SNM. What is the difference between a vault and a vault-type room? What is the significance of the central storage vault being designed for Category I and II SNM? How does this compare to other storage areas? Where are they located? Do any border on exterior walls? What is their proximity to exterior walls? Are they in the plutonium recovery area? Will the vaults and rooms have an inert atmosphere? Why or why not?

Response The designations "vault" and "vault-type room" are generally safeguards and security terms, and are defined in DOE Orders. Both areas are considered appropriate for storage of SNM: a vault relies on physical barriers to ensure protection of stored material, whereas a vault-type room relies on intrusion alarms. Categories I and II are simply the SNM quantity threshold that mandates storage within a vault or vault type room; all of the discussed storage areas in Building 371 meet either vault or vault-type room requirements. None of the areas border exterior walls, although four of them do border the roof of the building. The three remaining areas are completely below ground. All storage areas are within the plutonium recovery area. Only the central storage vault has an inert atmosphere. Such an atmosphere requires very specific design features, such as specialized ventilation equipment. The benefits of an inert storage environment are realized only for specific material types, and can be equaled with the proper packaging configuration.

42. Question According to the EA, various plutonium work including thermal stabilization and size reduction will occur in Building 371. What are the potential dangers associated with these activities? Is it wise to perform these activities in the primary plutonium storage building? What is the proximity of SNM storage areas to the work area?

Response Almost all plutonium will reside inside vaults and vault-type rooms. These locations are free of combustible materials, and they are continuously monitored by fire and intrusion detection equipment. Access to the vaults is carefully controlled for both security and safety reasons. Processing the materials is considered safest when performed in the same facility as storage because of elimination of transportation and handling accidents outside of the facility. Therefore, in the unlikely event that a spill, fire, or other loss of confinement accident occurs, the location of the accident is protected by a structure which contains a HEPA filtration system. Thus, the size or spread of a fire would be minimal. Thermal stabilization and repackaging activities are considered to be routine activities. The process line needs to be in the same building as the storage for the following reasons: a) to have the capability to repackage any problem containers, and b) to reduce the risks associated with transporting the material between the buildings. The room for the thermal stabilization line will not be used for storage. Storage will be in the enhanced SNM storage vaults or the central storage vault. This is not considered to

be a safety issue since the processing and packaging operations are in separate rooms from the storage areas. The distance from the work area, Room 3206, to the storage areas varies from a few yards to several hundred feet.

43. Comment The Daily Operations Brief from March of 1985 stated that there were numerous deficiencies in the ventilation systems in Building 371.

Question a. What is the nature of these deficiencies? How much will it cost to bring this building up to safe operating levels? Is it likely that we will see systems failures within parts of the building in the future?

Response a. Most of the deficiencies in the building ventilation involve problems with the control and instrument air systems. These systems provide for automatic operation of the ventilation to maintain necessary differential pressures needed to contain contamination. It should be noted that although there are many deficiencies in the ventilation system, it is operating above minimum requirements as specified by the building Operation Safety Requirements. The cost of correcting these identified deficiencies is roughly estimated at \$5M. Correcting these deficiencies would improve the reliability of the system. The safe operating level needed to support the future mission of the building is presently unknown and will be defined by the new building Final Safety Analysis Report. Although the building suffered from a lack of maintenance for several years due to a low priority, many improvements have been made in the last year. If the building continues to receive funding and attention, system conditions and reliability will continue to improve and will reduce the likelihood of major system failures.

Question b. What are the risks of consolidating a large amount of SNM in one building?

Response b. Almost all plutonium will reside inside vaults and vault-type rooms. These locations are free of combustible materials, and they are continuously monitored by fire and intrusion detection equipment. Access to the vaults is carefully controlled for both security and safety reasons. Processing the materials is considered safest when performed in the same facility as storage because of elimination of transportation and handling accidents outside of the facility. Therefore, in the unlikely event that a spill, fire, or other loss of confinement accident occurs, the location of the accident is protected by a structure which contains a HEPA filtration system. Thus, the size or spread of a fire would be minimal. Thermal stabilization and repackaging activities are considered to be routine activities. The process line needs to be in the same building as the storage for the following reasons: a) to have the capability to repackage any problem containers, and b) to reduce the risks associated with transporting the material between the buildings. The room for the thermal stabilization line will not be used for storage. Storage will be in the enhanced SNM storage vaults or the central storage vault. This is not considered to be a safety issue since the processing and packaging operations are in rooms separate from the storage areas.

Question c. How much will consolidation activities cost under the proposed plan (getting all materials ready for and into storage in Building 371), and how much will storage cost on a yearly basis after all material has been consolidated?

Response c. It is currently estimated that the proposed metal sizing in Building 707, consolidation of SNM into Building 371, and the processing for storage will cost \$145M for labor, \$15M for materials, and \$121M for equipment and construction projects. After the material has been consolidated and processed for storage, the annual cost for interim storage is estimated to be the building operating costs of \$39M, the sampling and inventory costs of \$1M, and the Safeguards and Security Inventories costs of \$1M. The building operating costs for Building 371

are not solely for interim storage of SNM. Building 371 will support storage of residues, TRU wastes, low level wastes and other wastes as well. After these wastes have been dispositioned it is expected that the building operating costs will decrease somewhat. Wackenhut security costs have not been included in this estimate. However, once the SNM is consolidated into Building 371, a substantial decrease in security costs is anticipated.

The following are written comments/questions received from the Rocky Flats Citizens Advisory Board.

44. Comment Only two alternatives are considered: keep the status quo or put all the material into Building 371. Building 991 could be an alternative. It might be possible to have two separate security zones in different protected areas.

Response Building 991 was considered as a location to consolidate SNM, but its limited size and other characteristics eliminated it from being a viable alternative. While it would certainly be possible to locate a portion of the SNM there, and to establish two separate protected areas (i.e., one around Building 991 and one around Building 371), such a plan would require significantly more funding than the current plan, would not allow the same level of cost savings, and would provide no greater safety for the material.

45. Comment It is not wise to "put all of the eggs in one basket" by putting all the plutonium into one area. At other facilities such as Pantex, the materials are dispersed, not consolidated.

Response The contemplated conditions at Building 371 are not analogous to this example. Plutonium is very different from a chemical explosive. It will be inside sealed containers, each with a small, subcritical quantity of the material. The internal configuration inside the containers is such that no critical array of containers is possible. An accidental criticality is self-limiting because the accompanying power excursion destroys any critical configuration immediately. Accordingly, the separation of material at Pantex is not required by the presence of plutonium. Instead, the specific storage arrangement at Pantex is required by the presence of chemical explosives. The arrangements must comply with military "quantity-distance" specifications. There are no chemical explosives associated with plutonium storage at the Rocky Flats, and the separation of SNM would not yield a similar benefit.

46. Question It is difficult to predict whether the material will be stored for an "interim" period or whether it will end up being stored for "long term." How can we guarantee that the storage mission will be "interim" and only last 10 to 15 years?

Response There can be no absolute guarantee that the timetable of 10 to 15 years as estimated by the implementation plan of the Long-Term Storage and Disposition of Weapons-Usable Fissile Materials PEIS will be met. A number of hurdles, including political opposition, must first be cleared prior to implementing the preferred alternative. Still, there are a number of factors which will help drive the preferred alternative. Most notably, significant reductions in risk to the public and in operating costs would be realized upon reducing the number of areas that store plutonium. Upon processing the plutonium per the long-term disposition, even further reduction in risk and costs would be realized. Thus, although there are a number of hurdles to clear (all outside the control of Rocky Flats), the preferred alternative of the PEIS will have significant advantages that will help drive it to realization.

47. Question Building 371 is ninth on DOE's list of most vulnerable facilities. Is it a good idea to use a vulnerable building?

Response The vulnerabilities that resulted in Building 371 being ranked ninth on DOE's list of most vulnerable facilities include the need to repackage the plutonium as described in the EA.

The highest risk vulnerabilities are currently scheduled to be eliminated by August 1996 by bringing material into compliance with the HSP Manual, Section 31.11. The remaining activities to eliminate vulnerabilities (which include repackaging plutonium into the 50-year storage containers) are scheduled to be complete in May 2002.

48. Question Does it make sense to store materials in the same building where materials will be treated?

Response Yes. Treatment is considered to mean those processes needed to support storage, such as periodic replacement of packaging, minimization of oxide buildup on metals, high-firing of oxides to meet new quality assurance criteria for storage, and implementation of new superior containers for storage. Processing of the materials is considered safest when performed in the same facility as storage because of elimination of transportation and handling accidents outside of the facility. Therefore, in the unlikely event that a spill, fire, or other loss of confinement accident occurs, the location of the accident is protected by a structure which contains a HEPA filtration system. Building 371 was designed and built to provide processing and storage for significant quantities of SNM. The processing proposed for consolidation and long-term processing is just a fraction of what the building was designed for. The Building 371 central storage vault, Room 1206, has always been the key storage location at Rocky Flats.

49. Question Before the 50-year cans are delivered, the materials will be placed in food-pack cans. How will gas build-up be monitored in these cans? Is it wise to pack into one can and then have to go back and pack the material into another?

Response The food-pack type cans are being used for near-term packaging of only plutonium metal. This process was developed and used extensively at the Hanford Site for storing plutonium metal. The small amounts of moisture or oxygen in the can when it is sealed will combine with the plutonium and not result in pressurization of the can. The food-pack cans will then minimize any further oxidation of the metal for the near-term by providing an air-tight barrier. The seal on the food-pack cans is only effective for a few years, and therefore not adequate for long-term storage of plutonium. Only the SNM requiring processing to be in compliance with the HSP Manual, Section 31.11, will be repacked in the food-pack cans. When the process line in Building 371 becomes operational, all SNM metal and oxide will be repackaged into the 50-year container.

50. Question There may be other alternatives to thermal stabilization for treating these materials. Have these been investigated? Are there other storage options?

Response Yes. Thermal stabilization is the most favorable method of treating oxides based on experimental results and historical experience. Storage options were considered during the formulation of DOE Standard 3013-94.

51. Comment DOE must further explore possibilities of moving those materials to other DOE sites away from Rocky Flats and the Denver metropolitan area.

Response As explained in Section 3.3.2 of the EA, no other DOE site (or combination of sites) is capable of receiving the extensive plutonium inventory at Rocky Flats. Thus, in the interim, plutonium must be stored at Rocky Flats. Implementation of the proposed action would help make this interim storage safer than the present storage configuration. In the long term, however, the only way to completely remove the risk to the Denver-area public from plutonium storage is to remove the plutonium from Rocky Flats. The Long-Term Storage and Disposition of Weapons-Usable Fissile Materials PEIS is exploring alternative sites to Rocky Flats for plutonium storage. The preferred alternative will not include Rocky Flats as a storage or treatment site. Implementation of the preferred alternative is estimated to occur within 10 to 15 years.

52. Comment If it makes better sense to construct a new facility at Rocky Flats to maximize safety, then DOE should not dismiss this possibility as taking too long to accomplish. If it is a priority, DOE can shorten the time necessary to build a new facility for the sole purpose of interim plutonium storage at Rocky Flats.

Response Certainly, a new building tailor-made to the storage and processing role would be ideal, but it is logistically and fiscally unlikely. Estimates have been developed that indicate that a such building would cost on the order of \$241M. The lean budgetary environment makes the dedication of this much funding difficult. In addition, federal requirements dictate a specific and distinct process to budget and spend that quantity of money. Congressional approval must be obtained, generally requiring two years or more. In addition, National Environmental Policy Act requirements will obligate further time, to ensure that environmental impacts are identified and understood. In the case of such a new building, this will almost certainly require an Environmental Impact Statement. Concurrent with NEPA activities, Conceptual Design Report and Design Criteria can be developed. For a project of this magnitude, these documents may take as much as two years to generate. Beyond this, engineering design will take at least two more years, given the stringent and numerous codes, laws, DOE Orders, and other requirements that such a complex structure will have to comply with. Finally, construction, testing, personnel training, readiness reviews, etc., are likely to take three to four years. These numbers assume a fast-tracked approach to the project; on a normal schedule, it would probably take half again as long.

53. Question Is there enough room at Rocky Flats to store the wastes that will be generated during treatment of special nuclear materials and the wastes that will be displaced during consolidation into Building 371?

Response The question of whether enough waste storage space is available or will be available in the future is under analysis through the Site Comprehensive Waste Management Plan (CWMP). The purpose of this plan is to provide an integrated picture of waste management needs such that all of the planned activities at the site can continue and be supported by the necessary waste management systems (including waste characterization, treatment, storage, shipping and disposal). It is currently recognized that the site will need additional waste storage (particularly transuranic (TRU) waste storage space) to accommodate the SNM Consolidation and Residue Stabilization program activities; however, a combination of waste reduction techniques may be employed to lessen the overall impact. This would include waste minimization, volume reduction (i.e., compaction), and decontamination. Conversion of existing buildings is a cost-effective alternative for increasing the waste storage capacity at the site.

54. Question Has the relationship between the consolidation activity and the residue activity (reprocessing and/or repackaging) been considered to ensure there will be sufficient storage space? There is concern that various activities at the plant are segmented and need to be integrated to ensure that there will be, for example, sufficient storage space for wastes, residues, and SNM.

Response See response to question 53.

55. Question Will plutonium be safe in Building 371? Is the building safe enough to allow treatment to go on?

Response Building 371 is considered to be the safest facility at Rocky Flats, and the ongoing efforts to prepare the facility for all aspects of its future mission will lead to demonstration that the facility is safe enough to allow treatment to go on.

56. Question Is the 50-year can the best option for storage? Onsite vitrification would be a better alternative and would protect the materials from proliferation. Materials should be placed in the least weapons-usable form possible.

Response Vitrification was not analyzed as an alternative under this EA. This EA only covers the Rocky Flats interim action to store plutonium per the DOE Standard 3013-94. Repackaging plutonium to the DOE Standard enables the later selection and implementation of any long-term option. Vitrification is one of several final disposition options for plutonium that is being considered under the Long-Term Storage and Disposition of Weapons-Usable Fissile Materials PEIS (draft is due out 12/95). Other options include use as mixed oxide fuel in reactors, other immobilization techniques, and emplacement in deep bore holes. Rocky Flats is not pursuing processing for any of these long-term disposition options since any one option could preclude implementation of the preferred alternative of the PEIS. Actual implementation of the preferred alternative is expected to occur in 10 to 15 years. The proposed action of the EA covers the interim period until the preferred alternative is implemented.

57. Question What risk analysis and vulnerability assessments are there that address safeguards and security concerns in relation to Building 371?

Response The Site Safeguards and Security Division calls upon safety and security experts from many different fields along with the Department of Energy (DOE) Design Basis Threat Guide (a document created at the national level integrating information from numerous government intelligence sources) to assess the vulnerabilities and analyze the risk for all nuclear storage areas onsite, including Building 371. Complex and comprehensive computer modeling programs are used to help identify security weaknesses and develop computer-generated scenarios to test the vulnerabilities to derive a computed risk level. DOE and DOE contractor security experts review this data and determine what security enhancements must be implemented to ensure the lowest possible risk to all Rocky Flats employees and the general public.

58. Question Will these plans for interim storage be in alignment with what will be proposed for the ultimate disposition in the Fissile Materials Programmatic Environmental Impact Statement?

Response This EA covers only the Rocky Flats interim action to store plutonium per the DOE Standard 3013-94. Repackaging plutonium to the DOE Standard enables the later selection and implementation of any long-term option. Rocky Flats is not pursuing processing for any long-term disposition options since any one option could preclude implementation of the preferred alternative of the PEIS. Actual implementation of the preferred alternative is expected to occur in 10 to 15 years. The proposed action of the EA covers the interim period until the preferred alternative is implemented.

59. Comment The focus of interim storage should be preparing the materials for ultimate disposition, either vitrification or reactor fuel.

Response Vitrification was not analyzed as an alternative under this EA. This EA only covers the Rocky Flats interim action to store plutonium per the DOE Standard 3013-94. Repackaging plutonium to the DOE Standard enables the later selection and implementation of any long-term option. Vitrification is one of several final disposition options for plutonium that is being considered under the Long-Term Storage and Disposition of Weapons-Usable Fissile Materials PEIS (draft is due out 12/95). Other options include use as mixed oxide fuel in reactors, other immobilization techniques, and emplacement in deep bore holes. Rocky Flats is not pursuing processing for any of these long-term disposition options since any one option could preclude implementation of the preferred alternative of the PEIS. Actual implementation of the preferred

alternative is expected to occur in 10 to 15 years. The proposed action of the EA covers the interim period until the preferred alternative is implemented.

60. Comment More attention needs to be placed on worker exposure due to maintenance of vaults and other facilities in Building 371.

Response Rocky Flats considered worker exposures associated with maintenance activities during the vault design process. The camera, lighting, and heat-detection systems selected require minimal maintenance based on industry experience. The number of lights and cameras inside of the vault has been kept to the minimum necessary to provide a safe and secure work environment. The time required for maintenance activities inside the largest vault-type room was estimated to be 86 person-hours per year. During the design process, the average dose rate in the full vault was estimated to be approximately 60 mrem per hour. Based on this data, vault maintenance activities would result in approximately 5 person-rem per year. Since this dose is distributed over many workers, individual doses will be acceptable.

61. Question Are there dangers in shipping unstable forms of plutonium to Building 371 from other facilities at Rocky Flats? Is it wise to have these unstable forms requiring treatment in proximity with forms that are being stored?

Response All material consolidated into Building 371 will be in compliance with HSP Manual, Section 31.11 requirements and therefore will not be unstable. The processing that will be performed in Building 371 will prepare the material to be placed in the 50-year container.

62. Comment Time frames are not detailed in the EA to allow one to know when different activities will be taking place.

Response It is currently proposed that the activities in the EA will take place as follows:

<u>EA Activity</u>	<u>Date</u>
Metal sizing in Building 707	Oct 95 - May 97
Receive procured pallets	Feb 96
Construct pallet loading glovebox	Aug 95 - Feb 96
Load pallets into central storage vault	Mar 96 - May 96
Construction of Vault 3337	Sep 95 - June 96
Building 371 receive SNM shipments from export buildings	Nov 95 - Aug 99
Installation of process equipment in Building 371	Jan 96 - Oct 97
Process SNM for storage	Oct 98 - Nov 02

63. Question Will the amounts of plutonium in each container, four to five kilograms, be safe in terms of criticality?

Response The criticality of SNM in a container depends on the quantity of SNM, moderation, and reflection provided by light nuclides (moderators like hydrogen and carbon), and the presence of neutron absorbers. It is the total configuration of quantity and geometry of these materials that determines the danger of criticality. Therefore, the contents of each individual container are analyzed before it is filled. There is a Criticality Safety Engineering Department at Rocky Flats whose responsibility is to ensure the critical safety of individual containers, and the interaction of multiple containers that will not pose a potential criticality danger. No criticality has ever occurred at Rocky Flats.

64. Question How will moisture be kept out of the cans? Will vents be installed to prevent pressurization? Why was the choice made to use 16 gauge steel instead of 10 gauge?

Response Storage containers will be welded closed to provide a leak-tight seal and individually leak-checked. Vents will not be installed. Plutonium metal and oxides will be processed to meet the DOE Standard 3013-94, thereby significantly reducing any moisture and potential pressurization. The storage containers have been tested and shown to be strong enough to withstand any potential pressurization. This container was designed to be light weight and simple to weld in a glovebox environment using conventional gas tungsten arc welding processes and fixturing. Initial designs of the storage container considered using commercially available pipe and tubing in the gauge thickness you suggest but were abandoned when we considered the added weight and limitations of handling in the glovebox. It is more difficult to ensure leak-tight welds in thinner materials and a thicker material would survive higher pressures. However, a weld process for the storage containers has been developed that is repeatable and can be controlled by an approved quality assurance program. The advantages of using 0.065 inch thick material outweigh those of a thicker (10 gauge) material.

65. Question The internal structures of Building 371 are not designed to withstand a strong earthquake. How will the equipment be made secure?

Response Modern seismic analysis methods acknowledge that as earthquakes become stronger, their frequency of occurrence becomes rarer, to the point where occurrences are predicted over geologic time only (tens of thousands to millions of years). Because the severe earthquakes which could damage internal structures within Building 371 are so rare (once in 5,000 to 10,000 years), it becomes difficult to assess when or if they will occur. The unique approach to design of this facility was to use dynamic structural modeling of equipment as a method of assuring that the equipment is properly secured. The seismic analyses of the structure and equipment are being repeated with the latest industry methods as a measure of assurance that the facility meets today's requirements for seismic integrity.

66. Question What is the amount and impact of the plutonium that is held up in the ductwork of Building 371?

Response Measurements indicate that there are approximately 1,500 grams of plutonium in Building 371, spread over 6,900 feet of ductwork. Safety assessments conclude that the duct material poses no significant threat to workers, the public, or the environment. Furthermore, duct assessments indicate that the risks of removal of the material far outweigh the risks of leaving it in place.

67. Question There is a problem with background radiation setting off criticality alarms when a lot of plutonium is together in one place. What will happen when all the material is consolidated into Building 371? Will there be a lessening of protection by raising alarm threshold levels?

Response Criticality alarms employ neutron detectors to monitor neutron radiation levels. Inside the plutonium storage areas neutron radiation levels will be increased from the present levels following SNM consolidation. A criticality accident causes an almost instantaneous large increase in the neutron radiation level. Detectors are placed such that a criticality accident would cause two detectors to measure levels in excess of the alarm setpoint. Requiring that two detectors trip in order to have a criticality alarm minimizes the false criticality alarm occurrence rate while allowing the alarm setpoint to be set just above normal neutron radiation levels. The protection provided to the worker by the system is not dependent on the quantity of material.

68. Question Putting all the plutonium into one building is foolish from a security standpoint. The major concern is not with loss of materials, but vulnerability to terrorist attack?

Response This question was answered by Mr. Sykes with his first response on page 14 in the Public Meeting Verbatim Transcript.

The following are questions/comments received from the Colorado Department of Public Health and Environment.

69. Comment In the discussions concerning bounding accidents as a result of SNM consolidation, the impact of consolidation upon the Emergency Planning Zone (EPZ) is not discussed. Presently, the EPZ for Rocky Flats is based upon the release of 100 grams of airborne respirable plutonium as a result of an airplane crash into buildings containing plutonium which results in a subsequent fire. The value was revalidated in the report May 1992, entitled "Analysis of Off Site Emergency Planning Zones for the Rocky Flats Plant, Maximum Credible Accident (1988-1991) Review." The question that must be addressed and answered is whether consolidation will result in an increase of the 100 gram value for the maximum credible accident, consequently increasing the radius of the EPZ.

Response The conclusion from the technical support document for the Environmental Assessment was that EPZ is not changed by SNM consolidation. A plane crash into Building 371 after consolidation does not result in a release of greater than 100 grams of plutonium at a frequency of less than 1×10^{-7} per year.

70. Comment The EA does not clearly address what will be done with the drums of waste presently stored in Building 371. We assume that these drums will have to be removed to another location on the site to make room for SNM consolidation. This waste, especially the combustible waste, has its own hazards and should be concurrently evaluated as part of the assessment.

Response The question of whether enough waste storage space is available or will be available in the future is under analysis through the Site Comprehensive Waste Management Plan (CWMP). The purpose of this plan is to provide an integrated picture of waste management needs such that all of the planned activities at the Site can continue and be supported by the necessary waste management systems (including waste characterization, treatment, storage, shipping and disposal). It is currently recognized that the Site will need additional waste storage (particularly TRU waste storage space) to accommodate the SNM Consolidation and Residue Stabilization program activities; however, a combination of waste reduction techniques may be employed to lessen the overall impact. This would include waste minimization, volume reduction (i.e., compaction), and decontamination. Conversion of existing buildings is a cost-effective alternative for increasing the waste storage capacity at the Site.

71. Comment On page 5-13, third paragraph, the report attempts to convey that a criticality event is unlikely due to the fact that criticality safety limits are strictly enforced at Rocky Flats and are very specific as to the quantity and mass of fissile materials allowed at a given location. We take exception to this statement. In the fall of 1994, a series of procedural violations by experienced Rocky Flats personnel in Building 771 could have resulted in a criticality event had the material involved been in the proper configuration and concentration. The Defense Nuclear Facilities Safety Board considers the possibility of a criticality event at Rocky Flats in the next two years to be very great. Lately, the daily Rocky Flats Shift Superintendent's reports frequently document tanks on the site where there are concerns over potential criticality problems. We could agree that plutonium stabilization would reduce the potential of a criticality event, but would strongly disagree with any statement that seems to indicate that a criticality event is unlikely.

Response A criticality event occurring during the SNM consolidation, processing, and interim storage activities identified in this EA is unlikely to due to the following:

SNM consolidation, processing, and storage involves solid fissile materials which have been assayed and have been packaged primarily in approved shipping containers which have been evaluated as critically safe for credible contingencies of flooding, moderation, overbatching, and seismic events. Since human error cannot be entirely ruled out, allowable quantities of fissile materials have been established to mitigate their effects.

Solid fissile materials are easier to control than liquids. They can be visually identified, properly assayed, and safely packaged from a criticality standpoint. Well established and rigid Nuclear Materials Safeguards controls have also been in place at Rocky Flats for a number of years. These controls also serve to enhance the criticality safety of solid SNM by providing routine surveillance and accountability of solid fissile materials.

Maximum masses and container volumes for storage of solid SNM which is not in approved shipping containers have been consistent in Rocky Flats facilities during production and post-production years. Uniform maximum masses and container volumes were established to ensure conservative criticality safety of solid fissile materials for credible upset conditions and have also served to simplify operator decisions and to mitigate the effects of human error.

All SNM consolidation activities require the use of Nuclear Material Safety Limits. New limits have been established and rigorously reviewed per standard procedure and DOE Order to ensure that no credible process upset can result in a criticality excursion. Older limits are reviewed before operations can commence to ensure that they meet the equivalent level of safety.

The historical perspective of criticality accidents in production facilities, both operational and out-of-service, has shown that eight accidental criticality excursions in the nuclear weapons complex occurred with liquid rather than solid fissile materials.

72. Question The proposed operation includes processing and repackaging operations in Building 371 (Room 3206) along with the materials consolidation and storage. Would it be safer to separate operations from storage of already packaged materials? Could not all materials be processed or repackaged in other buildings? Would this reduce accident potentials? How much?

Response Almost all plutonium will reside inside vaults and vault-type rooms. These locations are free of combustible materials, and they are continuously monitored by fire and intrusion detection equipment. Access to the vaults is carefully controlled for both security and safety reasons. Processing the materials is considered safest when performed in the same facility as storage because of elimination of transportation and handling accidents outside of the facility. Therefore, in the unlikely event that a spill, fire or other loss of confinement accident occurs, the location of the accident is protected by a structure which contains HEPA filtration protection. Thus, the size or spread of a fire would be minimal. The process line needs to be in the same building as the storage for the following reasons: a) to have the capability to repackage any problem containers, and b) to reduce the risks associated with transporting the material between the buildings. The room for the thermal stabilization line will not be used for storage. Storage will be in the enhanced SNM Storage Vaults or the central storage vault. This is not considered to be a safety issue since the processing and packaging operations are in separate rooms from the storage areas.

73. Question Current events reinforce the need to analyze the potential outcome of sabotage events on plutonium consolidated within Building 371. What are the outcomes and potential releases? Will this alter the maximum credible accident scenario? Will the consolidation affect the MCA through other scenarios?

Response Sabotage involving plutonium is an ongoing security concern. Unlike industrial accidents, sabotage is not a random event. Therefore, it is not possible to make probability estimates. Continuous vigilance by the security force at Rocky Flats makes the plutonium an unattainable sabotage target. The technical arrangements for security are classified. In general, the security force maintains a strong security posture. It is backed by armed guards, barriers, up-to-date intrusion detection and alarm systems, personnel security programs, and intelligence in coordination with federal law enforcement. Serious local sabotage would involve the dispersion of the SNM into the environment. A likely technique would involve explosion and fire. The maximum resulting consequences would be analogous to those from a large aircraft crash. The aircraft crash has been analyzed as the maximum credible accident.

This question was additionally answered by Mr. Sykes in his first response on page 14 in the Public Meeting Verbatim Transcript.

74. Question a. Table 5-2 (p. 5-12) does not identify the building or buildings having the listed consequences; where is the composite risk total as in Table 5-2?"

Response a. Table 5-1 attempts to compare the single bounding accident for the proposed action versus the no action alternative. The descriptions provided must be sufficiently general to ensure they are accurate for both situations. For example, the highest-risk fire for the proposed action is a fire in an inert glovebox in Building 707. The highest-risk fire for the no action alternative is a dock fire in Building 371. Because these probabilities and LCFs are for single bounding accidents and not for all of the fires, spills, explosions, etc., totaling these numbers would not give a composite total risk.

Question b. How can the fire probability be 6×10^{-5} when two major fires have occurred onsite in 40 years (5×10^{-2})?

Response b. The probability for a specific accident includes a building and activity-specific initiation frequency in addition to the probability of successful mitigation. The number in question was developed in the Addendum to the Building 707 FSAR Review Team Report, Building 707 Risk Assessment Review for Thermal Stabilization Mission and Other Non-Curtailed Operations (EG&G Rocky Flats, 1992). The Review Team used the operating years database of 1970 to 1990. The data show that there were no fires in Building 707 inert boxes in that time frame. There were potential fire initiator events, but loss of inerting is necessary to allow combustion. Given zero events during the 20-year period, the Review Team equated the fire initiation frequency to the frequency of loss of inerting due to loss of all AC power (0.01/yr), conservatively assuming that plutonium in the glovebox would ignite upon loss of inerting. Given initiation, the overall probability is the sum of four accident sequences which include the probability of sufficient combustibles being present to allow fire growth and the success or failure of mitigating systems such as automatic sprinklers and fire department intervention. Note that the major fire in Building 776 resulted in major changes in construction and operation on site, including the replacement of combustible construction materials, inerting of gloveboxes, installation of room sprinklers and heat detectors in gloveboxes.

Question c. Explain why the aircraft crash probability is different from the proposed action and no action alternative?

Question d. What difference does the scenario (proposed action) make to the probability of an airplane crash?

Responses c and d. Crash probability is proportional to the size of the storage area. With material being moved from five buildings to one, the crash probability decreases by approximately a factor of five. However, some material will be moved from areas not at risk of penetration by a crash to areas which may be at risk. The overall probability is higher for the proposed action.

75. Question Table 5-3 is confusing. Although entitled "consequences to workers . . ." it includes tables of population cancer fatalities. The table needs to be better titled and explained.

Response There is an error in Table 5-3. The headers for the two last columns should not have said, "Population <50 miles from Site." This has been changed to, "Workers."

76. Question Page 2-1 indicates that plutonium will be in interim storage at Rocky Flats for an estimated 22 years. During this period, it will be at risk to the population described on page 4-1. Does 22 years seem an excessive period for decision and action on a final solution to isolate the plutonium from the majority of the state's population?

Response There can be no absolute guarantee that the timetable estimated by the implementation plan of the Long-Term Storage and Disposition of Weapons-Usable Fissile Materials PEIS will be met. A number of hurdles, including political opposition, must first be cleared prior to implementing the preferred alternative. Still, there are a number of factors which will help drive the preferred alternative. Most notably, significant reductions in risk to the public and in operating costs would be realized upon reducing the number of locations that store plutonium. Upon processing the plutonium per the long term disposition, even further reduction in risk and costs would be realized. Thus, although there are a number of hurdles to clear (all outside the control of Rocky Flats), the preferred alternative of the PEIS will have significant advantages that will help drive it to realization.

77. Question Is the proposed vault in Room 3337 to be an inert vault? How will the safety and isolation of materials in this vault compare with those in the stacker-retriever?

Response The proposed vault in Room 3337 will not be inert. The safety and isolation of the materials will be maintained through packaging, engineered features such as shelf design, the robust construction of the room, the HEPA-filtered ventilation system, and other safety systems. The safety and isolation of the material in this room will be at least equal to that in the central storage vault.

78. Question What are worker dose-rates and accumulations in the stacker-retriever? Compare total accumulated doses in the consolidated scenario with doses in the no action scenario.

Response The central storage vault is remotely loaded by the stacker/retriever and has an inert atmosphere. Workers do not enter this vault. It has an emergency retrieval winch that is used in case of equipment failure. Dose rates inside the stacker/retriever do not expose workers. However, currently the dose rates inside the vault are a maximum of approximately 15 mrem per hour. This value will be increased due to SNM consolidation inside the vault. The design capacity of the stacker/retriever is 17 tons of plutonium.

79. Comment Page 5-21 lists the probability of a large fire in the central storage vault but not the consequence. Please supply release estimates and population doses for this scenario.

Response The material on page 5-21 is part of Section 5.3.2.2, Risk to Workers from Accidents. It would not be appropriate to discuss consequences to the offsite population in this section. That information can be found in Section 5.3.2.1, Risk to the Public from Accidents [page 5-14].

80. Comment To be useful, Table 5-4 needs to include the following:

- a. Public doses for the period after completion of processing and stabilization activities (seven years) vs doses for the same years under a no action scenario should be included. The chart comparing doses during the initial period misses the important comparison showing the reduction in doses and effects after completion of consolidation.
- b. Reductions in accident risks after consolidation need to be quantified. This is the main reason for the project and failure to quantify this comparison would be a major failing in the EA.

Response Natural phenomena and airplane crash dominate accident risk for the Site, and these would be reduced after seven years (graphically shown as the right side of the graphs). The reduction in Site risk is produced by the superior structural capabilities of Building 371 compared to other buildings onsite. The technical analyses show about a six-fold reduction in Site risk with the proposed action, as published in Table 5-2 of the EA under the title "Composite Risk Total".

81. Comment The principal comment or question is over coordination. This activity, (Consolidation and Interim Storage of SNM) needs to be integrated with the activities associated with the Actinide Solution Processing.

Response The Consolidation and Interim Storage activity is integrated with the Actinide Solution Processing activity and all other Special Nuclear Material activities through the use of the Site Integrated Stabilization Management Plan (SISMP). The SISMP provides the facility integration and coordination mechanism for planning, scheduling, budget, and performance. An example of this integration is that the oxides produced in the Actinide Solution Processing activity are identified in the SISMP as being transferred to the Consolidation and Interim Storage program then being stabilized and packaged in the 50-year storage container. The SISMP performance is reviewed weekly and the SISMP is a living document which will be revised when appropriate.

82. Question What mechanism or information system is in place to facilitate integration and coordination for the planning, scheduling, budgeting, and performance of these interrelated and interdependent activities?

Response See response to question 81.

83. Comment This environmental assessment should state that HEPA filters only control particulates. The processing to meet the DOE Standard 3013-94 will create some gaseous emissions that are not controlled.

Response HEPA filters control only particulate emissions (solid and liquid). Gaseous pollutants penetrate HEPA filters. The only gaseous pollutant that could be emitted from the processing to meet the DOE Standard 3013-94 is minute amounts of carbon tetrachloride evolved from processing contaminated nuclear material.

84. Comment Spill Control - There is no discussion of the specific details of the spill prevention, containment and control plans (SPCC) describing the interaction and evaluation of the processing activities and transfers between buildings, or the relationship of scheduled activities to the routine and emergency response procedures. Neither the risk of spills nor the

consequences and prescribed response activities are discussed. The risk of dose to workers was discussed but the response to preclude releases to soils and waters of the state and nation in the industrial area where the work is scheduled is not discussed. The SPCC and status of features to respond to normal execution of these activities and incidents, should they occur, must be in-place and in sync with the operations to preclude a release to soils and water.

Response All SNM consolidation and processing activities will be performed within the approved Authorization Basis of the building. Building containment systems such as gloveboxes and ventilation will mitigate the consequences of a spill and prevent release to the environment or public. All material is contained in approved shipping containers and will be handled by trained operators using approved procedures. The risk and consequence to a spill are discussed in Section 5.3.2.1 of the EA. Emergency procedures for handling spills are contained in the Building 371 Health and Safety Plan, the Building 371/374 Emergency Plan, and the Rocky Flats Emergency Plan.

85. Question What retention facilities and what capacity would be needed and available up to and including a fire, where water is added and must be contained very locally and stored until treatment can be completed?

Response Buildings are constructed with fire water deluge systems that include sprinkler systems for plenum fire suppression and sufficient tank capacity for fire deluge water should such an event occur.

86. Question What is the present usage of the treatment capacity in Building 374 and the plan over the life of these proposed activities?

Response Building 374 is for the treatment of liquid waste, not for plutonium metal and oxide.

87. Question What is the status of hazardous materials, raw product, and waste in each building? Inventory and management of this material in relationship to an accident involving the Actinide Solution Processing should be discussed.

Response Actinide solution processing was analyzed separately from SNM consolidation because it will be several years before the gloveboxes needed for repackaging of SNM are constructed and operated. By that time solution processing will have been completed and the possibility of interactions between the two processes will have been precluded. Accidents due to hazardous materials and waste were considered in the SNM consolidation EA. The only raw product from SNM consolidation would be plutonium oxide. Accidents involving the material are included in the environmental assessment.

88. Question What is the current status of the vault/stacker/retriever and Caustic Waste Treatment System in Building 371? Are these facilities fully functional now? If not when?

Response The central storage vault is designed to be part of Building 371. It is a fully-utilized storage area for plutonium. Currently, the stacker/retriever that accesses the central storage vault is only partially operable, due to some maintenance activities; it is expected that these will be completed in the summer of 1995. The caustic waste system is currently scheduled to be operational in October 1995.