EIS

From: John Isaacson [isaacson@lanl.gov]
Sent: Monday, June 20, 2005 1:13 PM
To: KIRK.W.OWENS@saic.com
Subject: Fwd: CMR determination document

Attachments: 3_CMR_rev.doc

3_CMR_rev.doc
(522 KB)

Kirk, previously you received the tables from the NEPA Determination Document for the CMR. I am now sending you the complete revised document that includes the updated tables.

JI

>X-Sieve: CMU Sieve 2.2
>X-Sender: sradz@harold-mail.lanl.gov
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LA-UR-01-3040

Title: ENV-ECO NEPA Determination Document 3
Chemistry and Metallurgy Research Building

Los Alamos
NATIONAL LABORATORY

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1.0 Introduction

This document describes the *National Environmental Policy Act of 1969* (NEPA) operational envelope for operations, capabilities, and parameters analyzed for the Chemistry and Metallurgy Research (CMR) Building at TA-3, a key facility in the *Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory* (SWEIS; DOE 1999). The principal buildings and structures for this key facility are shown in Table 1. The purpose of this document is to determine whether a proposed project for this facility has NEPA coverage in the SWEIS as implemented by the Department of Energy (DOE) in the Record of Decision (ROD) for the SWEIS. As long as the CMR Building operates within the bounds of the impacts projected by the SWEIS, the facilities are in compliance with NEPA. If there were potential to exceed projected impacts, further NEPA review would be required.

Table 1. Principal Buildings and Structures of CMR Building

Technical Area	Principal Buildings and Structures
TA-3	CMR Building: 3-29 Low Level Waste Storage and Transfer Facility: 3-154

Under the Laboratory Implementation Requirement (LIR) entitled "NEPA, Cultural Resources, and Biological Resources (NCB) Process," (LANL 2000a) proposed projects are screened by the authorized facility NCB reviewer as part of the NCB assessment. The screening requires the facility NCB reviewer to decide

- if the project is new or modified from a previous determination and
- if DOE has already made a determination that covers the proposed project.

The Facility NCB Reviewer uses the Facility NEPA Determination Document (LANL 2000b) for screening. Table 2 summarizes the capabilities, and the operations examples for the capabilities, that were published in the SWEIS to estimate the impacts. If the facility NCB reviewer finds that the proposed activity is one of the capabilities in the SWEIS and is within one of the operations examples for that capability as shown by Table 2, the reviewer could determine that the proposed activity is covered by the SWEIS and does not require further NEPA analysis.

However, a proposal that does not match a capability description in Table 2 or that is not included with one of the operations examples for that capability in Table 2 could still be covered by the SWEIS. The SWEIS analysis is based on information in background documents prepared for each of the key facilities; these background documents provide more detailed descriptions of the ongoing and potential operations for each key facility. In addition, the levels of activity called the "operations examples" for each of the capabilities reflects scenarios that were developed for each capability to provide an estimate for calculating potential impacts. The SWEIS was not intended to set stringent limits on the level of activity for a particular capability. In most facilities the operations examples for every capability would not be reached at one time because of the ebb-and-flow-like nature of the work at LANL. Thus it would be possible to exceed the operations examples for one capability and still be within the parameter limits for the facility or the LANL operations limit. If the proposal reviewer can demonstrate this, the proposal would still have NEPA coverage through the SWEIS. This document presents the procedure for a more detailed review and supporting information from the SWEIS and background documents.

Table 2. CMR Building

Capability	Operations Examples
1. Analytical Chemistry	1.1 Sample analysis in support of a wide range of actinide research and processing activities. Approximately 4,000 samples/year.
2. Uranium Processing	2.1 Activities to recover, process, and store LANL highly enriched uranium inventory by 2011. Includes possible recovery of materials resulting from manufacturing operations.
3. Destructive and Nondestructive Analysis	3.1 Evaluate less than 5 secondaries/year through destructive/nondestructive analysis and disassembly. 3.2 Receive, disassemble, and analyze assemblies and components used to measure radiologic effects on different materials such as metals, metal alloys, and ceramics. These activities could include machining, cutting, grinding, and polishing. 3.3 Performance Demonstration Program to test nondestructive analysis/nondestructive examination equipment.
4. Nonproliferation Training	4.1 Nonproliferation training involving SNM. No additional quantities of SNM, but may work with more types of SNM than in 1995.
5. Actinide Research and Development	5.1 Introduce research and development effort on spent nuclear fuel related to long-term storage, and analyze components in spent and partially spent fuels. 5.2 Metallurgical microstructural/chemical analysis and compatibility testing of actinides, and other metals. Primary mission to study long-term aging and other material effects. Characterize about 100 samples/year. 5.3 Analysis of TRU waste disposal related to validation of the Waste Isolation Pilot Project (WIPP) and other waste facilities performance assessment models. 5.4 TRU waste characterization. 5.5 Analysis of gas generation such as could occur in TRU waste during transportation to WIPP or other waste facilities. 5.6 Demonstrate actinide decontamination technology for soils and materials. 5.7 Develop actinide precipitation method to reduce mixed wastes in LANL effluents. 5.8 Develop small-scale (less than 1 kg/year) actinide processing capability. 5.9 Perform gas-solid interfacial studies using surface science instrumentation and associated techniques. 5.10 Investigate physical and mechanical properties of plutonium metal alloys.
6. Fabrication and Processing	6.1 As part of the Isotope Production Program, produce up to 100 Curies per year of industrial or medical radioisoptopes. 6.2 Process up to 5,000 Ci/year plutonium-238/beryllium and americium-241/beryllium neutron sources. 6.3 Produce up to 4 kg/year of americium oxide. 6.4 Stage up to 1,000 beta/gamma/neutron sources such as plutonium-238/beryllium, americium-241/beryllium, americium-241, plutonium-238, cobalt-60, cesium-137, strontium-90, californium-252, iridium-192, radium-226, and curium-244 in Wing 9 floor holes. 6.5 Support complete highly enriched uranium processing, research and development, and pilot operations. 6.6 Fabrication and casting of various actinide material shapes. 6.7 Material recovered and retained in inventory. Up to 1,000 kg annual throughput. 6.8 Fabricate actinide metal alloys. 6.9 Study/perform fabrication methods and effects of thermo-mechanical processing on actinide materials.

a: Source: Modified from SWEIS 1998 Yearbook (LANL 1999).

b: Includes installation of UF/RO and nitrate reduction processes in Building 50-01 and installation of above-ground tanks for the collection of influent radioactive liquid waste.

2.0 Procedure

A proposed project can be screened by the Facility NCB reviewer or ENV-ECO reviewer to determine if it is included in the descriptions in Table 2. Under that procedure, if a proposal does not clearly fit those descriptions of capabilities and one of the operations examples, it will be referred to ENV-ECO for review under this procedure, which requires more familiarity with SWEIS supporting documentation and projected additive impacts of other proposed work at LANL. The ENV-ECO reviewer will use the data on the CMR facilities and capabilities from the SWEIS document and the background documentation. The supporting documentation on the CMR facilities and capabilities is presented in Sections 3 and 4 below.

A flow chart that summarizes the procedure for the ENV-ECO reviewer to use in screening a proposal is presented in Attachment 1. Upon receiving a proposal, the reviewer should answer the following:

1. Is this a new capability? Review the detailed descriptions of the tritium facilities and capabilities from the SWEIS (Section 3 of this document) and from the background documents (Section 4 of this document).
   a. If this is a new capability, go to 4.
   b. If this is not a new capability, go to 2.
2. Does the proposal fit within one of the operations levels for that capability in the SWEIS? Compare description to second column of Table 2.
   a. If the proposal is within the operations levels for that capability, go to 5.
   b. If the proposal is not within the operations examples, go to 3.
3. Is the proposal within the facility operations data envelope? Work with the facility manager and other Environment, Safety, and Health subject matter experts (SMEs) to calculate if the proposal is within the envelope of facility operations data (Table 3).
   a. If the proposal is within the facility operations data envelope, go to 5.
   b. If the proposal is not within the facility operations data envelope, go to 4.

Table 3. TA-3 Chemistry and Metallurgy Research Facility Operations Data

Parameter	Units [a]	SWEIS ROD
Radioactive Air Emissions:		
• Total actinides	Ci/yr.	7.60×10^{-4}
• Selenium-75	Ci/yr.	Not Projected
• Krypton-85	Ci/yr.	1.00×10^{2}
• Xenon-131m	Ci/yr.	4.50×10^{1}
• Xenon-133	Ci/yr.	1.50×10^{3}
• Tritium Water	Ci/yr.	Negligible
• Tritium Gas	Ci/yr.	Negligible
NPDES Discharge:[b]		
• 03A-021	MGY	0.53

Wastes:[c]		
• Chemical	kg/yr.	10,800
• Low-level waste[c]	m^3/yr	1,820
• Mixed low-level waste	m^3/yr	19
• TRU waste	m^3/yr	28
• Mixed TRU waste[c]	m^3/yr	13

a: Ci/yr. = curies per year; MGY = million gallons per year.
b: NPDES is National Pollutant Discharge Elimination System.
c: Wastes (e.g. 4,000 m^3 LLW) from the Phase II CMR Upgrades are included.

4. ENV-ECO will prepare a NERF to complete the NEPA process.
5. Proposal is covered by the SWEIS. Attach explanation/calculations to NCB Screening Checklist (Attachment 2) to complete the NEPA process.

FACILITY BACKGROUND AND MISSION. The CMR Building was designed and constructed in 1952 to house research and experimental facilities for analytical chemistry, plutonium and uranium chemistry and metallurgy, and some engineering design, electronics, and other support functions. The facility was designed and constructed in accordance with the 1949 Universal Building Codes (UBC).

In 1959, Wing 9 was added to the CMR facility to provide heavily shielded facilities (hot cells) for remote-handling operations. These capabilities were used to support post-irradiation examination of irradiated fuels from the Liquid Metals Fast Breeder Reactor (LMFBR) Program and other advanced-fuel evaluation efforts. Nuclear fuels were also developed and characterized to support the ROVER Space Propulsion Program.

In 1986, a special nuclear materials (SNM) storage vault (designed to meet the requirements of DOE Order 6430.1) was added underground between Wings 1 and 5). This underground structure was designed to be seismically independent from the rest of the CMR facility.

The CMR Building is a multi-user facility. Current programmatic activity in the CMR facility is predominantly analytical chemistry, supporting major experimental programs at LANL and within the DOE complex. These programs include nuclear materials process technology, waste minimization, environmental restoration and remediation, nuclear safeguards, high-temperature superconductivity, support for the Rocky Flats site, mixed waste characterization, support for the Waste Isolation Pilot Project (WIPP), and a Special Nuclear Materials (SNM) standards development. The hot cells located in Wing 9 are used for activities requiring a heavily shielded facility such as processing irradiated targets and radioactive source recovery. The CMR facility is considered a critical facility for stockpile management programs.

FACILITY OVERVIEW. The CMR Facility is located on the corner of Diamond Drive and Pajarito Road in the Los Alamos National Laboratory Technical Area 3 (TA-3). The CMR Facility and the area bounded by its security fence are identified as South Mesa 29 and are considered public exclusion areas. While neither Diamond Drive nor Pajarito Road is considered public exclusion areas, they are located on DOE-owned property. DOE delegated the authority to close the roads to LANL for the purpose of transporting hazardous and radioactive materials and responding to emergency situations as well.

There are five possible members of the public that are not under DOE control nearest to the CMR Facility (the Maximum Offsite Individual (MOI)). These MOIs are at the boundary of the Los Alamos western residential area (approximately 1044m to the north), at the mobile home park (approximately 1433m to the east-northeast), at the pueblo land (approximately 4417m to the east-southeast), and at the State Road 4 (approximately 4462m to the south). Predominate wind direction at the site is north-north east.

Facility Floor Plan

The CMR building consists of approximately 550,000 ft^2, with a basement, a first floor, and an attic floor. Figure 1 depicts the CMR Building which consists of an administration wing, an office wing (Wing 1), and seven laboratory wings (Wings 2, 3, 4, 5, 7,and 9), joined together by a spinal corridor. Wings 2,3,4,5 and 7 are the laboratory wings and are similar in construction having equipment or change rooms located at the front of each wing, individual laboratories in the main areas of the wing, and filter towers located at the end of the wings. In 1959, a 54,000 sq ft Wing 9 was added to the CMR facility to provide heavily shielded facilities (hot cells) for remote-handling operations. This unique design makes the CMR Building more like several isolated facilities, rather than like a single facility. In 1986, SNM storage vault (designed to meet the requirements of DOE Order 6430.1) was added underground between Wings 1 and 5. This underground structure was designed to be seismically independent from the rest of the CMR facility. The CMR facility also contains a Waste Assay Facility (WAF), located near the loading dock between Wings 1 and 4.

FACILITY HAZARD CLASSIFICATION. The CMR is classified as a Hazard Category 2 Nuclear Facility in accordance with the inventory thresholds defined in DOE-STD-1027-92. The level of detail in the hazards and accident analysis is that necessary to derive the control set and is consistent with the guidance presented in the DOE Standard.

Facility Operations

The aqueous waste from radioactive activities and other non-hazardous aqueous chemical wastes from the CMR Building are discharged into a network of drains from each wing specifically designated to transport waste solutions to the Radioactive Liquid Waste Treatment Facility in TA-50 for treatment and disposal. The primary sources of radioactive inorganic waste at the CMR Building include laboratory sinks, duct wash-down systems, and overflows and blowdowns from circulating chilled-water systems. The facility infrastructure is designed with air, temperature, and power systems that are operational nearly 100 percent of the time. Power to these systems is backed up with an uninterruptable power supply. The CMR Building has one NPDES outfall, which discharges seasonally into Mortandad Canyon at a rate of one gallon per minute. This outfall is slated for waste stream corrections as part of LANL’s outfall reduction plan.

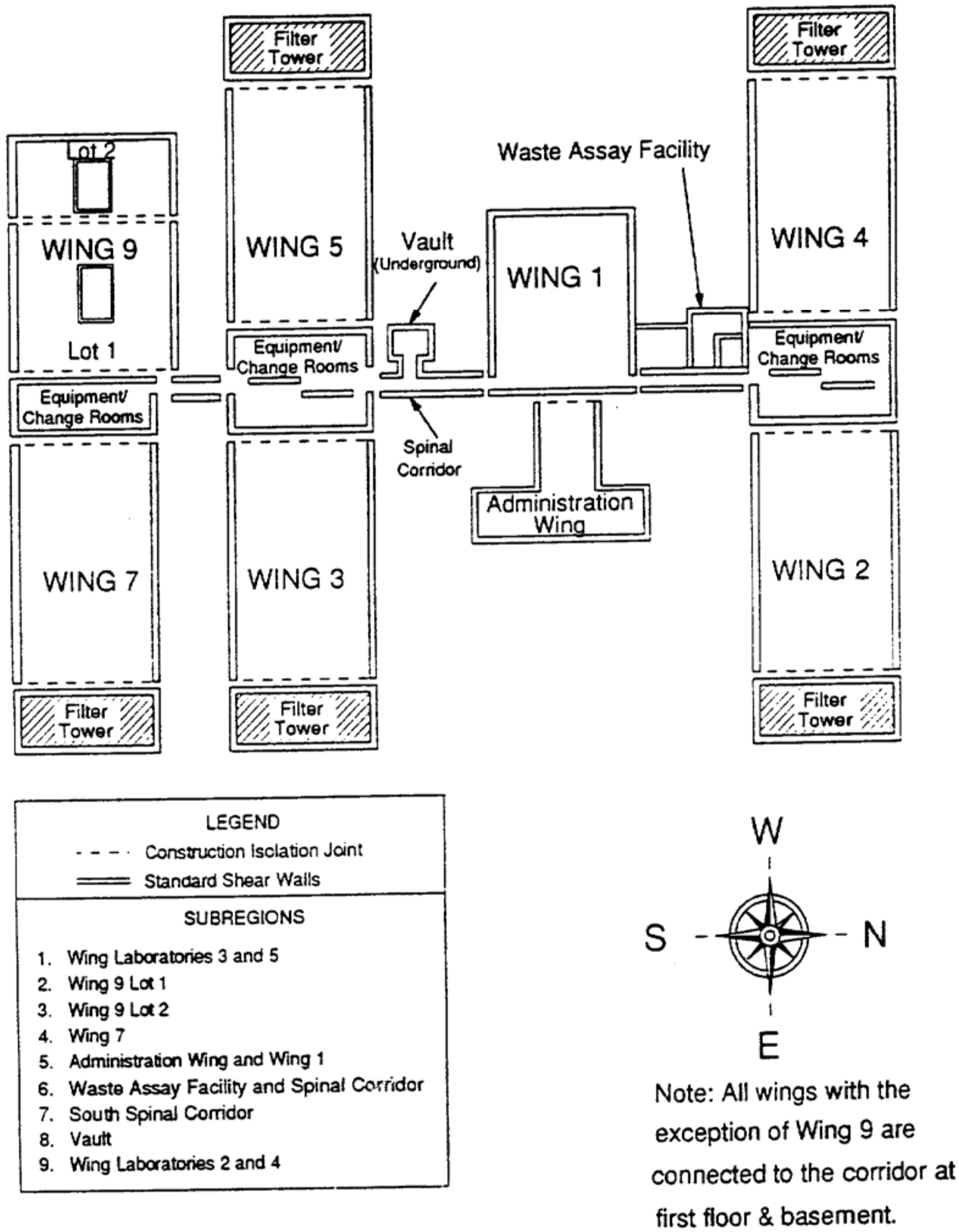


Figure 1. TA-3 Chemistry and Metallurgy Research Building

At the present time, the CMR Building is nearing the end of its original design lifetime and does not meet many of today's standards or requirements. The CMR Building was constructed in the early 1950's to the industrial building code standards in effect at that time. Over the intervening years, LANL has systematically identified and corrected some deficiencies and upgraded some systems to address changes in standards or improve safety performance. Beginning in 1970, these included:

- Ventilation system upgrades (1973 to 1974)
- Fire protection system upgrades (1978)
- Surety facility upgrades (1981, 1992)
- Asbestos repair and removal (1984 to present)
- Acid drain line replacement (1984)
- Evacuation system—public address system and alarms (1984)
- Curbing installed around equipment (1985)
- Vacuum system for continuous air monitors (1987)
- Exhaust duct cool-down system (1987)
- Heating, ventilation, and air conditioning controls (1987)
- Main storage vault (1987 to 1994)
- Alarm monitors (1988)
- PCB transformer replacement (1989)
- Removal of natural gas service from the building (1990)
- Stack emissions monitoring system (1991)
- Air sampling probes (1991)
- SNM waste assay facility (1991)

However, these upgrades have not kept up with the aging of the building or increasingly stringent safety standards. A more comprehensive series of upgrades was identified and authorized by DOE addressing specific safety, reliability, consolidation, and safeguards issues. These were prioritized, with the highest priority being assigned to equipment replacements and activities essential to maintain the minimum safe operating conditions for an interim period of 20 years, while more comprehensive upgrades were developed. These upgrades were identified by DOE as routine maintenance work, having no significant potential for environmental consequences and not intended to prolong the useful life of the facility. These "Phase I" upgrades were categorically excluded by DOE from the need for further NEPA analysis. The proposed "Phase I" work included:

- Replacing continuous air monitors in building wings
- Replacing some heating, ventilation, and air conditioning blowers
- Upgrading basic wing electrical systems
- Upgrading power distribution system
- Replacing the stack monitoring systems
- Installing an uninterruptable power supply for the stack monitoring systems in the laboratory wings
- Making limited (interim) improvements to the duct washdown system
- Improvements to acid vents/drains
- Modifying the sanitary sewer system
- Performing a fire hazard analysis
- Preparing an Engineering Assessment and Conceptual Design Report (CDR)

As of June 2005, all "Phase I" upgrades have been completed with the exception of installation of an uninterruptable power supply for the stack monitoring systems in the laboratory wings and improvements to acid vents/drains. In addition to the highest priority (Phase I) upgrades, the CMR Building required additional upgrading to continue to perform the essential analytical chemistry and metallurgy operations for LANL's existing assignments in a safe, secure, and environmentally sound manner for an additional 20 to 30 years. These further upgrades are not intended to increase the capabilities of the facility nor allow new missions or functions to be located there. These Phase II Upgrades, analyzed in the *Environmental Assessment for the Proposed CMR Building Upgrades* (DOE 1997) (and also presented in a Capital Asset Management Process Report [LANL 1996a]), included:

- *Seismic and Tertiary Confinement Upgrades.* Diagonal braces from walls to roof, exterior bracing from second floor to ground, internal vertical bracing, strengthening exterior columns, filling in window openings, and adding bracing to the Wing 9 hot cell supports would allow the CMR Building to meet seismic (earthquake resistance) criteria for a Hazard Category 2 facility

- *Security Upgrades.* Building doorways and other openings would be changed to make human entry other than through the security stations much more difficult.

- *Ventilation Confinement Zone Separation in Wings 1, 3, 5, 7, and 9.* The ventilation systems in these wings would be improved by adding one-way flow baffles and liners in the ventilation ducts, installing better doors and vestibules, adding a new filter tower to Wing 3, and installing a separate glovebox exhaust system. These upgrades are intended to prevent backflow of air carrying radioactive materials and chemical fumes from contaminated areas such as gloveboxes to uncontaminated laboratories, corridors, and offices.

- *Standby Power and Communications Systems.* This upgrade would provide standby electrical power in case a power failure caused the ventilation system to fail. This back up power would maintain negative pressure in the laboratories of Wings 3, 5, 7, and 9, reducing the likelihood that contamination from a laboratory would be spread into other areas. A small generator will provide standby power to the ventilation system and the emergency communication system.

- *Wing 1 Upgrades.* Wing 1 will be decontaminated and a new heating, ventilation, and air conditioning system will be installed to improve worker health and safety.

- *Operations Center Upgrades.* All building monitoring and control systems will be reported at a central location. This will include continuous air monitors (CAMs), stack monitors and alarms, fire alarm panels, heating, ventilation, and air conditioning and other building utilities, electrical substation switchgear, and glovebox sensors.

- *Chilled Water in Wings 3, 5, and 7.* The 40-year-old evaporative coolers in each wing will be replaced with refrigeration units. Chilled water is supplied to cool process equipment. A chilled water plant will be constructed outside the CMR Building, just west of Wing 1.

- *Main Vault CAMs and Dampers.* Detection capability for radioactive contamination will be enhanced by installing new CAMs in the main vault. The CAMs will be monitored in the

CMR Building Health Physics Office. In addition, seismically qualified dampers will be installed in the vault ventilation ducts.

- *Acid Vents and Drains in Wings 3, 5, and 7.* The current acid vents and drains do not rinse or drain completely, allowing radioactive liquid waste residues to stand in nearly horizontal sections of the piping. These systems would be replaced to provide greater slope and better drainage. These wastes are discharged to the RLWTF.

- *Fire Protection Upgrades.* To improve the fire protection system, backflow preventers, fire dampers, and new fire alarm system panels will be installed throughout the CMR Building.

- *Operations Center Standby Power.* A standby generator will provide power to the Operations Center in the event the main system electrical power is lost.

- *Exhaust Duct Washdown Recycle System in Wings 3, 5, and 7.* This planned upgrade is a waste minimization initiative whereby the duct washdown system would be fitted with a system to recycle up to 80 percent of the water used to rinse away materials from the air exhaust that fall out on the duct surfaces. This upgrade is anticipated to decrease the volume of radioactive liquid waste from the duct washdown system by about 450,000 gallons per year (1,700,000 liters per year), to about 120,000 gallons per year (454,300 liters per year).

- *Wings 2 and 4 Safe Standby.* Wings 2 and 4, unneeded to accomplish current mission element assignments, would be placed in safe standby, meaning that loose contamination and some equipment would be removed and the remaining equipment would be placed in a safe and stable condition such that it could not be used.

- In its finding of no significant impact regarding the CMR Phase II Upgrades, DOE stated that two potential upgrade designs were encompassed within the environmental assessment (DOE 1997) analyses: upgrading Wings 3, 5, and 7 without moving office safe standby condition.

The CMR Phase II Upgrades were funded, and construction began in mid 1998. These upgrades were originally scheduled for completion in May 2001, however, in early 1997, it became apparent that the costs of ongoing (Phase I) upgrades at the CMR Building would overrun the budgeted 1997 costs for that construction project. After considering budget, schedules, and project management issues, LANL, with DOE concurrence, suspended the CMR Building Upgrades Project activities pending a thorough budget and project management review (Whiteman 1997). During 1997, several audit and assessment activities were completed by LANL and DOE to allow project activities to resume.

In addition to the information discussed above regarding ongoing and planned upgrades, additional developments occurred during 1997 regarding CMR Building operations. These are highlighted here as contextual information. These developments are consistent with responsibilities and approaches regarding safe operations at LANL, as discussed in section 2.1.3 of the 1999 SWEIS, *Responsibilities for Safe Operations at LANL.*

On September 2, 1997, in response to safety considerations, LANL temporarily suspended operations within the CMR Building pending an in-depth review of all operations and procedures being implemented within the building to support ongoing LANL activities. During the period from September 1997 through April 1998, operations were resumed in a phased manner as work control and work authorization procedures were verified for each set of operations within the building (Gancarz 1997). Full resumption of CMR Building operations was authorized by DOE on April 17, 1998. To further improve operation of the CMR facility within a safe operating envelope for nuclear facilities, LANL Director Browne announced a new integrated management organization for the CMR Building in which the technical, operations, and facility management of the CMR Building would be integrated with that of TA-55. This reorganization became effective in January 1998 (Browne 1997).

In September 1997, DOE and LANL decided to develop a "Basis for Interim Operations" (BIO) at the CMR facility in lieu of a Safety Analysis Report in order to establish the safety authorization basis for the facility. This effort was completed in October 1998, with the issuance of the BIO and associated technical safety requirements (TSRs) that must be implemented according to a DOE/LANL approved plan over the next 2 years[1]. TSR implementation requires certain facility modifications be completed. With the authorization basis established through the BIO, the CMR Building Upgrades Project responded to meeting the TSR implementation requirements to ensure safe operations with the facility. Throughout 1998, the CMR Building Upgrades Project was integrated into the BIO/TSR development process. On March 24, 1998, a workshop was held to evaluate CMR Building upgrades required to support BIO/TSR implementation. A second workshop was held on July 17, 1998, to further refine BIO/TSR implementation upgrades and additional upgrades related to safe, reliable operations within the CMR Building.

Based on the above information, the CMR Building Upgrades Project resumed. The first priority was the completion of CMR facility modifications required to implement the BIO/TSRs and satisfy compliance requirements. Formal restart of CMR Building Upgrades Project activities commenced on April 13, 1998, with DOE authorizing LANL to initiate activities in support of BIO/TSR implementation that are within the scope of the CMR Building Upgrades Project. Since April 1998, additional project activities have been authorized (repriortized, but within the original scope) by the DOE. Authorized CMR Building Upgrades Project activities since resumption include:

- Fire protection panel replacement
- Transient combustible loading reduction
- Motor control centers replacement
- Duct washdown system refurbishment in Wings 3, 5, and 7
- Air compressor replacement
- Hood washdown system installation
- Heating, ventilation and air conditioning (HVAC) DP indicator installation
- Wing 9 ventilation system upgrades
- Emergency personnel accounting system installation
- Stack monitoring upgrades

[1] The approved CMR Bio includes a comprehensive accident analysis section, including a wing-wide fire scenario that is similar to an accident evaluated in this SWEIS. These analyses were compared, and it was found that, although modeling assumptions and methods varied significantly, the estimated consequences and frequency demonstrated a good agreement. See Appendix G, Section G.5.6.16, for further details.

- Hot cell upgrades, Wing 9 (West Bank only)

All of the above-listed project activities were developed and reviewed during the March and July 1998 workshops. The DOE and LANL defined all required facility modifications based on ongoing evaluations of site or facility conditions and program requirements to support a rebaselining of the overall CMR Building Upgrades Project during 1999.

In 1996 through 1998, LANL geologists conducted detailed geologic studies in and around TA-3 and TA-55 and geologic trenching studies on the Pajarito Fault. Results from these studies indicate that a possible connection exists between the Pajarito, Rendija Canyon, and Guaje Mountain faults, which may increase the likelihood for fault rupture within TA-3 should a seismic event occur (see SWEIS Chapter 4, Section 4.2.2.2, and appendix I). The earthquake accident frequencies utilized in Appendix G of the SWEIS have been compared to that which would be derived considering the results from the geologic mapping and trenching studies. Potential building seismic damage has been addressed for ground shaking and fault rupture, where appropriate, from earthquakes (SWEIS volume III, appendix G, Table G.5.4–3). The seismic failure frequencies that were used in the accident analysis do not increase significantly as a result of seismic ground rupture. The basis for this conclusion is that the return period (the inverse of frequency) for a damaging fault rupture is significantly greater than the return periods used for damaging ground motion in the accident analysis. Because additional damage could result should a fault rupture occur at the CMR Building, a sensitivity study is performed for this scenario as part of the earthquake analysis (SWEIS appendix G, SITE–03).

The DOE has decided not to implement the seismic upgrades as part of the CMR Building Upgrades Project, Phase II. This is a result of: (1) new seismic studies published after the draft SWEIS was released that indicated the additional hazard of a seismic rupture at the CMR Building (SWEIS Chapter 4, Section 4.2.2.2, and Appendix I) and (2) DOE's postponement of the decision to implement the pit manufacturing capability beyond 20 pits per year in the near future. Although the seismic rupture risk does not have a substantial effect on the overall seismic risk, it is an aspect of risk that cannot be cost-effectively mitigated through engineered structural upgrades. Given that assessment, the DOE is considering more substantial actions that are not yet ripe for analysis in the SWEIS (e.g., replacement of aging structures). The overall goal of DOE's evaluation is to ultimately reduce the risk associated with seismic event, should one occur. In the meantime, DOE is taking actions to mitigate seismic risks through means other than seismic upgrades (e.g., minimizing material at risk and putting temporarily inactive material in process into more sturdy containers).

In 1999, DOE directed the CMR Upgrades Project to re-baseline and include only those upgrades needed to ensure compliance with the Basis for Interim Operations. These upgrades were required for the facility to be reliable through 2010. The re-baseline was approved in October 1999. It included 16 upgrades necessary to ensure worker safety, public safety, environmental compliance, and reliability of services to safety systems. These 16 upgrades are listed below:

- Duct Wash-down System Upgrade,
- Heating, Ventilation, and Air Conditioning delta Pressure System Upgrade,
- Hood Wash-down System Upgrade,

- Hot Cell Delta Pressure System Upgrade,
- Hot Cell Controls Upgrade,
- Stack Monitors Phase A Upgrade,
- Emergency Personnel Accountability System Upgrade,
- Stack Monitors Phase B Upgrade,
- Compressor System Upgrade,
- Sprinkler Head Replacement Upgrade,
- Emergency Lighting System Upgrade,
- Emergency Notification Upgrade,
- Internal Power Distribution Upgrade,
- Operations Center Upgrade,
- Ventilation System Filter Replacement Upgrade, and
- Fire Protection System Upgrade.

All sixteen upgrades were completed by March 2002; the Project submitted all Turnover/Closeout documentation to DOE in July 2002; and DOE approved Turnover/ Closeout in November 2002.

3.2 Description of Capabilities (Baseline)

The operational CMR capabilities include both radioactive and nonradioactive substances. Work involving radioactive material (including uranium-235, depleted uranium, thorium-231, plutonium-238, and plutonium-239) is performed inside hoods, hot cells, and gloveboxes. Chemicals such as various acids, carcinogenic materials, and organic-based liquids are used in small quantities, generally in preparation of radioactive materials for processing or analysis. The principal activities conducted at the CMR Building are described below.

3.2.1 Analytical Chemistry

Analytical chemistry capabilities involving the study, evaluation, and analysis of radioactive materials reside at the CMR Building. These activities support research and development associated with various nuclear materials programs, many of which are performed at other LANL locations on behalf of or in support of other sites across the DOE complex (e.g., Hanford Reservation, Savannah River Site, Sandia National Laboratories). Sample characterization activities include assay and determination of isotopic ratios of plutonium, uranium, and other radioactive elements; major and trace elements in materials; the content of gases; constituents at the surface of various materials; and methods to characterize waste constituents in hazardous and radioactive materials.

3.2.2 Uranium Processing

Operations essential for the stewardship of uranium products are conducted at this facility. They include uranium processing (casting, machining, and reprocessing operations, including research and development of process improvements and characteristics of uranium and uranium compounds), and the handling and storage of high radiation materials. The facility also provides limited backup to support the nuclear materials management needs for activities at TA–55 and also provides pilot-scale unit operations to back up the uranium technology activities at the Sigma Complex, other LANL facilities, and other DOE sites.

3.2.3 Destructive and Nondestructive Analysis

Destructive and nondestructive analysis employs analytical chemistry, metallographic analysis, measurement on the basis of neutron or gamma radiation from an item, and other measurement techniques. These activities are used in support of weapons quality, component surveillance, nuclear materials control and accountability, SNM standards development, research and development, environmental restoration, and waste treatment and disposal.

3.2.4 Nonproliferation Training

LANL utilizes measurement technologies at the CMR Building and other LANL facilities to train international inspections teams for the International Atomic Energy Agency. Such training may use SNM.

3.2.5 Actinide Research and Processing

Actinide research and processing at the CMR Building typically involves solids, or small quantities of solution. However, any research involving highly radioactive materials or remote handling may use the hot cells that are in Wing 9 of the CMR Building to minimize personnel exposure to radiation or other hazardous materials. CMR actinide research and processing may include separation of medical isotopes from targets, processing of neutron sources (DOE 1995), and research into the characteristics of materials, including the behavior or characteristics of materials in extreme environments (e.g., high temperature or pressure).

3.2.6 Fabrication and Processing

Fabrication and processing at the CMR Building involves a variety of materials, including hazardous and nuclear materials. Much of this work is done with metallic uranium. The CMR Building can fabricate and analyze a variety of parts, including targets, weapon components, and parts used for a variety of research and experimental tasks.

3.3 SWEIS Description of Capabilities (Preferred Alternative)

The CMR Building is described in Section 3.1. Under the Expanded Operations Alternative, the following activities would occur at this facility. (Note: The SWEIS ROD limits some of the activities associated with pit fabrication. See Appendix 1 for details.)

3.3.1 Analytical Chemistry

LANL would provide expanded sample analysis in support of actinide research and processing activities, processing approximately 4,000 samples per year (including actinide sample analysis relocated from the Plutonium Facility).

3.3.2 Uranium Processing

LANL would conduct activities to recover, process, and store LANL's highly enriched uranium inventory over the next 6 years (same as No Action Alternative).

3.3.3 Destructive and Nondestructive Analysis

Up to 5 secondary assemblies per year would be evaluated through destructive and nondestructive analysis and disassembly.

3.3.4 Nonproliferation Training

LANL would also conduct more nonproliferation training using SNM than would be conducted under the No Action Alternative, and would possibly use different types of SNM in that training.

3.3.5 Actinide Research and Processing

LANL would process up to 5,000 curies of neutron sources (both plutonium-238/beryllium and americium-241/beryllium sources) per year at the CMR Building and would process neutron sources other than sealed sources. In addition, up to a total of 1,000 beta/gamma/neutron sources such as plutonium-238/beryllium, americium-241/beryllium, americium-241, plutonium-238, cobalt-60, cesium-137, strontium-90, californium-252, iridium-192, radium-226, and curium-244 would be staged in CMR Building Wing 9 floor holes. LANL would begin a research and development effort on spent nuclear fuels related to long-term storage and would analyze materials from spent and partially spent fuels. Further, LANL would characterize approximately 100 samples per year using metallurgical microstructural/chemical analysis, would conduct compatibility testing of actinides and other details in order to study long-term aging and other material effects, and would conduct research and development activities in hot cells on plutonium pits exposed to high temperatures. LANL would also conduct analysis of TRU waste disposal related to the validation of WIPP performance assessment models, characterize TRU waste, and analyze gas generation such as that which could occur during transportation to WIPP. Further, LANL would demonstrate decontamination technologies for actinide-contaminated soils and materials and develop an actinide precipitation method to reduce mixed wastes in LANL effluents. Under the Expanded Operations Alternative, some actinide activities currently housed in the Plutonium Facility Complex (at TA-55) could move to the CMR Building to make room in TA-55-4 for increased plutonium pit production. Up to 400 kilograms of actinides would be processed per year between TA-55 and the CMR Building, and hydrodynamic testing and tritium separation activities would be supported at the CMR Building. DOE selected the preferred alternative in the Record of Decision. The preferred alternative modified the level of pit manufacturing and thus affected the reclocation of activities from TA-55 to CMR. See Table 2 and Appendix 1 for the level of activities in CMR as a result of the Record of Decision.

3.3.6 Fabrication and Metallography

LANL would produce 1,320 targets per year for production of molybdenum-99, with each target containing approximately 20 grams of uranium-235. LANL would separate fission products from the irradiated targets to provide molybdenum-99 (and other isotopes); this capability would produce up to 3,000 6-day curies of molybdenum-99 per week. (A 6-day curie is defined as the amount of product, in curies, remaining 6 days after the product is delivered to the radiopharmaceutical company.) Although LANL no longer produces targets for the Mo-99 program, this capability still remains at CMR. The capability to fabricate metal shapes using highly enriched uranium no longer exists at CMR; this capability has been relocated to Sigma within TA-3.

3.3.7 Surveillance and Disassembly of Weapons Components

The CMR Building would also be used to disassemble approximately 65 plutonium pits per year (including 40 pits destructively examined). Up to 20 pits per year would be nondestructively examined, with additional testing conducted under the Expanded Operations Alternative (as compared to the No Action Alternative). This activity would move to the CMR Building from the TA–55 Plutonium Facility.

The Expanded Operations Alternative also includes the upgrades necessary to accommodate activities displaced from the Plutonium Facilities Complex to the CMR Building as a result of implementing enhanced pit fabrication. These upgrades are addressed in the PSSC analysis for the enhancement of plutonium pit manufacturing in the SWEIS, Volume II.

In addition, under the Expanded Operations Alternative, modifications to CMR Building Wing 9 hot cells would be undertaken to provide for the safety testing of pits in a high-temperature environment (to assess the fire resistance of pits). These changes would place a glovebox and a furnace into one of the hot cells, as well as introduce additional instrumentation and equipment for controlling, monitoring and measuring such tests. In addition, the four projects currently in development or implementation at the CMR Building are included in all alternatives as described under the No Action Alternative, SWEIS Section 3.1.3[2].

4.0 Background Document Information for CMR

This section presents information from the "Background Information for CMR Building for Site-Wide Environmental Impact Statement, Los Alamos National Laboratory (LANL 1996b)."

4.1 Background Document Description of Facilities

The Chemistry and Metallurgy Research (CMR) Building is located in Technical Area 3 (TA-3) of the LANL (Building 29 in Figure 1) and was constructed in 1952. It is the Laboratory's only facility with full capabilities for performing Special Nuclear Materials (SNM) analytical chemistry and materials science activities in support of the nuclear weapon program. The CMR Building was constructed in compliance with the standards in effect in 1952. It was designed as an actinide chemistry and metallurgy research facility and, at the time it was built it contained state-of-the-art instrumentation and safety controls. The work being performed in the CMR Building today is within the range of operations for which the building was originally designed.

Four construction or facility modification projects are currently in development or implementation at the CMR Building and are included in all alternatives (all have been previously reviewed under NEPA), as discussed in section 2.2.2.3:

- CMR Building Phase I Upgrades (ongoing)
- CMR Building Phase II Upgrades (DOE 1997)
- Medical Radioisotope Target Fabrication (DOE 1996a)
- Radioactive Source Recovery Program (DOE 1995)

The building consists of eight wings connected by a spinal corridor. The building has three floors per wing with a total of approximately 550,000 square feet of space. Each wing is served by its own mechanical and electrical systems. There is an administration wing and seven laboratory wings numbered 1-5, 7, and 9 (wings 6 and 8 were planned but never constructed).

Specific wings of the CMR Building are associated with different activities. Wings 3, 5, and 7 house the core actinide analytical chemistry functions in the building. Wings 2 and 4 have been used primarily for uranium and materials science activities. Most of these activities, along with their associated laboratory equipment, have been relocated out of wings 2 and 4. Some of the space in wing 4 is currently being used for low-hazard analytical chemistry activities. Wing 1 is used only for office and other support functions. Wing 9 is uniquely constructed with hot cells and high bay process areas and is used for materials science activities requiring these special building features as well as for other uranium activities.

4.2 Facility Activities

The nuclear materials operations occur within the CMR Building in various wings and within the main SNM storage vault. Wing 9 currently supports work on uranium technology in support of stockpile weapons; recovery and stabilization of uranium in support of the Defense Nuclear Facilities Safety Board 94.1 findings; and unique hot cell operations. Wings 3, 5, and 7 support analytical chemistry operations. Currently wings 2 and 4 are very lightly utilized and support various actinide research and development activities and SNM operations for the CMR Building. The activities in the various wings are discussed below.

Capabilities in wing 9 include uranium casting, machining, and reprocessing operations and the handling and storage of high radiation materials. These operations are essential for stewardship of the legacy of enriched uranium products from years of nuclear weapons research, development and technology activities. Additional laboratory capabilities that are being configured within wing 9 for chemical processing, machining, and fabrication are essential for investigation and analysis of all forms of enriched uranium components used in the weapons systems of the enduring stockpile. Beyond the science-based stewardship of uranium technology, wing 9 also provides a unique capability for handling and processing highly radioactive materials through its hot cells and shielded storage bins. Wing 9 currently contains high radiation emitting materials from the nuclear weapons program and will provide ongoing support for these materials which cannot be safely handled and processed elsewhere at LANL.

The combined capabilities of wing 9 provide limited scale backup to support the nuclear materials management needs of the Los Alamos Plutonium Facility (TA-55) and also provide pilot scale unit operations to backup the enriched uranium technology needed for the future nuclear weapons complex. Current wing 9 activities in support of the Defense Programs (DP) mission are expected to continue for the indefinite future.

The majority of the Laboratory's analytical chemistry capability for studying, evaluating, and analyzing radioactive materials resides in wings 3, 5, and 7. The nuclear materials programs rely on analytical chemical measurements to execute various facets of the program. Most of the analytical chemistry needs are associated with the nuclear materials used. The types of information needed include assay of, and determination of isotopic ratios of plutonium or uranium, major elements in the materials, trace elements in the materials, interstitial gases, surface characteristics, and the analysis of waste generated from operations prior to recycle or disposal. In addition, analyses are required of specific non-nuclear materials to verify type or purity to qualify the materials for use.

Wing 2 was upgraded during the CMR upgrade program. Work in wing 2 supports stockpile stewardship initiatives involved with studying deformation processing of plutonium, optical and electron microscopy studies of plutonium, and pit surveillance support. These activities will be relocated to other wings. Work in wing 4 involves CMR Building uranium inventory management and uranium processing chemistry R&D as part of the Stockpile Management program. This work was relocated to wing 9. Future activities in wings 2 and 4 are strongly dependent on results from the Stockpile Stewardship and Management Programmatic Environmental Impact Statement (SSM-PEIS) (DOE 1996b) process that may define a future enhanced mission at Los Alamos.

CMR is capable of limited Safeguards and Security (S&S) Category I operations within the Site Safeguards and Security Plan (SSSP) utilizing a temporary security plan employing localized protective force personnel. The CMR main vault is one of the three Category I SNM storage vaults at the Laboratory available for supporting nuclear material activities. This vault currently contains a variety of legacy enriched uranium materials, as well as samples from analytical chemistry operations. In June 2005, this vault although capable of Cat I operations, is now operating at a Cat III level in response to the reduced material at risk now located in the CMR Building. The mission for the vault is not expected to change significantly in the future.

4.3 Missions, Programs, and Operational Capabilities Under Alternatives

The programs performed at the CMR Building are described in this chapter. The section on the no-action alternative (Section 2.1.1) begins with a presentation of 12 current programs. Sections 2.1.2-2.1.4 present each of the 12 programs under the expanded, reduced, and greener alternatives, respectively.

Table 2-1, Summary of Missions/Programs Under the Four Alternatives, provides an overview of the pertinent deliverables for each of the programs.

4.3.1 Discussion of Missions/Programs Under The Expanded Operations Alternative

The preferred alternative modified the level of pit manufacturing and thus affected some relocation of activities and level of operations in CMR. See Table 2 and Appendix 1 for the level of activities in CMR. Note that DOE selected the preferred alternative in the Record of Decision.

4.3.1.1 General Analytical Chemistry Support

This program includes sample analysis in support of a wide range of actinide research and processing activities. The mix of programs currently planned for analytical chemistry include the Waste Isolation Pilot Plant (WIPP), (did not happen), waste management programs at TA-55, waste gas cylinder analysis support for the solid waste disposal facility (TA-54), recovery and disposal of obsolete plutonium-beryllium (PuBe) neutron sources, support of the Defense

Nuclear Facility Safety Board (DNFSB) stabilization and packaging program (94-1), pit surveillance programs for metallography analysis, sample analysis to support operation of TA-55, ^{238}Pu heat source production, and samples from the Above Ground Experiments (AGEX).

The expanded program could increase the rate at which the processing, stabilization, storage, and waste operations proceed. The most significant increase in sample analysis could occur in the pit surveillance activities in order to process the numerous metallography samples generated from that program. The sampling rate could increase to a total of 4,000 samples per year.

4.3.1.2 Analytical Chemistry Support - Pit Fabrication Support

The goal of this program is to support the ability to develop and maintain the technology base to build War Reserve (WR)-quality pits via analytical chemistry analysis of feed, waste, and in-process material. Most of the analytical chemistry infrastructure already exists at LANL, and additional sample throughput is anticipated to support the development and demonstration of pit manufacturing and quality capabilities. Sample analysis will be required for a variety of operations used to support the pit fabrication program. The pit source material, which will be from existing material at TA-55 and excess stockpile pits, along with process steps including reduction, processing, and machining will require sample analysis. Major feed streams, along with some aspects of waste management, will form the basis of the analytical chemistry support function that may be located offsite from TA-55 in the CMR Building.

Production of 1-2 pits per year started in 2000. This production rate requires approximately 200 samples per year for chemical analysis. The primary support of analytical chemistry will be in the quality program to provide sufficient data for meeting the standards of WR-quality pits.

The planned rate at LANL for production is 80 pits per year. This production rate will require the analysis of approximately 4000 samples per year.

4.3.1.3 Uranium Fabrication

This activity includes important highly enriched uranium (HEU) research and development activities conducted in the CMR Building. Although the efforts involve small amounts of HEU, the research and development efforts are essential for better understanding of the processing and casting characteristics of HEU.

The research and development efforts focus on process development including pilot operations and casting of components for a variety of LANL and Oak Ridge Y-12 Plant HEU operations. Included are work involving small amounts of HEU for investigation of criticality studies, mixed oxide fuels (MOX), and space reactor fuels.

Research and development work on HEU will continue. Additionally, the work at the CMR Building will include fabrication of the HEU components for the complete physics packages for 150 sets of nuclear components per year if this activity is assigned to LANL as a result of the SSM-PEIS.

4.3.1.4 Uranium Stabilization, Processing and Recovery

The goal of this program is to address the legacy of HEU inventory in the CMR Building by recovering, processing, and placing in storage all HEU at LANL. The storage criteria specify that the final form of the recovered material must be oxide. There are currently 3.2 metric tons of HEU to be processed and stored. Currently, 100 kg of HEU has been packaged. HEU materials that undergo processing will result in an oxide which meets long-term safe storage criteria.

The packaging effort will not burden the capacity of the CMR Building. Approximately 3,450 cans containing HEU in all forms are anticipated and the current plan is to complete the packaging effort by 2005 and store the cans in the CMR Building. A parallel effort is under way to develop improved storage containers. Tests are being conducted to better understand SNM/container compatibility and develop surveillance techniques to monitor stored containers over their lifetime.

There will be no expansion from the No Action Alternative. Based on the outcome of the SSM PEIS, this program may include the recovery of materials resulting from manufacturing operations.

4.3.1.5 Radioactive Source Recovery Program - RSRP

A large number of neutron sources (approximately 20,000) were provided by AEC and its successors to universities, industry, and government agencies. Most of these sources are no longer in use, and many source owners would like to transfer their sources to other owners or to dispose of them. Unfortunately, there are few mechanisms for transfer and none currently for disposal. Typical sources that fall into this category generate neutrons by an alpha-neutron reaction between a radionuclide and a light metal or light metal oxide such as beryllium, Be, or beryllium oxide, BeO. The radionuclides most commonly in use are ^{239}Pu, ^{241}Am, and ^{238}Pu. Separation (recovery) of the radionuclide from the light metal or light metal oxide before material storage is desirable, because the separation of the alpha-emitting material from the Be or BeO reduces the neutron emission rate, thus reducing the storage shielding required over that required for the unseparated source materials. Radioactive material separated from neutron sources requires less storage space than the material mixture contained in a neutron source. The recovery process requires removal of the stainless steel shells containing the material mixture and chemically separating the radionuclide, from the light metal or light metal oxide.

The No Action Alternative will consist of holding neutron sources (up to 1000) in the Wing-9 Hot Cell Facility at the CMR Building for recovery at the CMR Building or TA-55, the recovery of up to 3,600 Ci of ^{238}PuBe neutron sources (~250g $^{238}Pu0_2$ powder), then the recovery of up to 500 Ci of ^{241}AmBe neutron sources at CMR per year (150g $^{241}Am0_2$ powder) after recovery of ^{238}PuBe sources is complete. If additional ^{238}PuBe sources are returned, they will also be recovered.

All source recovery operations at LANL (TA-55 and CMR) could be expanded to a maximum of about 10,000 Ci/year distributed between chemical recovery operations at TA-55 and CMR. Up to 5000 Ci/yr of neutron sources will be recovered at CMR (It is also possible that the entire recovery program could occur in TA-55 or CMR). This expanded operation will include the recovery of material from more $^{239}PuBe$, $^{241}AmBe$, and $^{238}PuBe$ neutron sources and from sources containing other light elements. Storage for 1000 neutron sources will be maintained at the CMR Building with small numbers (~100) of neutron sources stored at TA-55. Additional activities could include the removal of pressure vessels from neutron sources and the separation of neutron sources from other instruments, such as gauges.

DOE is considering programs to recover other unwanted neutron sources such as $^{223}RaBe$ sources and single nuclide sources such as ^{241}Am gamma sources and other licensees, sealed sources such as curium; californium and cesium. DOE is also considering deactivation or recovery of other neutron sources other sealed sources. The source recovery requirements in these efforts have not been established at this time.

4.3.1.6 Non-Proliferation Technologies

The CMR non-proliferation technologies involve development and teaching a variety of non-proliferation courses in the CMR Building. The courses are held for laboratory and non-laboratory personnel. The subject matter requires hands-on participation of students to Category 2 quantities of Special Nuclear Material. Previously these courses were held at TA-18 at the laboratory. The special nuclear material used in the classes is typically stored in the CMR vault when not needed in the classrooms.

Future requirements for non-proliferation work at the CMR Building could increase the number of classes held in any year, but expanded classes will not require additional quantities of nuclear materials. Exposure to the personnel teaching the courses generally will not increase because, when not teaching the courses, the instructors are ordinarily working at other sites at the laboratory and receiving comparable exposures. Some of the workers might be exposed to higher levels with expanded training particularly those where their normal work site is Cat IV SNM.

4.3.1.7 Transuranic Waste Disposal

This program supported LANL's environmental management and site remediation activities, specifically in the areas of transuranic (TRU) characterization, packaging, and transporting to WIPP. The program has been completed, but the capability still remains at CMR.

The actinide source-term waste test program was conducted to test the WIPP performance assessment (PA) model with regard to waste solubility in brine. The program involved the performance of 39 liter-scale and 15 drum-scale tests. All of the liter-scale tests used actual homogeneous TRU waste. All of the drums were filled with heterogeneous TRU waste. The wastes were mixed with brine to determine the concentration of solubilized actinides. During the tests analyses of the following actinides were be conducted: ^{232}Th, ^{238}U, ^{237}Np, ^{239}Pu, and ^{241}Am. This activity remains a capability for additional studies as necessary.

In 1998 WIPP is tentatively scheduled to open. LANL is positioning itself to ship a substantial portion of its TRU waste inventory as soon as WIPP opens. This accelerated schedule will require TRU waste characterization activities including sampling and extensive volatile organic compound (VOC), semivolatile organic compound (SVOC), and metal analysis of TRU waste destined to go to WIPP. All analytical analyses will be conducted at the CMR Building.

The Gas Matrix-Depletion project involved tests to help predict the amount of gas that will be generated in waste while it was being shipped to WIPP. There were 60-70 tests conducted over a two-year period in Wing-5. The tests involved the use of one liter test containers containing simulated waste spiked with plutonium or uranium. Gas was generated due to the alpha-degradation of the simulated waste matrix in the containers.

The Performance Demonstration Program (PDP) for TRU waste characterization includes the following activities:

- Non-destructive assay (NDA) and nondestructive evaluation (NDE) standards will be fabricated and sealed in the CMR Building. These standards will be placed in drums for qualification of NDA and NDE equipment and methodology used to conduct NDA and NDE measurements on actual TRU waste drums.

- Participation in a PDP program will be required prior to conducting analytical analysis for VOCs, SVOCs, and RCRA metals on TRU waste destined for WIPP.

A method will be devised for the precipitation of actinide and RCRA hazardous metals to minimize mixed wastes in LANL effluents going to TA-50.

There will not be an expansion of the No Action alternative activities; however, there could be additional activities conducted during Expanded Operations. There could be a demonstration of technology for the decontamination of PuO_2 contaminated soil and materials.

4.3.1.8 Mo-99 Medical Radioisotopes

This activity involves refining and reproducing the uranium-coated targets used to produce the medical isotope Molybdenum-99. This program is no longer funded, however, the capability remains.

Target fabrication was performed in the target fabrication area of Wing-9. The work was be carried out in a specially designed glovebox line that was vented through double HEPA filters to the Wing-9 stacks. Each target was constructed of 304 stainless steel tubing approximately 51 cm. (20”) long and 3 cm (1.25”) outside diameter with a wall thickness of 0.09 cm (0.035”). End caps were welded on each end for closure. The top end cap included a thin diaphragm that contains the contents until it was punctured for the fission product recovery process. The inside wall of the tube was coated with an approximately 50 micron thick layer of 93% enriched ^{235}U. Each target contained approximately 20 g of ^{235}U.

Uranium oxide feedstock was dissolved in nitric acid and converted to the coating solution for transfer to the coating process gloveboxes. The ^{235}U was then be coated onto the stainless steel tubing. The coated tubes were then transferred to the welding glovebox. They were pyrolized, welded and leak tested. Following QC acceptance, each target was assayed and stored or shipped a DOE approved reactor facility for irradiation.

4.3.1.9 Weapons System Design Evaluation

This project is no longer active; capability has not been used since 1999. This program evaluated the design of component subassemblies (CSAs). It included both NDA and destructive assay techniques. This program was limited by a categorical exclusion that limits the number of units to be evaluated. This effort also involves considerable research and development effort into new evaluation techniques.

This program evaluated the design of approximately three CSAs per year over the next four years for a total of 10 CSAs.

Should other facilities not be able to meet the needs of DOE evaluation requirements then the project will continue with the examination of 6-10 CSAs per year on a continuing basis.

4.3.1.10 Reactor Fuel Storage Research and Development

This project involved the dry storage of spent fuel elements that came out of the Omega West Reactor. These elements were extensively monitored and a considerable amount of information (data) gathered on the performance of these elements in their dry storage environment. The information gathered from these is extremely important in understanding future Monitored Retrievable Storage (MRS) activities.

LANL continued to monitor these elements in dry storage until Savannah River Site (SRS) was ready to process them. This project was completed in February 1997 when the final shipment of spent fuel from the Omega West Reactor that was in dry storage in Wing 9 was packaged and shipped to Savannah River Site for reprocessing.

Expanded Operations could include a research and development effort using the dry storage elements as a test bed to examine the acceptance criteria for dry storage in MRS. In addition lifetime predictions for the storage of fuel elements will be developed. More importantly, new ways of monitoring these elements once they are in storage in an MRS will be evaluated.

4.3.1.11 Metallurgy Research for Stockpile Stewardship

The goal of this program is to address important metallurgical issues in actinide metals, regarding potential aging effects associated with the long-term storage of nuclear weapons components. Metal components will be studied using a variety of characterization techniques including light optical and electron microscopes, surface analysis instrumentation, x-ray diffraction, and other materials characterization instrumentation. Additional studies will involve the safety concerns associated with the potential for accidents involving nuclear weapons components and fires.

Metallographic specimens will be prepared from material received from the Pit Surveillance program. Standard metallographic procedures have been developed, involving minimal waste generation and safe handling of samples. Examinations using a variety of materials characterization techniques will be performed using these samples whenever possible, however, in some cases the samples will be examined in the as-received condition.

Compatibility testing will be performed to examine actinide containment issues associated with nuclear weapons components at high temperatures.

These research activities occur at the rate of approximately 50 samples a year.

An increased number of samples (100 samples per year) will be analyzed from the Pit Surveillance Program. There will not be significant changes made to the types of analyses performed. There will in an increase in the number of compatibility tests performed.

Actinide analytical chemistry supports the pit disassembly program at TA-55. No disassembly is performed at CMR.

Pit surveillance is not performed at CMR.

4.3.1.14 Plutonium Research and Development and Support of Stockpile Stewardship and Management

As part of the effort to better understand the relationship of aging to performance in the materials, used in nuclear weapons, various kinds of materials research are conducted at LANL. Some experiments are directed at better understanding the aging characteristics of plutonium as part of the continual assessment of the safety of nuclear weapons; others are aimed at the scientific underpinnings of stockpile management, such as developing improved welding and bonding processes, developing special mold coatings to resist plutonium attack, and conducting fire-resistance tests. Some activities are related to dynamic experiments conducted elsewhere on the Laboratory site. LANL personnel test materials using a 7-inch and 40-mm Impact Test Facility and the Kolsky Bar apparatus to determine the shock wave properties of materials and stress-strain curves for solids in compression and tension. A large portion of the data derived from these experiments is used as benchmark data for computer codes. These research efforts involve relatively small amounts of plutonium and hazardous materials compared with other activities at TA-55 and CMR. The elimination of underground nuclear testing has increased the need for better understanding the material properties of plutonium, and fundamental research is central to the SSM Program.

In the expanded alternative the rate of research would increase consistent with the SSM Program and with the capacity provided by expanded operations in TA-55. Roughly half of these operations will be moved from TA-55 to CMR.

These processes were never transferred to CMR.

4.4 Discussion Of Operational Capabilities As They Support Programs

4.4.1 Process Chemistry

4.4.1.1 Description

A major activity in the CMR Building is chemical processing. Chemical processing operations span a wide range of techniques including irradiated material characterization, radioactive source term analysis, aqueous processing (uranium, radioactive neutron generators, analytical chemistry samples), and). There is a wide variety of specialized equipment at the CMR Building to support these operations.

Several of the process chemistry operations use aqueous chemical systems based on nitrate and/or chloride operations to recover uranium and other radioactive material from various residues. The aqueous processes include pretreatment, dissolution, anion exchange, precipitation, calcination, and evaporation steps.

Funding for this project was lost and ULISSES no longer exists at CMR

4.4.1.2 Programs Supported

Process chemistry supports the uranium stabilization, processing, and recovery, radioactive source recovery, transuranic waste disposal, Mo-99 medical radioisotopes, weapons system design evaluation, reactor fuel storage research and development, and metallurgy research for stockpile stewardship programs. Process chemistry will also support the pit surveillance and actinide processing and recovery programs in the Expanded Operations Alternative.

4.4.1.3 Radioactive Materials

Most of the work performed in process chemistry centers on the use of radioactive material (^{235}U-all enrichments, depleted uranium, ^{238}Pu, ^{239}Pu) in the form of metal, oxide, or solutions. Most of these operations are performed inside ventilated enclosures.

4.4.1.4 Non-Radioactive Toxic/Hazardous Substances

Most of the activities require preparation of the radioactive material for chemical processing. This involves a wide range of chemicals in small quantities. These include acids (mineral, perchloric, hydrofluoric, sulfuric), a small quantity of carcinogenic materials (oxidizers, solvents), and organic-based liquids (ethanol, vacuum pump oil, chemical reagents, solvents).

4.4.1.5 Hazardous Energy Sources

Other safety concerns in process chemistry are related to the use of high-energy electrical systems, lasers, compressed gases, furnaces, cranes, welding equipment, and batteries. Additionally, combustible hazards are associated with the use of open flames, gases, electrical equipment, and combustible materials (e.g., paper, cloth, plastics).

4.4.2 Analytical Chemistry

4.4.2.1 Description

Most of the work performed in Wings 3, 5, and 7 of the CMR Building is related to analytical chemistry operations. Typically, small samples are modified with chemical pretreatment and then distributed to various instruments for analysis. These samples are nominally five to ten grams in size, and the analytical techniques are tailored to identify trace compounds and elements in the parts per million or billion (ppm, ppb) range. Some of the samples require further preparation prior to analysis on instruments designed specifically for work with radioactive materials. Almost all the instruments, sample preparation steps, and waste management tasks are performed inside of gloveboxes or open-front hoods.

4.4.2.2 Programs Supported

Analytical chemistry supports all of the programs except for uranium fabrication.

4.4.2.3 Radioactive Materials

Analytical chemistry operations involve the use of small quantities (10 g to 100g) of radioactive material in the form of metal, oxide, or solutions. The analysis of actinide-bearing materials include work on ^{238}Pu, ^{239}Pu, and ^{241}Pu. Uranium isotopes of interest typically represent all enrichments of ^{235}U, along with depleted uranium and the associated daughter product ^{231}Th. Analysis of spent nuclear reactor fuel involves the manipulation of small quantities (sub-gram) of a wide range of isotopes. Tritium salts are also analyzed in the CMR Building.

4.4.2.4 Non-Radioactive Toxic/Hazardous Substances

Most of the sample analysis activities require preparation of the radioactive material prior to analysis. This preparation involves a wide range of chemicals in small quantities. These include acids (mineral, perchloric, hydrofluoric, sulfuric), a small quantity of carcinogenic materials (oxidizers, solvents), and organic-based liquids (ethanol, vacuum pump oil, chemical reagents, solvents).

4.4.2.5 Hazardous Energy Sources

Other safety concerns in analytical chemistry are related to the use of exposed flames, high energy electrical systems, lasers, compressed gases, furnaces, welding equipment, and batteries. Additionally, combustible hazards are associated with the use of open flames, gases, electrical equipment, combustible materials (e.g., paper, cloth, plastics), and grinders that generate sparks.

4.4.3 Actinide Research

4.4.3.1 Description

Actinide research (principally plutonium and uranium materials) supports the research and development of nuclear weapons, nuclear reactors, radioisotope heat sources, and some nonnuclear weapons. Research on actinide elements, compounds, and alloys is extensive at Los Alamos, and addresses metallurgy, actinide thermodynamics, surface science, and neutron scattering research. The study of actinides is important for several reasons including the unusual characteristics in atomic binding that often results in dramatic property changes, the localization of electrons related to catalytic activity, exciting new physics resulting from electron crossover, and complex alloying behavior. Most of the actinide research infrastructure already exists at the CMR Building, and increasing research effort is anticipated to support the development and demonstration of pit manufacturing and quality capabilities. The nature of the nuclear weapons program and its related test hardware requires the study of new materials. Physics requirements drive the use of materials and thus they tend to be exotic or not commercially available. New materials may be synthesized and fabricated into special and unusual geometries as a result of ongoing research.

4.4.3.2 Programs Supported

Actinide research supports all programs associated with pit manufacturing and surveillance.

4.4.3.3 Radioactive Materials

Actinide research operations involve the use of small quantities (10 g to 100g) of radioactive material in the form of metal, oxide, or solutions. The analysis of actinide- bearing materials include work on ^{238}Pu, ^{239}Pu, and ^{241}Pu. Uranium isotopes of interest typically represent all enrichments of ^{235}U, along with depleted uranium and the associated daughter product ^{231}Th. Analysis of spent nuclear reactor fuel involves the manipulation of small quantities (sub-gram) of a wide range of isotopes.

4.4.3.4 Non-Radioactive Toxic/Hazardous Substances

Most of the sample analysis activities require preparation of the radioactive material prior to analysis. This preparation involves a wide range of chemicals in small quantities. These include acids (mineral, perchloric, hydrofluoric, sulfuric), a small quantity of carcinogenic materials (oxidizers, solvents), organic-based liquids (ethanol, vacuum pump oil, chemical reagents, solvents), ceramics, polymer films, and ultrafine metallic powders.

4.4.3.5 Hazardous Energy Sources

Other safety concerns in actinide research are related to the use of x-rays, microwaves, high energy electrical systems, high magnetic fields, and lasers. Additionally, combustible hazards are associated with the use of gases, electrical equipment, combustible materials (e.g., paper, cloth, plastics), and grinders that generate sparks.

4.4.4 Metallography

4.4.4.1 Description

Operations associated with metallography in the CMR Building involve analysis of actinide-based metals (e.g., plutonium, uranium, etc.) to gain insight into fundamental metal properties. Recent work has been used in support of the fabrication and surveillance of plutonium components. As part of the Fire Resistant Pit testing program, high temperature corrosion studies of materials is conducted using plutonium metal. In addition, other radioactive/non-radioactive materials analysis are performed on various types of radioactive waste, and irradiated metals and ceramics. These studies are performed using a wide array of specialized instrumentation (e.g., mass spectrometer, optical microscopy) in gloveboxes.

4.4.4.2 Programs Supported

Metallography supports all of the programs associated with pit manufacturing and surveillance.

4.4.4.3 Radioactive Materials

Most of the work planned for this program centers around material analysis preparation steps performed in gloveboxes or the Wing 9 Hot Cells. These activities involve the use of highly radioactive material (^{235}U, ^{238}Pu, and ^{239}Pu) in the form of metal, oxide, or solutions.

4.4.4.4 Non-Radioactive Toxic/Hazardous Substances

Most of the operations require chemical treatment of the radioactive material samples. These operations involve a wide range of chemicals in small quantities. These include acids (mineral, perchloric, hydrofluoric, sulfuric), a small quantity of carcinogenic materials (oxidizers, solvents), and organic-based liquids (ethanol, vacuum pump oil, chemical reagents, solvents).

4.4.4.5 Hazardous Energy Sources

Other safety concerns in metallography are related to the use of high-energy electrical systems, lasers, compressed gases, furnaces, welding equipment, and batteries. Additionally, combustible hazards are associated with the use of open flames, gases, electrical equipment, combustible materials (e.g., paper, cloth, plastics), and grinders that generate sparks.

4.4.5 Wing 9 Hot Cells

4.4.5.1 Description

A core capability at the CMR Building is the Hot Cell Facility located in Wing 9. Originally constructed to provide the capability to examine pre-and post-irradiation effects of reactor fuels, the facility now has much broader programmatic efforts in place. The Hot Cells offer the capability to isolate and manipulate highly radioactive materials using remote manipulators located in each of the sixteen hot cells. Access into the individual cells is controlled via hydraulic lifts that are electronically activated by the operator.

The hot cells form the core capability to support several different programs via the isolation provided by each cell along with the remote handling capability.

4.4.5.2 Programs Supported

As indicated in Table 2-2, the Wing 9 Hot Cells supports the radioactive source recovery, non-proliferation technologies, transuranic waste disposal, Mo-99 medical radioisotopes, weapons system design evaluation, reactor fuel storage research and development, and metallurgy research

4.4.5.3 Radioactive Materials

Most of the work planned for this program centers around material analysis preparation and chemical processing steps performed in the Wing 9 Hot Cells. These activities involve the use of highly radioactive material (^{235}U, ^{238}Pu, and ^{239}Pu) in the form of metal, oxide, or solutions.

4.4.5.4 Non-Radioactive Toxic/Hazardous Substances

Most of the operations involve a wide range of chemicals in small quantities. These include acids (mineral, perchloric, hydrofluoric, sulfuric), a small quantity of carcinogenic materials (oxidizers, solvents), and organic-based liquids (ethanol, vacuum pump oil, chemical reagents, solvents).

4.4.5.5 Hazardous Energy Sources

Other safety concerns in the wing 9 hot cells are related to the use of high energy electrical systems, lasers, compressed gases, furnaces, welding equipment, and batteries. The majority of the energy sources in the Hot Cells are necessary for the operation of the access doors, ventilation system, and the high-bay area that houses cranes and electrical systems. Additionally, combustible hazards are associated with the use of open flames, gases, electrical equipment, combustible materials (paper, cloth, plastics), and grinders that generate sparks.

4.4.6 Main Vault

4.4.6.1 Description

A nuclear materials measurement and accountability system is used at the CMR Building in support of almost all the programs in the facility. The vault is just that, a safe secure storage area for all the radioactive material used in the building. Along with the nuclear materials storage vault, there are operations that include materials accounting, measurement support operations, operations of a NDA laboratory, and nuclear materials packaging and transfer. All nuclear materials that are in process or stored on-site are monitored to ensure that material balances are properly maintained and can be inventoried on a real-time basis. The nuclear materials storage operation is responsible for providing a safe storage location for actinide materials at the CMR Building.

4.4.6.2 Programs Supported

The vault supports all of the programs.

4.4.6.3 Radioactive Materials

Most of the work planned for this program involves material storage, packaging, and analysis. These activities involve handling radioactive material (^{235}U, ^{238}Pu, and ^{239}Pu) in the form of metal, oxide, or solutions.

4.4.6.4 Non-Radioactive Toxic/Hazardous Substances

None are used in significant quantities.

4.4.6.5 Hazardous Energy Sources

There are no other significant safety concerns.

4.4.7 Waste Operations

4.4.7.1 Description

The CMR facility has established several capabilities for managing waste, including analyzing, packaging, storing, and transporting low-level, TRU, and hazardous waste generated from programmatic operations. All liquid radioactive and inorganic chemical wastes meet the Laboratory's waste acceptance criteria before the waste is allowed to be sent via the industrial waste line to the Laboratory's Radioactive Liquid Waste Treatment Facility (TA-50) for processing. Because the volume of liquid organic chemical wastes is very low, the wastes are collected in small containers in temporary holding areas, packaged, and transported from CMR to TA-50 by truck. Low-level solid wastes are also packaged in the CMR Facility, where care is taken to avoid combining hazardous wastes with radioactive wastes to form mixed wastes. Solid wastes are stored in temporary locations until they are shipped to waste storage and disposal locations at TA-54.

4.4.7.2 Programs Supported

As indicated in Table 2-2, waste operations supports all of the programs.

4.4.7.3 Radioactive Materials

Waste operations could involve any of the radioactive materials found in the CMR Building. However, these materials are typically not present in large quantities or high concentrations in process wastes.

4.4.7.4 Non-Radioactive Toxic/Hazardous Substances

Waste operations could involve any of the toxic/hazardous substances found in the CMR Building; however, these materials are typically not present in large quantities.

4.4.7.5 Hazardous Energy Sources

There are no other significant safety concerns.

5.0 References

Browne 1997: "CMR Facility," memo (e-mail) from J. Browne, Director of Los Alamos National Laboratory, to LANL Manager (December 19, 1997).

DOE 1995: "Radioactive Source Recovery Program Environmental Assessment," US Department of Energy, Los Alamos Area Office, DOE/EA-1059, Los Alamos, New Mexico (December 1995).

DOE 1996a: "Medical Isotope Production Project: Molybdenum-99 and Related Isotope Environmental Impact Statement," US Department of Energy, Office of Nuclear Energy, Science and Technology, DOE/EIS-0249, Washington, D.C.

DOE 1996b: "Final Programmatic Environmental Impact Statement for Stockpile Stewardship and Management," US Department of Energy, Albuquerque Operations Office DOE/EIS-0236 (September 1996).

DOE 1997: "Environmental Assessment for the Proposed CMR Building Upgrades at the Los Alamos National Laboratory," US Department of Energy, Los Alamos Area Office, DOE/EA-1101, Los Alamos, New Mexico (February 4, 1997).

DOE 1999: "Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory," US Department of Energy, Albuquerque Operations Office DOE/EIS-0238 (January 1999).

Gancarz 1997: "Suspension of Normal Operations within CMR," memo from A Gancarz, Los Alamos National Laboratory, to all CMR Building occupants (September 2, 1997).

LANL 1996a: "Capital Asset Management Process for Fiscal Year 1998," Los Alamos National Laboratory, LA-UR-96-3081, Los Alamos, New Mexico.

LANL 1996b: “Background Information for CMR Building for Site-Wide Environmental Impact Statement,” transmitted to Mr. Thomas Anderson, GRAM, Inc., by Doris Garvey, Project Leader, LANL Site-Wide Environmental Impact Statement (December 2, 1996).

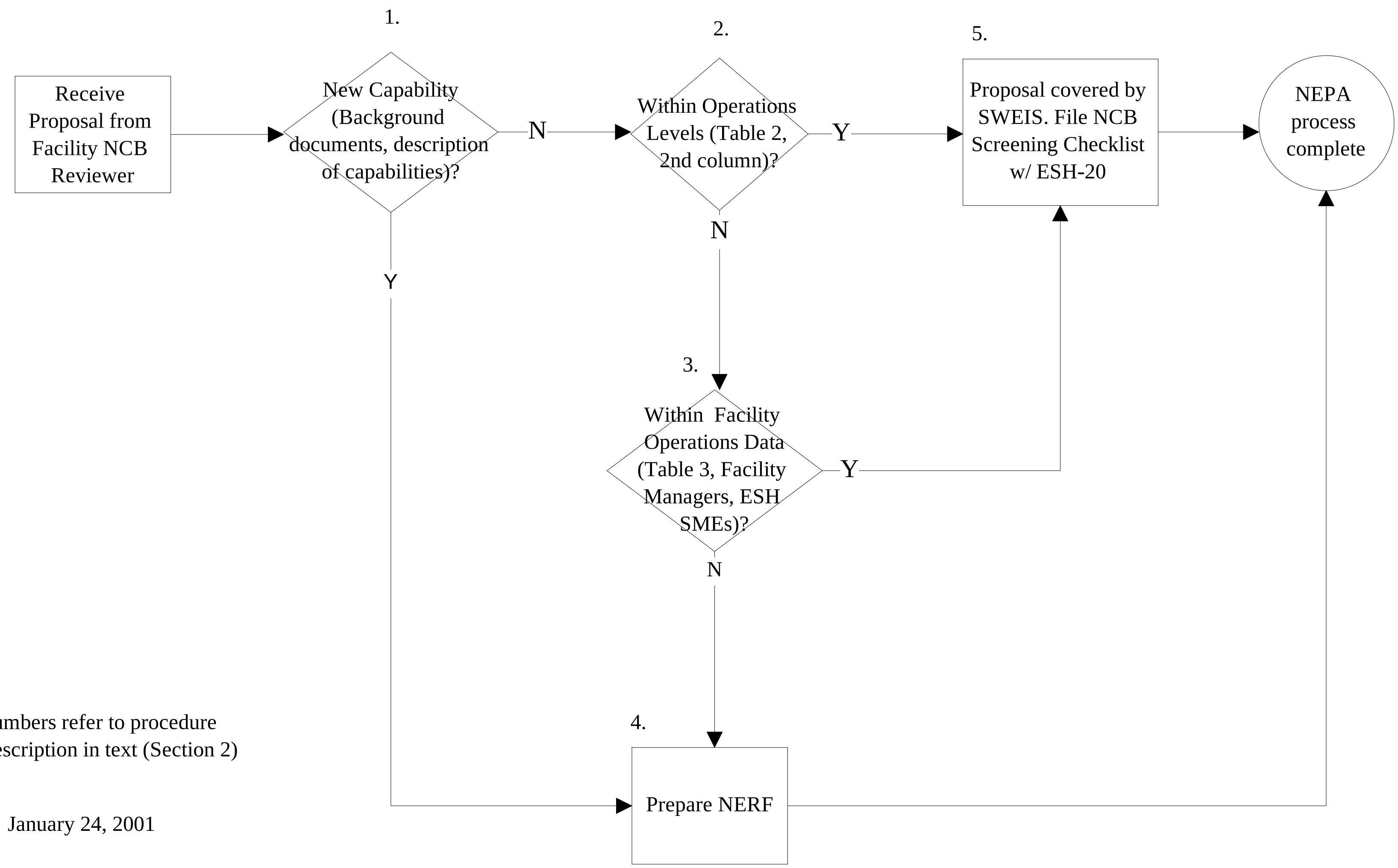
LANL 1999: “SWEIS 1998 Yearbook: Comparison of 1998 Data to Projections of the Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory,” Los Alamos National Laboratory LA-UR-99-6391 (December 1999).

LANL 2000a: “NEPA, Cultural Resources, and Biological Resources (NCB) Process Laboratory Implementation Requirement,” Los Alamos National Laboratory LIR 404-30-02.0 (01/20/2000).

LANL 2000b: “Facility NCB Reviewer Determination Document 3: TA-03 Chemistry and Metallurgy Research (CMR) Facility.”

Whiteman 1997: “Chemistry and Metallurgical Research Upgrade Project, Los Alamos National Laboratory,” memo from A.E. Whiteman, DOE Albuquerque Operations, to P. Cunningham, LANL, (May 5, 1997).

Attachment 1: ENV-ECO Screening Flow Chart



Numbers refer to procedure description in text (Section 2)

January 24, 2001

Attachment 2: NCB Screening Checklist

REVIEWER: DATE:

PROJECT TITLE:

PROJECT IDENTIFIER/Reference No:

DESCRIPTION/Comments:

Air or water emissions to environment: Yes ☐ No ☐
Describe issue or resolution:

LOCATION: FMU No: FMU No:

TA:__ Building:_____ TA:__ Building:_____ TA:__ Building:_____
TA:__ Building:_____ TA:__ Building:_____ TA:__ Building:_____
Other: _____

CRITERIA:

2a. 1. Schedule or location modified to avoid T&E concerns? Yes ☐ No ☐
2. After project modification is there an unresolved T&E issue?: Yes ☐ No ☐
3. For T&E buffer areas, map of project footprint is attached or has been sent to ENV-ECO? Yes ☐ No ☐

2b. Floodplain issue: Yes ☐ No ☐
2c. Wetland issue: Yes ☐ No ☐
Wetland BMPs implemented? Yes ☐ No ☐
2d. Modifications to a historic building: Yes ☐ No ☐
2e. Archaeological resources affected: Yes ☐ No ☐
Sites within project area were avoided (notify ENV-ECO and provide map): Yes ☐ No ☐

3a. NEPA Documentation:
CX (specify): LAN-__-_____ LAN-__-_____
Site-wide EIS (specify): Facility NCB Document No.: _____ Operations Level (Use Table 2): _____

3b. Conditions that preclude a cx or SWEIS reference:
Connected action: Yes ☐ No ☐
Extraordinary circumstances Yes ☐ No ☐
Siting/expansion - Treatment, Storage, Disposal facility? Yes ☐ No ☐
Uncontrolled releases of contaminants Yes ☐ No ☐

Reviewed by ENV-ECO NCB staff:

NEPA:	Name	Date	Comment:
Biological Resources:	Name	Date	Comment:
Cultural Resources:	Name	Date	Comment:

Attachment 2: NCB Screening Checklist

Other: Name Date Comment: ____________________

Appendix 1: Modifications to Pit Fabrication

Appendix 1 consists of four memos that explain the modifications to impacts described in the SWEIS as a result of the selection of the Preferred Alternative rather than the Expanded Operations Alternative.

1. Operations Details of Pit Fabrication for the ROD

2. Construction Details of Pit Fabrication for the ROD

3. Pit Fabrication Waste Generation for the ROD

4. SWEIS ROD – Details of Parameters other than Wastes.

Memo

TO: File
FROM: J.C. Del Signore
DATE: 10/04/99
SUBJECT: Operations Details of Pit Fabrication for the ROD

Introduction: The Site-Wide Environmental Impact Statement (SWEIS) examined LANL operations under four alternatives, and quantified the consequences and impacts of each alternative. Subsequently, the Record of Decision (ROD) selected the Expanded Alternative, but limited war reserve pit production to a capacity that can be accommodated within the limited space currently set aside for this activity in the plutonium facility (estimated at nominally 20 war reserve pits per year). This results in a level of production between the levels analyzed by the No Action Alternative (14 war reserve pits per year) and Expanded Alternative (80 war reserve pits per year).

This memo identifies operations related to pit fabrication in the Expanded Alternative and whether they were affected by the restrictions inherent in DOE's ROD. A definition of ROD operations is needed because understanding the ramifications of operations is necessary for making valid comparisons in the SWEIS Yearbook.

Background: Only two of LANL's Key Facilities are affected by the ROD – the Plutonium Complex at TA-55 and the Chemistry and Metallurgical Research (CMR) Building. Information about assumed facility operations is found in two tables:

- Table 3.6.1-1, Alternatives for Continued Operation of TA-55 Plutonium Facility Complex
- Table 3.6.1-5, Alternatives for Continued Operation of the Chemistry and Metallurgical Research Building (TA-3)

Each table presents operations data for each identified facility capability for each of the SWEIS alternatives.

Plutonium Complex Operations: Seven capabilities are identified. There is no difference between the Expanded Alternative and the ROD for four of these -- plutonium stabilization; fabrication of ceramic-based reactor fuels; Pu-238 R&D and applications; and SNM storage, shipping, and receiving. The other three, which are affected, are presented and summarized in the attached Table 1.

CMR Operations: Eight capabilities are identified. There is no difference between the Expanded Alternative and the ROD for five of these – uranium processing; destructive and nondestructive analysis; nonproliferation training; actinide research and processing; and fabrication and metallography. The other three, which are affected, are discussed below and summarized in the attached Table 2.

Analytical chemistry: Table 3.6..1-5 of the SWEIS projects the analysis of approximately 5,200 and 11,000 samples in the No Action and Expanded Alternatives, respectively. Part of the increase in the Expanded Alternative results from increased activities at CMR, and part results from the relocation of some actinide sample analysis workload from the Plutonium Complex. The latter number is tucked away in a memo in the SWEIS files:

White, A. and Loughead, J., 03/05/97. "WMPO Responses to Corey Cruz's Resolution of GRAM Data Questions", ESH-EIS:97-098, Los Alamos, NM.

This memo responds to an item from a data audit by the DOE contractor for the SWEIS, in which the contractor questioned waste quantities projected for the Expanded Alternative at CMR and at the Plutonium Complex. Specifically, the contractor noted that waste projections should be adjusted to reflect the relocation of some analytical support from TA-55 to CMR. In response to the data audit, the memo indicates that the workload to be transferred would be about 4,000 samples annually, and adjusts waste generation estimates accordingly.

Information in the memo allows estimation of the number of samples analyzed at CMR in the ROD via subtraction (since this work would not relocate in the ROD):

11,000 samples per year at CMR in the Expanded Alternative
- 4,000 samples per year remaining at TA-55 for the ROD
7,000 samples per year analyzed at CMR

This projection is an increase from 5,200 samples per year analyzed at the CMR in the No Action Alternative.

Surveillance and disassembly of weapons components: Since this capability does not relocate in the ROD, it would have no activity at the CMR.

Actinide materials and science processing and R&D, Support to hydrodynamic testing and tritium separation activities: Since this capability does not relocate in the ROD, it would have no activity at the CMR.

Attachments

Table 1: Operations at TA-55 Affected by the ROD
Table 2: Operations at CMR Affected by the ROD

cc: D. Garvey ESH-EIS
K. Rea ESH-EIS

Table 1

Operations at TA-55 Affected by the ROD

CAPABILITY	NO ACTION	ROD	EXPANDED OPERATIONS
Manufacturing plutonium components	Production of up to 14 pits/ yr.	Produce nominally 20 pits/yr (requires minor facility modifications).	Produce 50-80 pits/yr (long-term goal requires major facility modifications). Produce 20 pits/yr in intial phase (requires minor facility modifications).
Surveillance and disassembly of weapons components	Pit disassembly: No activity. Pit surveillance: Up to 20 pits/ yr destructively examined and 20 pits/yr nondestructively examined.	Pit disassembly: Up to 65 pits/yr disassembled. Pit surveillance: Up to 40 pits/ yr destructively examined and 20 pits/yr nondestructively examined.	This activity moves to CMR.
Actinide materials and science processing and R&D [a]	Process up to 100 kgs/yr of actinides. Tritium separation: Process 1-2 pits/month (up to 12 pits/yr). Support for hydrodynamic testing.	Process up to 400 kgs/yr of actinides. Tritium separation: Process 1-2 pits/month (up to 12 pits/yr). Support for hydrodynamic testing.	Process up to 400 kgs/yr of actinides. Tritium separation activity moves to CMR. Support for hydrodynamic testing moves to CMR.
Actinide materials and science processing and R&D [a]	Analyze samples in support of actinide R&D and reprocessing.	Analyze samples in support of actinide R&D and reprocessing.	Analyze half as many samples at TA-55. Remaining analyses move to CMR.

a: There a number of sub-activities within this capability. Only two sub-activities would move to CMR, as shown here. For the remaining sub-activities, operations under the ROD are assumed the same as in the Expanded Alternative.

Table 2

Operations at CMR Affected by the ROD

CAPABILITY	NO ACTION	ROD	EXPANDED OPERATIONS
Analytical chemistry	Analyze approximately 5,200 samples/yr.	Analyze approximately 7,000 samples/yr.	Analyze approximately 11,000 samples/yr. Includes actinide sample analysis relocated from TA-55.
Surveillance and disassembly of weapons components			This activity moves from TA-55. Pit disassembly: Up to 65 pits/yr disassembled. Pit surveillance: Up to 40 pits/ yr destructively examined and 20 pits/yr nondestructively examined
Actinide materials and science processing and R&D			Tritium separation activity moves from TA-55. Process 1-2 pits/month (up to 12 pits/yr). Support for hydrodynamic testing moves from TA-55.

Memo

TO: File
FROM: J.C. Del Signore
DATE: 10/01/99

SUBJECT: Construction Details of Pit Fabrication for the ROD

Introduction: The Site-Wide Environmental Impact Statement (SWEIS) examined LANL operations under four alternatives, and quantified the consequences and impacts of each alternative. Subsequently, the Record of Decision (ROD) selected the Expanded Alternative, but limited war reserve pit production to a capacity that can be accommodated within the limited space currently set aside for this activity in the plutonium facility (estimated at nominally 20 war reserve pits per year). This results in a level of production between the levels analyzed by the No Action Alternative (14 war reserve pits per year) and Expanded Alternative (80 war reserve pits per year). In addition, the ROD eliminated several construction activities from the Expanded Alternative.

This memo identifies construction activities in the Expanded Alternative and whether they were affected by the restrictions inherent in DOE's ROD. A definition of ROD construction is needed because understanding the ramifications of not doing these construction projects is necessary in making valid comparisons in the SWEIS Yearbook. (For example, construction wastes are included in SWEIS waste projections.)

Background: The ROD potentially affects projected construction at only two of LANL's Key Facilities – the Plutonium Complex at TA-55 and the Chemistry and Metallurgical Research (CMR) Building at TA-03. Information about assumed facility construction and modifications is found in the following locations for these two facilities:

For the Plutonium Complex:

- SWEIS Section 3.1.1, pages 3-5 and 3-6, which describes the No Action Alternative.
- SWEIS Section 3.2.1, pages 3-17 and 3-18, which describes the Expanded Alternative.
- SWEIS Section II.2.1.1, pages II-9 and II-10, which equates the Expanded Alternative to use of the CMR Building for some plutonium operations and describes three phases to modification of the Plutonium Complex.

For CMR:

- SWEIS Section 2.2.2.3, pages 2-38 through 2-46, which details facility modifications.
- SWEIS Section 3.1.3, page 3-7, which describes the Expanded Alternative.
- SWEIS Section 3.2.3, pages 3-19 and 3-20, which describes the Expanded Alternative.

Plutonium Complex Construction: The SWEIS identifies seven facility construction projects, all of which take place in the Expanded Alternative, but only some of which occur in the No Action Alternative. The task, therefore, is to identify which occur in ROD, but not in the Expanded Alternative. The seven are discussed below:

(a) Renovation of NMSF: Page 3-5 states that "The NMSF renovation is included in all alternatives" Footnote "a" on Page 3-73 echoes this.

(b) Phase 1: Page II-9 defines this as action "to support continued pit manufacturing at the existing capacity of about 14 pits per year (this is part of all SWEIS alternatives). This is echoed on Page 3-6.

(c) Phase 2: Page II-9 defines this as refurbishment for long-term viability of the facility in support of all missions... By completion of the second phase, it is expected that an intermediate pit manufacturing capability of 20 pits per year would be achieved.." This appears no where else in the SWEIS.

(d) Phase 3: Page II-9 defines this as "..transfer of activities to the CMR Building, followed by modification of TA-55-4 to provide for pit manufacturing at TA-55-4 as described above [for 80 pits per year]."

(e) Dedicated transportation corridor: Page II-10 states that a restricted-access road would be constructed under the Expanded Alternative. It also states "This road would not be constructed for the 20 pits per year rate."

(f) Relocation of Processes to CMR: This is the basis of the Expanded Alternative. Footnotes "b" on Pages 3-73 and 3-81 stipulate that five activities would be relocated to CMR in the Expanded Alternative – pit disassembly, pit surveillance, actinide R&D, and hydrodynamic testing support, and tritium separations.

(g) New Office Building: Page II-9 states that this new building would be needed at the level of 80 pits per year. The SWEIS is silent on whether the building is constructed for the No action Alternative.

Examination of this information leaves the timing of only one construction project uncertain – a new office building. The attachment to this memo summarizes construction information by alternative.

CMR Building Construction: The SWEIS identifies six facility construction projects, all of which take place in the Expanded Alternative, but only some of which occur in the No Action Alternative. The task, therefore, is to identify which occur in ROD, but not in the Expanded Alternative. (Note: Only one of the six are related to pit production). The six are discussed below:

(a) Medical Radioisotope Target Fabrication: Page 3-7 states that this is one of four construction or facility modification projects that are "included in all alternatives."

(b) Radioactive Source Recovery Program: Page 3-7 states that this is one of four construction or facility modification projects that are "included in all alternatives."

(c) Phase I Upgrades: Page 2-40 describes these as upgrades essential to maintain minimum safe operating conditions for 5-10 years. These are not intended to prolong the life of the facility, and are not intended to introduce new capabilities. Page 3-7 states that this is one of four construction or facility modification projects that are "included in all alternatives." Details of this project, along with its status as of March 1998, appear on Page 2-41.

(d) Phase II Upgrades: Page 2-41 describes these as upgrades essential to maintain minimum safe operating conditions for 25-40 years. These are not intended to introduce new capabilities. Page 3-7 states that this is one of four construction or facility modification projects that are "included in all alternatives." Page 2-45 amends this declaration, however, by stating that "DOE has decided not to implement the seismic upgrades as part of the CMR Building Upgrades Project, Phase II."

(e) Relocation of Processes to CMR: This is the basis of the Expanded Alternative. Footnotes "b" on Pages 3-73 and 3-81 stipulate that five activities would be relocated to CMR in the Expanded Alternative – pit disassembly, pit surveillance, sample analysis in support of actinide R&D and processing, and tritium separations in support of hydrodynamic testing. This is echoed on Page 3-20.

(f) Hot Cell Modifications: Page 3-20 states that the hot cells would be modified in the Expanded Alternative to provide for the safety testing of pits in a high temperature environment. These changes would place a glovebox and furnace into one of the hot cells.

Examination of this information leaves only one construction project, hot cell modifications, uncertain for the ROD. The attachment to this memo summarizes construction information by alternative.

References:

DOE, September 1996. "Final Programmatic Environmental Impact statement for Stockpile Stewardship and Management", DOE/EIS-0236, Washington, DC.

DOE, January 1999. "Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory", DOE/EIS-0238, Albuquerque, NM.

DOE, 08/30/99. "Record of Decision: Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory in the state of New Mexico", ...

Attachment

cc: D. Garvey, ESH-EIS
K.H. Rea, ESH-EIS

Construction Related to Pit Fabrication Facilities

Component	No Action Alternative	ROD	Expanded Alternative
Production	14 pits/yr	20 pits/yr [a]	80 pits/yr
Plutonium Complex:			
Renovation of NMSF	Yes	Yes	Yes
PF-4 modifications:			
Phase 1	Yes	Yes	Yes
Phase 2	No	Yes	Yes
Phase 3	No	No	Yes
Dedicated transportation corridor	No	No	Yes
Relocation of processes to CMR	No	No	Yes
New Office Building	[b]	Yes [c]	Yes
CMR:			
Medical radioisotope target fabrication	Yes	Yes	Yes
Radioactive source recovery program	Yes	Yes	Yes
Phase I upgrades	Yes	Yes	Yes
Phase II upgrades [d]	Yes	Yes	Yes
Relocation of processes to CMR	No	No	Yes
Hot cell modifications	No	Yes [e]	Yes

Notes:

a: Nominally
b: Uncertain / Not specified in the SWEIS.
c: Assumed, since intent is to establish capability of 80 pits per year after 2005.
d: All except seismic upgrades.
e: Assumed, since hot cells not available at TA-55.

Memo

TO: File
FROM: J.C. Del Signore
DATE: 10/05/99
SUBJECT: Pit Fabrication Waste Generation for the ROD

1. Introduction: The Site-Wide Environmental Impact Statement (SWEIS) examined LANL operations under four alternatives, and quantified the consequences and impacts of each alternative. Subsequently, the Record of Decision (ROD) selected the Expanded Alternative, but limited war reserve pit production to a capacity that can be accommodated within the limited space currently set aside for this activity in the plutonium facility (estimated at nominally 20 war reserve pits per year). This results in a level of production between the levels analyzed by the No Action Alternative (14 war reserve pits per year) and Expanded Alternative (80 war reserve pits per year).

This memo identifies wastes related to pit fabrication in the Expanded Alternative and whether they were affected by the restrictions inherent in DOE's ROD. Clearly quantified waste estimates are necessary for making valid comparisons in the SWEIS Yearbook.

2. Summary: Information about waste generation is found in three locations – the SWEIS (DOE, January 1999), the SSM PEIS (DOE, September 1996), and responses to a DOE data audit during preparation of the SWEIS (Garvey, 03/28/97). Thorough review of the three shows differences in wastes related to pit fabrication, and pit fabrication waste quantities can only be estimated by choosing from the available data.

Only two of LANL's Key Facilities are affected by the ROD – the Plutonium Complex at TA-55 and the Chemistry and Metallurgical Research (CMR) Building. To obtain ROD waste estimates for these facilities, one starts with waste quantities projected for the Expanded Alternative, and adjusts them to account for differences between the ROD (or Preferred Alternative) and the Expanded Alternative. For TA-55, adjustments consist of construction wastes (a subtraction), pit fabrication at lower levels (a subtraction), and production wastes from processes that are not relocated to CMR (an addition). For CMR, adjustments consist only of production wastes from processes not relocated to CMR (a subtraction).

Determination of waste volumes for the Expanded Alternative appear in the attached Table 1. Adjustments, and determination of waste volumes for the ROD or Preferred Alternative are summarized in Tables 3 through 5 for TA-55, CMR, and LANL. Table 2 summarizes waste projections under the ROD. The largest adjustments, as a percentage of total wastes, are for TRU wastes (1,339 fewer cubic meters in the Preferred Alternative) and for mixed TRU wastes (-358 cubic meters). This is as expected, given reduced pit fabrication and diminished construction and construction wastes. Details appear in the following sections.

3. Waste Estimates for the Expanded Alternative

Table 5.3.9.3-1 on page 5-129 of the SWEIS is entitled "Projected Annual and 10-Year Total Waste Generation Under the Expanded Operations Alternative". However, these waste volumes must be adjusted by a sentence on page 5-128 of the SWEIS:

> "In addition to the volumes reflected in Table 5.3.9.3-1, the "CMR Building Use" Alternative, discussed in the PSSC Analysis for Enhancement of Plutonium Pit Manufacturing Operations (volume II, part II), would generate an additional ... waste during construction activity"

Accordingly, Expanded Alternative waste projections can only be obtained by adding volumes from Table 5.3.9.3-1 and volumes, which are found on page II-27, from Part II of the SWEIS. This math is performed in the attached Table 1.

Waste quantities for the Expanded Alternative then serve as the starting point for estimating waste quantities for the ROD. Three adjustments must be made to the Expanded Alternative quantities: construction not performed under the ROD (Section 4), pit fabrication wastes not generated under the ROD (Section 5), and adjustments for operating wastes from processes not relocated to CMR (Section 6).

4. Construction Wastes Related to Pit Fabrication

4.1 Choosing Construction Waste Quantities Estimates of construction wastes are presented in three places in the SWEIS and also in the PEIS. Only two of the four sets of data agree, however, so that one must choose which set of volumes to use. Within the SWEIS, Estimates of construction wastes for the "CMR Building Use" alternative, which is the SWEIS Expanded Alternative, appear in three locations, as follows:

	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
page 3-68	1306	31	426	288
page 5-128	1193	31	427	288
page II-27	1306	31	426	288

The PEIS provides different estimates of construction wastes. Construction assumed in the PEIS, however, appears to differ from that described in the SWEIS, which might help explain the differences. Accordingly, we are left to select from the three SWEIS estimates. The two sets that match, from pages 3-68 and II-27 of the SWEIS, are the obvious choice to be used for the Expanded Alternative.

Page II-27 of the SWEIS provides two other pieces of information. It states that solid wastes, RCRA wastes, TSCA wastes, and sewage would be generated, but provides no estimates for these four waste types. This information cannot be used since it is qualitative. Page II-27 also identifies where the radioactive construction wastes would be generated, however:

	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
TA-55	229	0	229	0
CMR	1077	31	197	288
Total	1306	31	426	288

This second piece of information is, indeed, needed for determining waste volumes by facility.

4.2 CMR Construction Wastes At CMR, wastes related to pit fabrication can only result from the relocation of processes from TA-55 to CMR. As listed above, these quantities are identified on Page II-27 of the SWEIS: 1077 cubic meters of LLW, 31 m^3 MLLW, 197 m^3 TRU wastes, and 288 m^3 MTRU waste. Since processes are not relocated to CMR in the ROD, these waste quantities would not be generated under the ROD, and these quantities must be subtracted from estimates of waste quantities in the Expanded Alternative.

4.3 TA-55 Construction Wastes Construction wastes at TA-55 are not identified for the ROD. As a result, a set of assumptions is needed in order to arrive at an estimate of construction wastes for the Preferred Alternative. Page 5-128 of the SWEIS provides the only guidance for estimating construction wastes under the ROD, by stating:

> “Under the Preferred Alternative, at the 20 pits per year rate, a fraction of the waste generation projected for the PSSC “CMR Building Use” Alternative would be incurred; this is a small portion of the totals generated for each of these waste types, so impacts would not be different for construction to achieve this lower rate.”

Nowhere, however, does the SWEIS quantify the fraction. It is necessary, therefore, to make some assumptions. A comparison of the Expanded Alternative and the ROD (Del Signore, 10/01/99) shows the following:

- Four of seven construction projects proceed in both the Expanded and Preferred alternatives – renovation of NMSF, Phase 1 and Phase 2 modifications to PF-4, and construction of a new office building.

- Three of seven construction projects proceed in the Expanded Alternative, but not in the ROD – Phase 3 modifications to PF-4, dedicated transportation corridor, and the relocation of processes to CMR.

This information can be coupled with the following assumptions:

(a) Radioactive wastes are not generated by the office building or the dedicated transportation corridor construction projects.
(b) The relocation of process equipment to CMR generates little rad waste (which is echoed on Page 3-69 of the SWEIS). For simplicity, this volume is also set to zero.
(c) Since the NMSF has not been used, its renovation will also not generate rad wastes.
(d) Phase 3 modifications to PF-4 will be more extensive than either Phase 1 or 2 modifications, since Phase 3 jumps capacity from 20 to 80 pits per year. This project, therefore, accounts for 50% of construction wastes.
(e) Without knowledge of construction activities, it is assumed that the remaining projects generate equivalent waste quantities.

This set of assumptions is summarized as follows:

	% of TA-55 wastes	Assumed for the ROD?
New office Bldg.	Zero	Yes
Renovate NMSF	Zero	Yes
PF-4, Phase 1	25	Yes
PF-4, Phase 2	25	Yes
PF-4, Phase 3	50	No
Dedicated road	Zero	No
Relocate processes	Zero	No

This coupling of information and assumptions leads to the conclusion that the Expanded Alternative generates 100% of quantities on Page II-27 of the SWEIS, and that the ROD generates only half of this amount. Specifically:

Waste	Units	ROD	Expanded
LLW	m^3	115	229
MLLW	m^3	0	0
TRU	m^3	115	229
MTRU	m^3	0	0

5. Operating Wastes for Pit Fabrication

The SWEIS and the PEIS both estimate wastes from pit fabrication at the rate of 80 pits per year (i.e., the Expanded Alternative). The SWEIS also projects wastes at 20 pits per year (i.e., the

ROD or Preferred Alternative). A summary, in cubic meters per year except where noted, appears in the below table.

To be consistent with the SWEIS, it will be assumed that operating wastes resulting from pit

Waste Type	PEIS (80/yr)	SWEIS (p. 3-69)	SWEIS (p. 5-128)
Chemical	2	<43,000 kgs/yr [a]	little [b]
LLW	386	<142 [a]	little [b]
MLLW	0	<5 [a]	little [b]
MTRU	2	<2 [a]	little [b]
TRU (80 pits/yr)	43	100	100
TRU (20 pits/yr)	---	15	15

(a) Less than 5% of historical wastes, as defined in Table 4.9.3.3-1, page 4-188.
(b) "Pit production operations contribute little to waste generation with the exception of TRU waste generation"

fabrication in the Preferred Alternative (nominally, 20 pits per year) will be the same as operating wastes resulting from pit fabrication in the Expanded Alternative (80 pits per year) – except for TRU wastes. For TRU wastes, there are 85 cubic meters per year fewer under the ROD, or 850 cubic meters for the ten-year SWEIS timeframe.

6. Operating Wastes for Processes Relocated to CMR

Footnotes to Tables 3.6.1-1, "Alternatives for Continued Operation of TA-55 Plutonium Facility Complex" and 3.6.1-5, "Alternatives for Continued Operation of the chemistry and Metallurgy Research Building (TA-3)", state that the Expanded Alternative assumes the relocation of four processes from TA-55 to CMR – pit disassembly, pit surveillance, actinide R&D (specifically, sample analysis), and actinide R&D (specifically, tritium separation and support for hydrodynamic testing). Information about waste quantities from the operation of each of these processes is found in responses to a data audit performed by a DOE contractor (Garvey, 03/2/97). Specific waste generation estimates for these relocation processes are provided in attachments to this response letter:

- For the relocation of pit disassembly, Attachment 51 added the following to projected waste quantities (ten-year totals) for CMR for the Expanded Alternative: 3.9 cubic meters of LLW and 0.07 cubic meters of TRU waste. The Attachment further specifies that these amounts were also subtracted from projections of TA-55 wastes for the Expanded Alternative.

- For the relocation of pit surveillance, Attachment 52 added the following to projected waste quantities (ten-year totals) for CMR for the Expanded Alternative: 420 kilograms of chemical wastes, 18 cubic meters of LLW, 0.3 cubic meter of MLLW, and 8.0 cubic meters of TRU waste. The Attachment further specifies that these amounts were also subtracted from projections of TA-55 wastes for the Expanded Alternative.

- For the relocation of sample analysis, Attachment 38 added the following to projected waste quantities (ten-year totals) for CMR for the Expanded Alternative: 3300 kilograms of chemical wastes, 390 cubic meters of LLW, 4.6 cubic meters of MLLW, 7.4 cubic meters of TRU waste, and 3.3 cubic meters of MTRU waste. The Attachment also specifies that these amounts were not subtracted from projections of TA-55 wastes for the Expanded Alternative.

- For the relocation of tritium separation and support for hydrodynamic testing, Attachment 55 added the following to projected waste quantities (ten-year totals) for CMR for the Expanded Alternative: 210 kilograms of chemical waste, 3.9 cubic meters of LLW, 0.07 cubic meter of MLLW, and 0.65 cubic meter of TRU waste. The Attachment further specifies that these amounts were also subtracted from projections of TA-55 wastes for the Expanded Alternative.

- For the relocation of tritium separation and support for hydrodynamic testing, Attachment 56 added the following to projected waste quantities (ten-year totals) for CMR for the Expanded Alternative: 170 cubic meters of TRU waste and 67 cubic meters of MTRU waste. The Attachment further specifies that these amounts were not subtracted from projections of TA-55 wastes for the Expanded Alternative.

In order to obtain estimates for the ROD, therefore, the appropriate additions and subtractions are made to projections for Expanded Alternative, as detailed in Tables 3 and 4.

References:

Del Signore, J.C., 10/01/99. "Construction Details of Pit Fabrication for the ROD", memo to file, Los Alamos Technical Associates, Inc., Los Alamos, NM.

DOE, September 1996. "Final Programmatic Environmental Impact statement for Stockpile Stewardship and Management", DOE/EIS-0236, Washington, DC.

DOE, January 1999. "Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory", DOE/EIS-0238, Albuquerque, NM.

Garvey, Doris, 03/28/97. "Your Letter to Don Silva of 2/6/97 regarding comparative Review of Key Parameter Data Packages & Alternatives Documents", ESH-EIS:97-127, Los Alamos, NM.

Attachments:

Table 1 – Waste Generation in the Expanded Alternative
Table 2 – Waste Generation in the ROD, or Preferred Alternative
Table 3 – Plutonium Complex Waste Projections for the ROD
Table 4 – CMR Waste Projections for the ROD
Table 5 – LANL Waste Projections for the ROD

cc: D. Garvey ESH-EIS
K. Rea ESH-EIS

Table 1

Waste Generation[a] in the Expanded Alternative

Projection or Adjustment	Chemical	LLW	MLLW	TRU	MTRU
p. 5-129: [b]					
TA-55	83,400	7,400	130	3,100	1,020
CMR	112,000	18,600	196	466	204
LANL	32,493,000	122,600 [c]	6,330	4,250	1,220
p. II-27: [d]					
TA-55	0	229	0	229	0
CMR	0	1,077	31	197	288
LANL	0	1,306	31	426	288
Expanded: [e]					
TA-55	83,400	7,630	130	3,330	1,020
CMR	112,000	19,700	227	663	492
LANL	32,493,000	123,900	6,360	4,680	1,510

a: All quantities are ten-year totals.
b: From Table 5.3.9.3-1, page 5-129, of the SWEIS.
c: Table 5.3.9.3-1 has a math error, and reports this as 122,400.
d: Page 5-128 states that wastes from construction related to pit fabrication are in addition to quantities in Table 5.3.9.3-1 on page 5-129.
e: By addition, with numbers rounded.

Table 2

Waste Generation[a] in the ROD, or Preferred Alternative

	Chemical (kgs)	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
TA-55 [b]	84,000	7,540	130	2,370	1,020
CMR [b]	108,000	18,200	191	280	134
LANL Totals [b]	32,490,000	122,300	6,320	3,340	1,150

a: All quantities are ten-year totals.
b: Using assumptions and calculations above, as summarized in Tables 3, 4 and 5.

Table 3

Plutonium Complex Waste Projections[a] For the ROD

Projection or Adjustment	Chemical (kgs)	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
SWEIS Table 5.3.9.3-1 [b]	83,400	7,400	130	3,100	1,020
Construction [c,d]	0	229	0	229	0
Expanded Alternative	83,400	7,630	130	3,330	1,020
Adjustments: [e]					
Construction [f]	0	-115	0	-115	0
Pit fabrication [f]	0	0	0	-850	0
Ops. not relocated:					
A51 [g]	0	+4	+0.07	0	0
A52 [h]	+420	+18	+0.32	+8	0
A55 [i]	+210	+4	+0.07	+1	0
Subtotal	+630	+26	+0	+9	0
Total adjustments	+630	-91	+0	-956	0
ROD [j]	84,000	7,540	130	2,370	1,020

Notes:

(a) All waste quantities are ten-year totals.
(b) Per Table 5.3.9.3-1, page 5-129, of the SWEIS.
(c) Page 5-128 of the SWEIS states that these are in addition to quantities in Table 5.3.9.3-1.
(d) Quantities from Table II.4.1.8-1, page II-27 of the SWEIS.
(e) Fabricate only 20 pits per year, not 80.
(f) Per discussion above.
(g) Attachment 51: Relocate pit disassembly to CMR
(h) Attachment 52: Relocate pit surveillance to CMR
(i) Attachment 55: Relocate Plutonium R&D to CMR
(j) Rounded

Table 4

CMR Waste Projections[a] For the ROD

Projection or Adjustment	Chemical (kgs)	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
Expanded Alternative [b]	112,000	18,600	196	466	204
Construction [c,d]	0	1,077	31	197	288
Expanded Alternative	112,000	19,680	227	663	492
Adjustments: [e]					
Construction [f]	0	-1,077	-31	-197	-288
Pit fabrication [g]	0	0	0	0	0
Ops. not relocated					
A38 [h]	-3,300	-390	-4.6	-7.4	-3.3
A51 [i]	0	-4	-0.1	0	0
A52 [j]	-420	-18	-0.3	-8.0	0
A55 [k]	-210	-4	-0.1	-0.7	0
A56 [l]	0	0	0	-170	-67
Subtotal	-3,930	-416	-5	-186	-70
Total adjustments	-3,930	-1493	-36	-383	-358
ROD [m]	108,000	18,200	191	280	134

Notes:

(a) All waste quantities are ten-year totals.
(b) Per Table 5.3.9.3-1, page 5-129, of the SWEIS.
(c) Page 5-128 of the SWEIS states that these are in addition to quantities in Table 5.3.9.3-1.
(d) Quantities from Table II.4.1.8-1, page II-27 of the SWEIS.
(e) Fabricate only 20 pits per year, not 80.
(f) Per discussion above.
(g) Pit fabrication does not occur at CMR under any alternative.
(h) Attachment 38: Relocate analytical chemistry from TA-55
(i) Attachment 51: Relocate pit disassembly to CMR
(j) Attachment 52: Relocate pit surveillance to CMR
(k) Attachment 55: Relocate Plutonium R&D to CMR
(l) Attachment 56: Relocate Actinide Processing and Recovery to CMR
(m) Rounded

Table 5

LANL Waste Projections[a] For the ROD

Projection or Adjustment	Chemical (kgs)	LLW (m^3)	MLLW (m^3)	TRU (m^3)	MTRU (m^3)
Expanded Alternative [b]	32,493,000	122,600	6,330	4,250	1,220
Construction [c,d]	0	1,306	31	426	288
Expanded Alternative	32,493,000	123,900	6,360	4,680	1,510
Adjustments: [e]					
Construction [f]	0	-1,192	-31	-312	-288
Pit fabrication [g]	0	0	0	-850	0
Ops. not relocated					
A38 [h]	-3,300	-390	-4.6	-7.4	-3.3
A51 [i]	0	0	0	0	0
A52 [j]	0	0	0	0	0
A55 [k]	0	0	0	0	0
A56 [l]	0	0	0	-170	-67
Subtotal	-3,300	-390	-5	-177	-70
Total adjustments	-3,300	-1,582	-36	-1,339	-358
ROD [m]	32,490,000	122,300	6,320	3,340	1,150

Notes:

(a) All waste quantities are ten-year totals.
(b) Per Table 5.3.9.3-1, page 5-129, of the SWEIS.
(c) Page 5-128 of the SWEIS states that these are in addition to quantities in Table 5.3.9.3-1.
(d) Quantities from Table II.4.1.8-1, page II-27 of the SWEIS.
(e) Fabricate only 20 pits per year, not 80.
(f) Per discussion above.
(g) Pit fabrication does not occur at CMR under any alternative.
(h) Attachment 38: Relocate analytical chemistry from TA-55
(i) Attachment 51: Relocate pit disassembly to CMR
(j) Attachment 52: Relocate pit surveillance to CMR
(k) Attachment 55: Relocate Plutonium R&D to CMR
(l) Attachment 56: Relocate Actinide Processing and Recovery to CMR
(m) Rounded

Memo

TO: File
FROM: J.C. Del Signore
DATE: 10/06/99
SUBJECT: SWEIS ROD -- Details of Parameters Other Than Wastes

Introduction: The Site-Wide Environmental Impact Statement (SWEIS) examined LANL operations under four alternatives, and quantified the consequences and impacts of each alternative. Subsequently, the Record of Decision (ROD) selected the Expanded Alternative, but limited war reserve pit production to a capacity that can be accommodated within the limited space currently set aside for this activity in the plutonium facility (estimated at nominally 20 war reserve pits per year). This results in a level of production between the levels analyzed by the No Action Alternative (14 war reserve pits per year) and Expanded Alternative (80 war reserve pits per year). In addition, the ROD eliminated several construction activities from the Expanded Alternative.

This memo identifies the consequences of pit fabrication, other than solid wastes, in the Expanded Alternative, and whether they were affected by the restrictions inherent in DOE's ROD. A definition of ROD consequences is needed because annual operations are to be compared to the environmental envelope inherent in the ROD.

Background: Only two of LANL's Key Facilities are affected by the ROD – the Plutonium Complex at TA-55 and the Chemistry and Metallurgical Research (CMR) Building. Information about assumed facility consequences is found in two tables, each of which presents data for each of the SWEIS alternatives:

- Table 3.6.1-2, Parameter Differences Among Alternatives for Continued Operation of TA-55 Plutonium Facility Complex
- Table 3.6.1-6, Parameter Differences Among Alternatives for Continued Operation of the Chemistry and Metallurgical Research Building (TA-3)

Each table presents data on radioactive air emissions, NPDES discharges, wastes, number of workers, and contaminated space. Wastes have been discussed separately (Del Signore, 10/05/99), and not further discussed in this memo. Contaminated space is not being carried forward for comparison in the Yearbook, and thus are also not discussed in this memo.

Plutonium Complex:

Rad Air: Projections are summarized in the below table. Plutonium emissions in the ROD are conservatively assumed to approximate those in the Expanded Alternative because all operations except pit fabrication occur at Expanded levels of activity. Tritium emissions are assumed to be

Isotope	Units	No Action	Expanded	ROD
Pu-239	C_i/yr	1.7 x 10^{-5}	2.7 x 10^{-5}	2.7 x 10^{-5}
Tritium in water vapor	C_i/yr	7.5 x 10^{2}	7.5 x 10^{1}	7.5 x 10^{2}
Tritium as a gas	C_i/yr	2.5 x 10^{2}	2.5 x 10^{1}	2.5 x 10^{2}

the same as in the No Action Alternative for TA-55, and the same as in the Expanded Alternative for CMR, because tritium separation activities will not relocate from TA-55 to CMR in the ROD alternative.

NPDES Discharge: The Plutonium Complex has but one discharge point, Outfall 03A-181. Discharge quantities are projected to be 14 million gallons per year for all SWEIS alternatives. Discharges are therefore also projected to 14 MGY for the ROD alternative.

Workforce: Totals of 735 and 1,111 are projected for the No Action and Expanded Alternatives, respectively. The SWEIS, page 5-125, indicates that 260 of the 1,111 FTEs in the Expanded Alternative are required for pit fabrication, but that this figure would decrease to about 100 FTEs for the Preferred Alternative or ROD. This loss of 160 FTEs under the ROD, however, is assumed to be offset by the retention at TA-55 of five processes that would relocate to CMR in the Expanded Alternative. (The five processes: pit disassembly, pit surveillance, sample analysis, tritium separation, and support for hydrodynamic testing.) Accordingly, TA-55 workforce in the Preferred Alternative is assumed to approximate that in the Expanded Alternative.

CMR Data:

Rad Air: Projections are summarized in the below table.

Isotope	Units	No Action	Expanded	ROD
Total actinides	C_i/yr	4.20 x 10^{-4}	7.6 x 10^{-4}	7.6 x 10^{-4}
Krypton-85	C_i/yr	None	1.00 x 10^{2}	1.00 x 10^{2}
Xenon-131m	C_i/yr	None	4.5 x 10^{1}	4.5 x 10^{1}
Xenon-133	C_i/yr	None	1.5 x 10^{3}	1.5 x 10^{3}
Tritium in water vapor	C_i/yr	Negligible	7.5 x 10^{2}	Negligible
Tritium as a gas	C_i/yr	Negligible	2.5 x 10^{2}	Negligible

Actinide emissions in the ROD would likely be lower than projected for the Expanded Alternative because of the processes that would not relocate to CMR from TA-55. Since emissions are quite small, however, ROD emissions are set equal to Expanded emissions, which presents a bounding projection. Krypton and xenon emissions are from the hot cell. Activity levels would be the same in both the ROD and Expanded Alternatives, so that ROD emissions are equated to Expanded emissions. Tritium emissions, in contrast, result from the tritium separation process. Since this process would not be relocated to CMR in the ROD alternative, ROD emissions are assumed equal to No Action emissions.

NPDES Discharge: CMR has but one discharge point, Outfall 03A-021. Discharge quantities are projected to be 0.53 million gallon per year for all SWEIS alternatives. Discharges are therefore also projected to 0.53 MGY for the ROD alternative.

Workforce: Totals of 329 and 527 are projected for the No Action and Expanded Alternatives, respectively. As explained above, five processes do not relocate to CMR under the Preferred Alternative. These five are assumed to require a workforce of 160 FTEs. By subtraction, therefore, workforce for the Preferred Alternative is assumed to be 527 minus 160, or 367 FTEs.

References

Del Signore, J.C., 10/05/99. “Pit Fabrication Waste Generation for the ROD”, memo to file, Los Alamos Technical Associates, Inc., Los Alamos, NM.

DOE, January 1999. “Site-Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory”, DOE/EIS-0238, Albuquerque, NM.

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