EIS

From: John Isaacson [isaacson@lanl.gov]
Sent: Tuesday, June 07, 2005 7:00 PM
To: KIRK.W.OWENS@saic.com
Cc: ewithers@doeal.gov; torig@lanl.gov; sradz@lanl.gov; janecky@lanl.gov; hld@lanl.gov
Subject: TA-55 Plutonium Facilities

Attachments: 1_TA-55_rough_cut.doc

1_TA-55_rough_cut .doc (536 KB)...

Kirk, attached is a first cut at the TA-55 Plutonium Facilities NEPA Determination Document revisions. Since we received this, we have had some new guidance from NA-26 regarding MOX production and this will change the numbers somewhat. We should have a newly revised version by the middle of the month. So this is sort of a place holder, but it might be somewhat useful.

Thanks, JI
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John Isaacson
S-SWEIS Project Leader
ENV Division M887
(505) 667-2276 (phone)
(505) 667-0731 (fax)

LA-UR-01-3040

Title: ESH-20 NEPA Determination Document 1
Plutonium Complex (TA-55)

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 Plutonium Complex or Technical Area (TA) 55, a key facility in the *Site-Wide Environmental Impact Statement for the Continued Operation of Los Alamos National Laboratory* (SWEIS; DOE 1999a). 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 TA-55 operates within the bounds of the impacts projected by the SWEIS, the facility is in compliance with NEPA. If there is potential to exceed projected impacts, further NEPA review would be required.

Table 1. Principal Buildings and Structures of the Plutonium Facility Complex (TA-55)

Technical Area	Principal Buildings And Structures
TA-55	Offices, Laboratories: 55–1, 2, 3, 20, 39, 66 107, 110, 114, 124, 135, 136, 137, 138, 139, 144, 145, 177, 264, 313 Fire Safe Storage Building: 55-314 Plutonium Building: 55–4 Warehouse: 55–5 Calcium Building: 55–7 Materials Control and Accountability Support Building: 55–28 Training Center: 55–39 Nuclear Materials Storage Facility: 55–41 ?? Process Support Building: 55–42 Assessment Buildings: 55–43, 142 Generator Building: 55–47 Storage Building: 55–185

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 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 levels for that capability as shown in Table 2, the reviewer could determine that the proposed activity is covered by the SWEIS and does not require further NEPA analysis.

Table 2. Plutonium Complex[a]

Capability	Operations Levels
1. Plutonium Stabilization	1.1 Recover, process, and store the existing plutonium inventory in 8 years.
2. Manufacturing Pit Components	2.1 Produce nominally 50 war reserve pits per year. Requires minor facility modifications.[b]
3. Surveillance and Disassembly of Weapons Components	3.1 Pit disassembly, surveillance and examination: Up to 65 pits/yr
4. Actinide Materials and Science Processing, Research, and Development	4.1 Develop production disassembly capacity. 4.2 Process up to 500? pits/yr, including a total of 250 pits (over 4 years) as part of disposition demonstration activities.?? 4.3 Process neutron sources up to 5000 Ci/yr. Process neutron sources other than sealed sources. 4.4 Process up to 600 kg/yr of actinides.[c] 4.5 Provide support for dynamic experiments. 4.6 Process 1 to 2 pits/month (up to 12 pits/yr) through tritium separation. 4.7 Perform decontamination of 28 to 48 uranium components per month. 4.8 Research in support of DOE actinide cleanup activities. Stabilize minor quantities of specialty items. Research and development on actinide processing and waste activities at DOE sites. 4.9 Conduct plutonium research and development and support. Prepare, measure, and characterize samples for fundamental research and development in areas such as aging, welding and bonding, coatings, and fire resistance. 4.10 Fabricate and study nuclear fuels used in terrestrial and space reactors. Fabricate and study prototype fuel for lead test assemblies. 4.11 Develop safeguards instrumentation for plutonium assay. 4.12 Analyze samples in support of actinide reprocessing and research and development activities.
5. Fabrication of Ceramic-based Reactor Fuels	5.1 Build mixed oxide test reactor fuel assemblies and continue research and development on fuels.
6. Plutonium-238 Research, Development, and Applications	6.1 Process, evaluate, and test up to 25 kg/yr plutonium-238 to support space and terrestrial uses. Recycle residues and blend up to 18 kg/yr plutonium-238.
7. Special Nuclear Materials (SNM) Storage, Shipping, and Receiving	7.1 Continue to store working inventory in the vault in Building 55-4; ship and receive as needed to support LANL activities. 7.2 Conduct nondestructive assay on SNM at TA-55-4 to identify and verify the content of stored containers.

a: Source: Modified from SWEIS 1998 Yearbook (LANL 1999c). Data is based on SWEIS Record of Decision (DOE 1999b).
b: Includes construction of new technical support office building, and upgrades to enable the production of nominally 50 war reserve pits per year.
c: The actinide activities at the Chemistry and Metallurgy Research Building and at TA-55 are expected to total 600 kg/yr. The future split between these two facilities is not known, so the facility-specific impacts at each facility are conservatively analyzed at this maximum amount. Waste projections that are not specific to the facility (but are related directly to the activities themselves) are only projected for the total of 600 kg/yr. Is this true for CMR or should we drop this?

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 levels” 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 envelope 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 one of the levels for a capability and still be within the parameter limits for the facility. If the ESH-20 reviewer can demonstrate this, the proposal would still have NEPA coverage through the SWEIS. This document presents the procedure for this more detailed review and supporting information from the SWEIS and background documents.

2.0 Procedure

A proposed project can be screened by the Facility NCB reviewer or ESH-20 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 associated operations examples, it will be referred to ESH-20 for review under this procedure, which requires more familiarity with SWEIS supporting documentation and projected additive impacts of other proposed work at LANL. The ESH-20 reviewer will use the data on TA-55 facilities and capabilities from the SWEIS document and the background documentation. The supporting documentation on the TA-55 facilities and capabilities is presented in Sections 3 and 4 below.

A flow chart that summarizes the procedure for the ESH-20 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 TA-55 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 the operations levels 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.
4. ESH-20 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.

Table 3. TA-55 Operations Data

Parameter	Units [a]	SWEIS ROD
Radioactive Air Emissions:		
• Plutonium-239[b]	Ci/yr	2.70×10^{-5}
• Tritium in Water Vapor	Ci/yr	$7.50 \times 10^{+2}$
• Tritium as a Gas	Ci/yr	$2.50 \times 10^{+2}$
NPDES Discharge:[c]		
• 03A–181	MGY	14
Wastes:		
• Chemical	kg/yr	8400
• Low-level waste	m^3/yr	754[d]
• Mixed low-level waste	m^3/yr	13[d]
• Transuranic waste	m^3/yr	237[d]
• Mixed transuranic waste	m^3/yr	102[d]
		Bob and Andy to help here

Source: Modified from SWEIS 1998 Yearbook (LANL 1999c)
a: Ci/yr = curies per year; MGY = million gallons per year; FTEs = full-time equivalent workers.
b: Projections for the SWEIS ROD were reported as plutonium or plutonium-239, the primary material at TA-55.
c: NPDES is National Pollutant Discharge Elimination System.
d: Includes estimates of waste generated by the facility upgrades associated with pit fabrication.

3.0 SWEIS Data for TA-55

This section provides the information from the SWEIS. Section 3.1 is a description of TA-55 facilities from Chapter 2 of the SWEIS. Section 3.2 is a description of the traditional capabilities at TA-55, while Section 3.3 is a description of the capabilities under the Record of Decision.

3.1 SWEIS Description of Facilities

The facilities at TA-55 are located on a 40-acre (16-hectare) site about 1 mile (1.6 kilometers) southeast of TA-3 (Figure 1). TA-55 is one of the larger TAs at LANL. The main complex has five connected buildings:

- Administration Building (55-1),
- Support Office Building (55-2),
- Support Building (55–3),
- Plutonium Facility (55–4),
- and Warehouse (55–5) (listed in Table 2.2.2.1–1).

Various support, storage, security, and training structures are located throughout the main complex (Note that these buildings are sometimes referred to as Plutonium Facility [PF]–1, PF–2, PF–3, PF–4, PF–5, and PF–41.). The cornerstone research and development facility at TA–55 is the Plutonium Facility (55–4). Plutonium is processed at this facility, which is a two-story laboratory of approximately 151,000 square feet (14,028 square meters). The Plutonium Facility complex has the capability to process and perform research with the range of actinide materials (actinides are a series of chemically

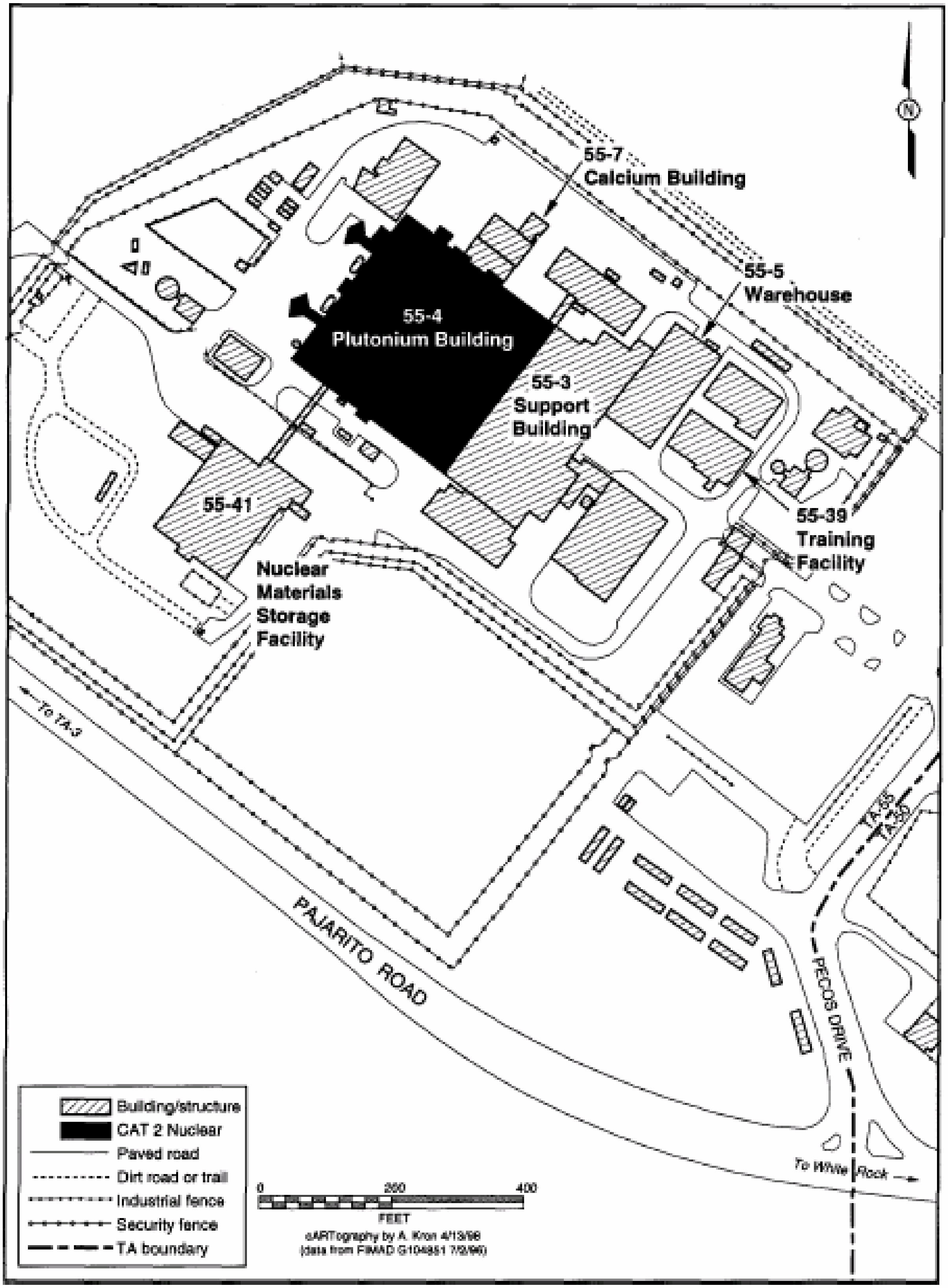


Figure 1. TA-55 Plutonium Facility Complex

similar, mostly synthetic, radioactive elements with atomic numbering ranging from 89 [actinium] through 103 [lawrencium] and including thorium [90], uranium [92], plutonium [94], and americium [95]). The discussion focuses on plutonium because most of the work in this facility is done with plutonium; work done with other actinides is similar in nature.

Building TA-55-4 is categorized as a Hazard Category 2 nuclear facility and was built to comply with seismic standards for Hazard Category 1 buildings. The ventilation system in the facility has four zones. The overall design concept for the Plutonium Facility separates the building into two halves, separated by a fire wall and other fire safety features. TA-55-4 was designed to correct the deficiencies that led to the 1969 Rocky Flats fire. Two facilities (TA-55-3 and TA-55-5) are designated as low hazard chemical facilities, and one facility (TA-55-7) has a low hazard energetic source classification. The other facilities at TA-55 are designated as no hazard facilities. (These are administrative, technical, and general storage buildings, passageways, and pump stations.)

3.2 SWEIS Description of Capabilities (Baseline)

The capabilities at TA–55 include many operations by which actinides (primarily plutonium and uranium):

- Are used in research on and characterization of physical and chemical properties and metallurgy of these materials and alloys.
- In weapons component form are taken apart or disassembled into metal scrap to be recovered.
- In metal scrap form are recovered (or reprocessed) into oxide and metal forms (stabilized) that may be stored or redirected into fabrication, research and development processes, or may be dispositioned
- In residue form are dissolved and chemically processed to recover the plutonium as metal, oxalate or oxide, for further processing.
- In metallic form are manufactured into components or parts useful in research or weapons applications.
- In metal or oxide form are processed (or fabricated) into materials useful as sources of heat and nuclear power (fuel pellets and rods).
- Can be converted from metal to oxide and visa versa.
- In any of the above forms serve as feedstock for various research and development activities.

Measurement technologies are developed for material control, nonproliferation, international inspection applications.

The processing capabilities can be divided into manufacturing steps and reprocessing or recovery steps. Processes can also be considered as “wet” or “dry” in terms of the relative volumes of radioactive liquid wastes produced. Chemical reprocessing operations are generally considered wet because they generate radioactive liquid wastes from precipitation, wash and ion exchange elution steps. The nitrate and chloride aqueous processes produce acid and caustic streams containing most of the radioactive content in the aqueous waste from TA-55.

Manufacturing processes are considered to be dry because they involve metal forming and oxide-pressing operations that do not produce aqueous wastes containing dissolved actinides. Similarly, pyrochemical processing and other recovery processes that utilize heat to effect separations (e.g., tritium separations) are considered dry processes.

Division into wet and dry processes is complicated because 95 percent by volume of the radioactive liquid waste effluent from TA-55 is industrial wastewater, water used in various cooling processes within the facility. All the manufacturing and pyrochemical operations and many of the reprocessing operations require water for cooling. This includes water used in cooling processing equipment (cooling jackets on ion exchange columns and metal melting furnaces) and the discharge from the heating, ventilation, and air conditioning system that serves the radioactive processing areas in TA-55-4.

The principal activities conducted at the Plutonium Facility are described below.

FROM THIS POINT UP TO SECTION 5.0 IS WHERE I NEED PROGRAM MANAGER/LEADER AND PI ASISTANCE. ADDITIONAL INFORMATION IS ALSO NECESSARY FOR ANY NEW, MODIFIED OR INCREASED CAPABILITIES, PROPOSED CAPABILITIES OR PROJECTS AT TA-55 OUT TO 2011.

3.2.1 Plutonium Stabilization.

Stabilization encompasses a variety of plutonium (and other actinide) recovery operations. The goal of this activity is to improve the storage condition of legacy plutonium in the LANL inventory. Some of the existing containers show signs of corrosion. Further, the stability of some of the materials can be improved through reprocessing, cleaning, high-firing (oxidizing at relatively high temperatures) oxides, and storage in improved containers. As of early 1996, the inventory included 1.2 tons (1.1 metric tons) of metallic plutonium, 0.83 tons (0.75 metric tons) of plutonium in residue forms, and 0.83 tons (0.75 metric tons) of plutonium in oxide forms. Under all of the alternatives, the plan is to reprocess 10 percent of the metal form, all of the residues, and 15 percent of the oxides to a stable oxide form. The remainder of the metal will be cleaned and remaining oxides will be high-fired. After these stabilization steps, the materials will be repackaged under inert atmosphere (an atmosphere free of materials that may initiate chemical reactions) in pressure-closure cans that are then placed in outer cans that are welded closed. These will be stored until needed to support program requirements. The processes that will be used to clean metallic plutonium, to convert metal to oxide, to reprocess the scrap material, and to high-fire oxides are parts of the regular chemical processing capability in operation at TA–55. The length of time that would be taken to complete these activities varies among the alternatives.

3.2.2 Manufacturing Plutonium Components.

The goal of this activity is to take purified plutonium metal and use it to manufacture pits or other items for research and development or to manufacture components for the nuclear weapons stockpile. This capability includes the fabrication of samples and parts for research applications, including dynamic experiments, subcritical experiments (at the Nevada Test Site), fundamental research on plutonium at the Los Alamos Neutron Science Center (LANSCE), and has been used in the past to fabricate pits for nuclear tests. Some equipment, tools, designs, and documentation specific to pit manufacturing have been moved from the Rocky Flats Plant to LANL. Changes will be made in the manufacturing process to reduce waste production and worker exposure. In general, the processes and procedures used for this capability differ in capacity, in technology, and in safety and environmental measures as compared to those previously used at the Rocky Flats Plant. Some aspects of the manufacturing process such as welding and coating technologies will continue to be developed. Pure metal will be cast to a very close approximation of the final dimensions (near net shape). This will reduce the need for extensive machining and reduce the production of waste and scrap (as compared to techniques used in the past). Some final machining and polishing will be required. The plutonium items produced may be encapsulated or coated with stainless steel, beryllium, or other materials. At every step, the pieces are inspected and samples are taken for analysis. Those finished components that meet the specifications may be stored in the Plutonium Facility vault pending shipment or research use. Those that do not meet specifications are reprocessed into plutonium metal.

3.2.3 Surveillance and Disassembly of Weapons Components

The goal of this activity is to conduct a series of nondestructive and destructive evaluation on pits removed from the stockpile and/or from storage, as well as for materials being considered in process development activities. These evaluations determine the effects of aging and other stresses on pits, as well as the compatibility of materials used or being considered for use in weapons. They are a part of the stockpile reliability and safety analysis and documentation programs that DOE has conducted for the nuclear weapons stockpile since pit production was initiated. The evaluation program was transferred from the Rocky Flats Plant to LANL in the early 1990’s. Beginning with the intact pit, a series of tests are made to determine the changes in the materials from which the pit was constructed. Tests include leak testing, weighing, dimensional inspection and measurements, dye penetration tests, and radiography. Some of the pits evaluated at LANL are returned to storage after these nondestructive analyses (to be analyzed again at a later date). Other pits are taken apart (disassembled) for further tests, which include metallography, micro-tensile testing, and chemical analysis. The scrap remaining after these destructive tests is reprocessed. Any pit fabricated at LANL or sent to LANL could be evaluated or disassembled through these processes.

3.2.4 Actinide Materials Science and Processing Research and Development

Several aspects of materials research on plutonium (and other actinides) are conducted at TA–55. In general, these include metallurgical and other characterization of materials, and measurements of physical materials properties. These measurements provide data that support assessments of the safety and reliability performance of nuclear weapons, including the behavior of aging weapons components and replacement components and their suitability for certification. They also support other activities at LANL, such as characterizing samples for components, including those produced at TA–55, for experiments conducted at LANL or elsewhere, as well as measurements surveillance of stockpile components. Activities to develop new measurements for enhanced surveillance also are conducted at the facility. In addition, measurements at TA–55 study the properties of plutonium materials and samples at high strain rates using a 40-millimeter projectile launcher Impact Test Facility, apparatus such as Kolsky (split Hopinson) Bars, and other bench-scale capabilities to measure mechanical and physical properties. These operations are usually conducted in gloveboxes and involve relatively small amounts of plutonium, as compared with other activities at TA–55.

In addition, research at TA–55 supports development and assessment of technologies for manufacturing and fabrication of components, a capability discussed previously in this section. These activities include research on welding and bonding processes and research associated with casting, machining, and other forming technology. In addition, measurements associated with fire-resistance of weapons components are conducted at TA–55.

Actinide processing (also called recovery and reprocessing) includes methods by which plutonium and other actinides, including uranium can be extracted, concentrated, and converted into forms easier to store and to use in other activities. The discussion below focuses on plutonium because this accounts for most of the processing activity at TA–55, but the discussion also applies to the many other actinides used in research at LANL. The ease with which plutonium may be recovered depends upon the form of the material:

- Recoverable—Metal components, ash, and, slag, castings, combustible and noncombustible equipment, impure oxides, sweepings, organic solutions, alloys, various salts, and filter residues
- Difficult to recover further—Leached metal, decontaminated components, and evaporation residues
- Practically irrecoverable—Vitrified material and ceramic forms

The form, recoverability, and the concentration of plutonium remaining determines whether the material will be discarded as waste or treated with further reprocessing steps. Aspects of this reprocessing capability are described below.

Actinide recovery processing typically involves dissolving materials in nitric or hydrochloric acid using the physical and chemical characteristics of the actinide (e.g., using solvent extraction or ion-exchange processes) to preferentially extract it as a high purity solution. The high-purity actinide can then be removed from the solution (through precipitation and filtration) and converted to an oxide or oxalate form. Finally, the oxides and oxalates can be converted to metal using a variety of chemical processing techniques, including high temperature oxidation and electrochemical techniques. Waste solutions from these processes are pre-treated (redistilled to reclaim acid and precipitate nitrate sludges if appropriate) before being discharged as radioactive liquid waste to TA-50.

Tritium separation is a special type of actinide processing. Tritium sorbs into many actinide materials where it is strongly held. Tritium can be removed from these materials by heating the material in an inert atmosphere. The actinide material is then cooled and removed. The dedicated glovebox line at TA–55–4 containing the furnace and associated equipment is called the Special Recovery Line. The SRL is expected to undergo significant upgrades over the next 5 yrs? The hydride-dehydride process is another special type of actinide processing. This process is used in the Advanced Recovery and Integrated Extraction System and may be used in other disassembly and material recovery processes. This process converts plutonium metal to plutonium hydride, which can be easily removed from other materials. The plutonium hydride can then be converted to either plutonium metal or oxide. The hydrogen used in this process is recycled. Although this process was designed for pits, other forms of metallic plutonium that are amenable to hydriding could also be reprocessed using this technique.

Actinide materials that emit alpha particles, such as plutonium or americium, have been intimately mixed with a material such as beryllium or beryllium oxide, to produce a strong and long-lasting source of neutrons, which is then sealed in stainless steel cladding. The U.S. Government provided about 20,000 of these neutron sources to universities, industry, and governmental agencies, which are licensed through the U.S. Nuclear Regulatory Commission (NRC) to utilize such materials. Most of these sources are no longer in use and, through an agreement with the NRC, they are being returned to DOE for reprocessing (using actinide recovery processes) at LANL. At present, plutonium-239/beryllium sources are being reprocessed at TA–55, but the capability could be used to reprocess americium-241/beryllium sources as well.

In addition, this actinide reprocessing capability includes research into new recovery and decontamination techniques, research regarding the fundamental properties of actinides, analytical and nondestruction measurement of actinides (including development of new techniques), and research regarding nuclear fuels.

3.2.5 Fabrication of Ceramic Based Fuels

LANL develops and demonstrates ceramic-based nuclear reactor fuel fabrication technologies. LANL has demonstrated the ability to produce such fuel, including prototype mixed oxide (MOX) fuel from plutonium and uranium. This demonstration involves processing of metals and oxides. Plutonium and uranium oxides are mixed together, and made into a ceramic form that is pressed into pellets. The pellets are sealed in cladding materials as a fuel rod. Fuel rods can be bundled together into fuel assemblies. This work is expected to continue at TA-55 over the next five years and is expected to fabricate an additional 60 to 70 kg (approximately 60% of what was fabricated on the 2004 time frame). This material may be stored at LANL until the Savannah River MOX fabrication plant comes into operation.

3.2.6 Plutonium-238 Research, Development, and Applications

Plutonium-238 has the interesting properties of being minimally fissile (making it more difficult to sustain a chain reaction) yet producing a large amount of heat through radioactive decay. This isotope is used to provide a long-term reliable source of heat that can be used directly and can be converted into electricity when assembled into radioisotopic thermoelectric generators (RTGs). The electricity produced by the RTGs has been used to operate mechanical devices, instruments, and communications on remote sensing devices such as spacecraft and to activate switches in some nuclear weapons designs. RTGs and units called milliwatt generators have been produced, tested, and reprocessed at the Plutonium Facility for many years, and RTG research and development (including design), fabrication, and testing activities continue. Plutonium-238 activities are kept separate from the other plutonium processes to avoid cross-contamination of isotopes. After the RTGs are produced, they are extensively tested for integrity, resistance to mechanical shocks, and heat generation rate. Aqueous reprocessing of plutonium-238 material uses the same processing techniques as used for other actinides as discussed above. Plutonium 238 activities are expected to transfer operations from TA-55 to another DOE facility beginning in approximately the 2008 through 2011 time frame. During this transfer TRU and Low Level waste generation for TA-55 are expected to increase significantly as the Pu 238 glove boxes and associated appurtenances are removed and the rooms decontaminated in order to make way for other work in these areas at PF-4.

3.2.7 Storage, Shipping, and Receiving

Under this activity, LANL stores, packages, measures (using variety of destructive and nondestructive techniques), ships, and receives nuclear materials. These activities are housed throughout TA-55-4, with storage currently in the TA-55-4 vault.

3.3 SWEIS Description of Capabilities (Preferred Alternative)

The following is the description of activities under the preferred alternative that was adopted in the ROD for the SWEIS (DOE 1999b). The SWEIS ROD did not fully adopt the pit fabrication capabilities described in the Expanded Operations Alternative. See Appendix 1 for further information about the modification of impacts as a result of the SWEIS ROD.

3.3.1 Plutonium Stabilization

LANL would recover, process, and store its existing plutonium residue inventory.

3.3.2 Manufacturing Plutonium Components

LANL would produce up to 80? plutonium pits per year in multiple shift operations (up to 50 ? pits per year in single-shift operations). This would be implemented in a phased manner, with the near-term objective of establishing this capability at a 50 pits per year rate (Preferred Alternative). Under longer-term objectives, the 80 pits per year (using multiple shifts) capability would be established. In addition, LANL would fabricate parts and samples for research and development at a higher level than under the No Action Alternative (within the existing capacity of TA-55-4).

3.3.3 Surveillance and Disassembly of Components

LANL would continue to examine and disassemble plutonium pits, but the existing equipment and the responsibility for this activity would be moved to the CMR Building to make room for the expanded pit production capability needed at the Plutonium Facility. Is this a valid statement or should we remove it? Or would this be a good into to CMRR (A detailed analysis of the alternatives considered to address the need for additional space for pit production is included in the project-specific siting and construction [PSSC] analysis in the SWEIS, volume II. To bound the impact analysis, PSSC "CMR Building Use" Alternative, relocation of some activities to the CMR Building is assumed because it does not create new nuclear space.) This relocation would result in increased transportation between the Plutonium Facility and the CMR Building, causing increases in road closures (and increased inconvenience to motorists) or in increased packaging costs and risks to the public if U.S. Department of Transportation (DOT)-approved packaging without road closures is used. The DOE has included the environmental impacts to establish a dedicated road for transport between the Plutonium Facility and the CMR Building in the Expanded Operations Alternative. However, the road would not be constructed to establish the

20 pits per year capability (Preferred Alternative). Also, under the Preferred Alternative, the pit manufacturing process activities would not be moved to the CMR Building.

3.3.4 Actinide Materials Science and Processing Research and Development

Research would continue to be conducted on plutonium (and other actinide) materials, as described in Section 3.2 at a higher level than under the No Action Alternative (but within the existing capacity of TA–55–4). LANL would demonstrate the disassembly/conversion of plutonium pits as under the No Action Alternative and would also develop expanded disassembly capacity, processing up to 200 pits per year (including a total of 250 pits over 4 years as part of disposition demonstration activities) (DOE 1998). Up to 5,000 curies of neutron sources (plutonium-239/beryllium and americium-241/beryllium) would be processed at TA–55. Up to 880 pounds (600 ? kilograms) of actinides would be processed each year between TA–55 and the CMR Building. LANL would also process neutron sources other than sealed sources. Although LANL would continue to process items through the Special Recovery Line (tritium separation), that activity would also move to the CMR Building to make room for the expanded pit production at the Plutonium Facility. LANL would perform oralloy decontamination of 28 to 48 uranium components per month in the TA–55 Plutonium Facility. Is this valid and if so is/are the values adequate?

Research in support of DOE's actinide clean-up activities and on actinide processing and waste activities at DOE sites would be conducted at a level higher than that under the No Action Alternative. In addition, LANL would stabilize larger quantities of specialty items and residues from other DOE sites; fabricate and study larger amounts of nuclear fuels used in terrestrial and space reactors; fabricate and study larger amounts of prototype fuel for lead test assemblies; ?? develop safeguards instrumentation for plutonium assay at a level increased from that of the No Action Alternative; and analyze samples. Half of the sample analysis would be conducted at the Plutonium Facility, with the remainder moved to the CMR Building or CMRR (again, to make room for expanded pit production at the TA–55 Plutonium Facility).

3.3.5 Fabrication of Ceramic-Based Reactor Fuels

LANL would make prototype MOX fuel and would build test reactor fuel assemblies. LANL also would continue research and development on other fuels.

3.3.6 Plutonium-238 Research, Development, and Applications

LANL would process, evaluate, and test up to 55 pounds (25 kilograms) of plutonium-238 per year in production of materials and parts to support space and terrestrial uses. In addition, LANL would recover, recycle, and blend up to 40 pounds (18 kilograms) per year of plutonium-238.

3.3.7 Storage, Shipping, and Receiving

NMSF is to be renovated to perform as originally intended: to serve as a centralized receiving area and vault for the interim storage of up to 7.3 tons (6.6 metric tons) of the LANL SNM inventory, mainly plutonium. This is expected to be an adequate capacity to allow the PF-4 vault to return to its intended use as a working vault and to accommodate the projected inventory growth at LANL (approximately 287 pounds [130 kilograms] per year). Storage, shipping, and receiving activities would be similar to those under the No Action Alternative, with the differences in shipping activity, as presented in volume III (appendix F, section F.5.3 of the SWEIS), increasing the amount of shipping and receiving activity (but not requiring a change in the storage capacity for TA–55). Once renovation is complete, nuclear materials will be moved to the NMSF from other LANL vaults and from other DOE facilities as necessary to support tasks assigned to LANL. Nondestructive assays would be conducted on SNM at the NMSF to verify and identify the content of stored containers. Material stored would be limited to nuclear material in metal or oxide forms. Nuclear material solutions and tritium would not be stored in NMSF, although some may be accepted at the receiving area and redirected to other facilities within the same day.

The Plutonium Facility would be renovated to ensure the continued availability of existing capabilities under all alternatives. Activities to be included in all alternatives as renovation that will ensure continued availability of the Plutonium Facility's existing capabilities are:

- Improvements to utilities that increase reliability
- Emergency lighting and interior improvements to meet fire and life safety code requirements.
- Replacement components in the process waste treatment systems
- Replacement of outdated laboratory equipment
- Improvements to communication and fire alarm systems
- Electrical system improvements

Under the Expanded Operations Alternative, additional upgrades would be performed to support newly assigned missions. Additional upgrades to support newly assigned missions under the Expanded Operations Alternative could include reconfiguration of interior space and installation of new equipment (see volume II, part II, of the SWEIS for additional information on these upgrades) in support of expanded activities, as described above. It is recognized that project plans change over time. If this alternative is selected, the construction projects proposed under this alternative as described above, would be reviewed prior to construction to determine whether additional NEPA analysis is required. It would seem this entire section is no longer valid. Is that a correct assumption on my part?

4.0 Background Document Information for TA-55

This section presents information from the "Background Information For TA-55 or Site-Wide Environmental Impact Statement Los Alamos National Laboratory" (LANL 1996).

4.1 Background Document Description of Facilities

The facilities at TA-55 are located on a 40-acre site about 1 mi southeast of the Laboratory's central technical area (TA-3). TA-55, one of the larger technical areas at LANL, is situated adjacent to a Laboratory-owned and -controlled roadway (Pajarito Road) that is accessible to the public and passes along one side of and below TA-55.

Most of TA-55, including the main complex, is situated inside a restricted area surrounded by a double security fence. The main complex has five connected buildings: the Administration Building (PF-1), the Support Office Building (PF-2), the Support Building (PF-3), the Plutonium Facility (PF-4), and the Warehouse (PF-5). The Nuclear Material Storage Facility (PF-41) is separate from the main complex but shares an underground transfer tunnel with PF-4. Various support, storage, security, and training structures are located throughout the main complex.

4.1.1 Plutonium Facility

The cornerstone R&D facility at TA-55 is the Plutonium Facility (PF-4). All plutonium processing-occurs in this facility, which is a two-story laboratory of approximately 151,000 ft^2. PF-4's capabilities include

- Plutonium and other actinides recovery processes to convert recovered material to plutonium (or other actinides) metal,
- dissassembly of weapons components for analysis and parts manufacture,
- fabrication of ceramic-based reactor fuels,
- processing ^{238}Pu to produce heat sources, and
- materials control and accountability (MC&A) techniques.

PF-4 was built to comply with seismic standards for *Class 1* buildings. The outer walls and roof are reinforced concrete. The overall design concept for PF-4 separates the building in two halves, each of which contains its own ventilation systems and electrical substations. One half (the 100 and 200 areas) houses the plutonium research and development laboratories, ^{238}Pu operations, and the personnel decontamination area. The other half (the 300 and 400 areas) houses plutonium recovery, metal preparation and fabrication, and nondestructive assay (NDA) laboratories. Large central corridors span the length of the four main areas of PF-4. Each of the processing areas is further divided into a number of rooms that contain gloveboxes for plutonium work. The ventilation systems supporting the gloveboxes and all other utilities are located in the basement of the facility. The basement also houses other ventilation equipment, the packing/unpacking room, the waste-handling areas, the isopress laboratory, and the plutonium storage vault. This arrangement provides maximum flexibility in meeting the frequently changing needs of a research and development (R&D) facility. We should expand here on potential changes over the next five years.

As part of the Capability Maintenance and Improvement Project (CMIP) Now called the TRP?, the Plutonium Facility will be rehabilitated and upgraded to allow it to better support current and future missions.

4.1.2 Nuclear Material Storage Facility

The Nuclear Material Storage Facility (NMSF), PF-41, at TA-55 will eventually contain a significant amount of stored nuclear material. The NMSF is intended primarily for intermediate (less than 2 years) and long-term storage of special nuclear material (SNM). Although completed in 1987, the NMSF has never operated because of design and construction deficiencies. A major renovation project is being planned to correct those deficiencies so that the facility can operate. The renovation project, expected to be completed in 2001, will provide PF-41 with a total of 6,000 storage locations whose approximate storage capacity will be 6.6 metric tons of material in metal or oxide form. The major planned modifications of the NMSF involve developing a passive natural-convection cooling system capable of dissipating 20 kW of heat.

In its current form, the NMSF is a reinforced concrete structure consisting of two levels. The facility contains a nuclear material storage vault, including an NDA count room, an unpacking room, a secure shipping and receiving room, and a safe secure transport (SST) vehicle garage and dock and shares a transfer tunnel with PF-4. The total floor area of the NMSF is approximately 30,400 ft^2, including 12,100 ft^2 of vault storage area on two floors. Another section of no relevance to current operations (or future)?

4.1.3 Other Facilities

Other Class 1 structures located at TA-55 are the Generator Building (PF-8) and two fire service water pumphouses (PF-10 and -11). Most of the other auxiliary structures are constructed to meet Class 2 structural criteria. These structures include the Calcium Chloride Building (PF-7), a building (PF-28) housing the Nuclear Material Accountability Group, the TA-55 Training Facility (PF-39) no longer the training facility, the Process Support Building (PF-42), and the Office Support Building (PF-114).

4.2 Discussion of Missions/Programs Under the Expanded Operations Alternative

4.2.1 Nuclear Material Stabilization and Packaging

The goal of this program is to address the legacy plutonium inventory at TA-55 by recovering, processing, and storing all the plutonium at the Laboratory that exists in metal, residue, and oxide forms. The storage criteria specify that the final form must be either metal or oxide (>50 wt% plutonium). The current plutonium inventory consists of 1.1 metric tons of metal plutonium, 0.75 metric tons of plutonium in residues, and 0.75 metric tons of plutonium in oxide form.

In the no-action alternative, all of the stored materials will either be processed or repackaged to meet DOE's long-term storage standard, DOE-STD-3013-94 (DOE 1994). Approximately 85% of the present oxide holdings require only repackaging. Of the current residue holdings, all require processing and approximately 90% require only cleaning and repackaging. Processed plutonium-bearing materials will be converted to an oxide that meets the storage standard. The processed material will be packaged in specially designed welded cans and stored in the TA-55 vault until the NMSF is available.

It is expected that processing and repackaging will take 8 years to complete. The will consolidate holdings in the TA-55 vault and provide more space for storage of programmatic materials. When the containers are moved to NMSF they will not burden its capacity but will provide further flexibility and will allow the TA-55 vault to be used as a day-storage-type vault. Approximately 1,000 cans containing the metal or oxide forms are anticipated, and the current plan is to complete packaging by 2002 and store the cans in NMSF.

A parallel effort is under way to develop improved storage containers. Tests are being conducted to better understand SNM/container compatibility and to develop surveillance techniques to monitor stored containers over their lifetime.

4.2.2 Pit Fabrication

The goal of this program is to develop and maintain the technology base required to build pits so that war-reserve- (WR) quality pits can replace units removed from the stockpile for surveillance or other assignments directed by DOE. The pit-manufacturing and quality control capabilities required to build WR-qualified pits at the Laboratory will be developed, and the Laboratory will demonstrate these capabilities by building a pit that can qualify. The equipment, tooling, and inventory transfers from Rocky Flats and the design required by the changes in the manufacturing infrastructure will be completed. The weld parameters, the coating parameters, the necessary plutonium technologies, and non-nuclear fabrication will be developed.

The plutonium for the WR pits will be fabricated from plutonium existing at TA-55 and from plutonium in stockpile pits. The material from the stockpile pits will be reduced, processed, and machined to provide new, recast, machined WR-qualified pits. The major production areas in TA-55 will be the foundry area, the machine shop, and the postassembly areas in Wing 300 and the Wing 400 residue-processing area, where plutonium will be recovered and converted to an oxide for storage in the TA-55 vault.

It is planned to start producing 1–2 pits/yr by 1997, creating 6-12 developmental pits in the process. Radiography, analytical testing, and some aspects of waste management are all key support processes currently located at Laboratory facilities other than TA-55, which must be coordinated for successful implementation of the Pit Fabrication Program at TA-55. The developmental pits will be reprocessed after measurements; no developmental pits will be transferred to war reserve.

The following paragraph describes the Expanded Operations Alternative. However, please note that the Record of Decision did not select this level of operations. See Table 2 of this document (page 3) for the level of operations selected by the SWEIS Record of Decision.

Under the Expanded Operations Alternative, LANL would produce 80 WR pits/yr, a production rate that would require multiple shifts of operations. This alternative would also require low- and high-energy radiographic capabilities located near associated processes at TA-55. These radiographic capabilities, would reside at TA-55 and/or at the CMR Building. As part of the capability maintenance and improvement project (CMIP), the pit disassembly operations would be moved to the CMR Building in the Expanded Operations Alternative (Demuth 1996**).**

4.2.3 Pit Surveillance

The Laboratory conducts destructive and nondestructive evaluations on pits for the purposes of maintaining stockpile reliability and staging safety. Each destructive evaluation, depending on pit type, includes the following operations: leak testing, weighing, dimensional inspection, dye penetrant inspection, radiography, metallography, chemical analysis, and microtensile testing. Except for radiography, these operations are performed at TA-55. Each evaluation culminates in a detailed evaluation report on the condition of the pit. Approximately 20 we should probably increase this value pits are destructively examined each year. The pit material remaining after the evaluations is properly stored in the TA-55 vault.

The Pit Surveillance Program also includes two supporting efforts related to nondestructive evaluations: the shelf-life program and stockpile information services. The shelf-life program provides time-dependent information using nondestructive methods similar to the tests described above through sampling on a fixed set of 80 to 100 pits (Cunningham 1996). Approximately 20 ?? of these pits are nondestructively evaluated each year and are returned to storage in TA-55 until their cycle for reexamination cycle begins again. The stockpile information services portion of pit surveillance provides supporting documentation and historical information regarding pits for the entire DOE Weapons Complex. Hundreds of cubic feet of documentation have been transferred from the Rocky Flats Plant and are being scanned into a more useful format electronic system to allow information to be retrieved more conveniently.

Expanded operations would provide destructive testing of 40 pits/yr. More testing would be performed on the 20 pits that are nondestructively examined each year. As part of the CMIP (TRP), all of the pit surveillance operations would be moved to the CMR Building in the Expanded Operations Alternative (Demuth 1996). Changes needed?

4.2.4 Material Disposition

DOE has asked the Laboratory to fabricate mixed-oxide (MOX) irradiation test fuel pins and work with industry to build MOX fuel lead test assemblies for commercially sized light-water or CANDU (heavy-water) reactors. ??

The goal of the National Fissile Materials Disposition Program is to implement the disposition of excess fissile material from the nuclear weapons program. Los Alamos has been asked to provide technical support to this program in two key areas: pit disassembly/material conversion and nuclear fuels technology.

The capabilities of the Advanced Recovery and Integrated Extraction System (ARIES) at TA-55 are being used to help demonstrate an integrated approach that can disassemble a pit in a lathe cutting operation; convert the plutonium into a pellet in a hydride-dehydride furnace; place the material in a welded storage container; and decontaminate, assay, and store the container. Another approach could be to provide the plutonium as an oxide suitable for fabrication as a MOX reactor fuel or to immobilize it in a glass, ceramic, or other matrix. The integrated approach used in ARIES offers two important advantages: (1) it eliminates primary waste streams and (2) it facilitates implementation of safeguards and security and material protection, control, and accountability (MPC&A). The goal is to demonstrate that the ARIES process is capable of processing 1–2 pits/day by the last half of FY97. It is expected that a total of 30–40 pits will be processed, mostly in the last 3–6 months of the program. Update and elaboration necessary?

The disposition of the excess fissile material of the national program has two near-term options: (1) Plutonium could be buried in a geologic repository similar to Yucca Mountain or in very deep boreholes. Before burial, the plutonium could be immobilized through vitrification with high-level waste in the form of glass, or it could be converted to a MOX reactor fuel. LANL will not be involved in immobilizing or vitrifying plutonium.What about the vitrification project? The nuclear fuels technology assignment for LANL focuses on the MOX alternative. (2) Surplus weapons plutonium could be converted to oxide, blended with uranium oxide, pressed into a fuel pellet, sintered, ground, and loaded into cladding tubes to form a MOX fuel assembly or bundle. LANL will work closely with the reactor vendor selected by DOE to help develop the specifications for the fuel assemblies, develop the prototype MOX fuel for testing and qualification, and ultimately work with DOE to determine technical requirements for fabrication of MOX fuel assemblies.

Under the Expanded Operations Alternative, successful demonstration of the ARIES integrated approach (occurring in FY97) would require the next logical step—providing a production-mode facility. A possible future scenario at TA-55 would include modifying and retrofitting the demonstration unit at TA-55. It should be stressed that the demonstration unit would need to be modified before production capabilities could be assured. The United States is also considering making this technology available to the Russians for use in disposing of their weapons

LANL may also be asked to fabricate MOX irradiation test fuel pins and to work with industry to build MOX fuel lead test assemblies for commercially sized light-water or CANDU reactors.

4.2.5 Plutonium Research and Development and Support of SSM

As part of the effort to better understand the relationship of aging to performance in the materials used in stockpile nuclear weapons, various kinds of materials research are conducted at TA-55. Some experiments are directed at better understanding the aging characteristics of plutonium as part of the continual assessment of the safety and reliability of nuclear weapons with other research 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. TA-55 personnel test materials using the 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 are crucial to TA-55's efforts. The elimination of underground nuclear testing has increased the need for better understanding the material properties of fundamental plutonium research as central to the SSM Program.

The rate of research would increase consistent with the SSM Program and with the capacity provided by expanded operations in TA-55. As part of the CMIP(TRP), roughly half of the plutonium R&D and Support of SSM operations would be moved to the CMR Building in the Expanded Operations Alternative (Demuth 1996). ??

4.2.6 EM Technology Support

In this program, the Laboratory provides continuing technical support to DOE-Headquarters' Environmental Management (EM) Office to assist the entire weapons complex in better understanding selected issues associated with cleanup around the DOE Weapons Complex. In the near future, the Laboratory's efforts for EM fall in three general areas: (1) issues associated with stabilization, chemical processing, shelf life, surveillance, and skid-mounted processing techniques; (2) technical transfer matters involving mockups and training personnel from other DOE sites as operators; and (3) stabilizing minor quantities of specialty items from other DOE sites.

Interactive programs with the Hanford Reservation include stabilizing polycubes; electrolytically decontaminating gloveboxes; stabilizing sand, slag, and crucible residue; and stabilizing $MgOH_2$ precipitation. ??

Work with Savannah River Site (SRS) includes characterizing residues, performing laser sampling, developing $^{237}Np/^{238}Pu$ repack criteria, vitrifying wastes, developing off-gas monitors, and developing vault and packaging technology.

Under the Expanded Operations Alternative, operations could be expanded to enable a better understanding of the phenomena involved in shelf-life issues, to allow more specialty items to be stabilized at LANL, to increase technical support to other sites, and to extend R&D beyond stabilization to ultimate disposal.

4.2.7 Plutonium-238 Operations

This program includes $^{238}PuO_2$ fuel recycle and reprocessing and $^{238}PuO_2$ heat-source recovery, disposition, and stabilization operations. The PuO_2 removed from excess and retired milliwatt radioisotope thermoelectric generators (RTGs) and other heat sources received from Pantex, Sandia, and others may be sent to SRS for reprocessing, or they may be processed at LANL. LANL's role in fuel recycle and reprocessing involves aqueous and high-temperature (pyrochemical) processing to ensure the availability of fuel for heat source fabrication operations, to recover fuel from process waste steams, and to stabilize process residues.

Operations would be expanded to recycle residues and blend up to 18.0 kg of ^{238}Pu to support space and terrestrial missions. Up to 10.0 kg ^{238}Pu may be processed annually at TA-55 as part of heat source recovery, disposition, and stabilization; recovery research and development; and safety testing activities.

4.2.8 Plutonium-238 and Heat Sources

All this depends on the transition to another facility (id ever) but no matter what that will take several years so, is this all reflective of current and projected future ops?

Activities will be conducted to maintain the technology base required for

- producing RTG heat sources,
- designing and developing new heat sources, and
- ensuring the safety of deployed or proposed heat source designs and configurations.

Oxides of ^{238}Pu, ^{238}U (^{235}U depleted), and other materials, such as hafnia, are processed, tested, and evaluated in the following operations conducted at TA-35 (nonplutonium operations) and TA-55 (plutonium operations):

- fuel form fabrication,
- high-temperature mechanical tests of $^{238}PuO_2$, UO_2, and other materials,
- noble metal/$^{238}PuO_2$ diffusion barrier studies,
- helium release studies,
- fuel capsule decontamination studies,
- particle size analysis of RTG heat sources and fuel stimulants,
- bench-scale fuel-reprocessing studies (see Recovery Program, Section 4.2.9),
- revaluation of alternate $^{238}PuO_2$ sources,
- operation of a launcher designed to impact RTG heat sources and RTG heat source components,
- investigation of alternate fuel powder processing and fuel forming technologies,

- determination of the effects of aging on milliwatt RTG shelf-life units, and
- nondestructive and destructive testing of milliwatt RTGs from the nuclear weapons stockpile.

Activities will be conducted to support national and international space exploration programs, to provide heat sources for national defense purposes, and to provide heat sources for use as calorimetric and radiation sources. During years when there is a need for heat sources to support large programs such as Cassini, up to 25.0 kg of ^{238}Pu may be processed at TA-55.

4.2.9 Neutron Source Materials Recovery/Radioactive Source Recovery Program

The Atomic Energy Commission and its successors provided a large number of neutron sources (approximately 20,000) 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 currently none 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 or BeO. The radionuclides most commonly used are ^{239}Pu, ^{241}Am, and ^{238}Pu. Separating (recovering) the radionuclide from the light metal or light-metal oxide before storing the material is desirable, because separating the alpha-emitting material from the Be or BeO reduces the neutron emission rate, thus reducing the amount of shielding required for unseparated source materials and thereby reducing the amount of storage space needed. The recovery process requires removing the stainless-steel shells containing the material mixture and chemically separating the radionuclide from the light metal or light-metal oxide. At present, personnel at TA-55 are accepting and recovering neutron sources, most of which contain ^{239}Pu and Be (^{239}PuBe). Correct me if I'm wrong but as I understand it we are no longer recovering the material but will just be an interim stop (re-packaging?) until the sources are sent on to their final destination, correct?

From 1979-1990, 717 ^{239}PuBe sources were recovered at TA-55. An automated processing facility is currently being used and, since March 1994, 167 sources have been reprocessed at a rate of about 500 Ci/yr. Since March 1994, 239 sources have been received, and there is a waiting list of 335 sources. Most of the sources that will require recovery are in the 1- to 10- Ci range, (16 to 160 g of plutonium), and most of those on hand are in the 1- to 5-Ci range. A small number (less than 10) of neutron sources containing ^{241}Am have been recovered. Planning for reprocessing larger numbers of beryllium-actinide neutron sources containing ^{238}Pu (^{238}PuBe) and ^{241}Am (^{241}AmBe) is under way. Activities include developing flowsheets and specifying layouts for process equipment and facilities. Same comment as above.

All source recovery operations could be expanded to a maximum of about 10,000 Ci/yr distributed between chemical recovery operations at TA-55 and CMR. Up to 5000 Ci/yr in neutron source will be recovered at TA-55. (It is also possible that the entire recovery program will occur in TA-55 or CMR). This expanded operation would 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 1,000 neutron sources would be maintained at the CMR Building, and small numbers of neutron sources (~100) would be stored at TA-55. Additional activities could include the removal of pressure vessel containment surrounding neutron sources used in oil exploration and 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; single-nuclide sources, such as ^{241}Am gamma sources; and sealed sources, such as curium, californium, and cesium. DOE is also considering deactivation or recovery of other neutron sources and sealed sources. The source recovery requirements in these efforts had not been established as of March 1996. Same comment as previous in this section.

4.2.10 Nonproliferation Technologies

Nonproliferation technologies at TA-55 involve developing safeguards methodologies and instrumentation for plutonium assay. A typical example is the development of NDA equipment for the ARIES Program. NDA devices for plutonium developed for nonproliferation purposes are routinely tested at TA-55. TA-55 provides LANL with a unique capability to determine needs for and development of nonproliferation technology. Although direct nonproliferation technology funding is not large, TA-55 supports the development of safeguards instrumentation that contributes to nonproliferation technology. Future requirements for nonproliferation work at TA-55 could increase to a level of effort of $1,000,000/yr. ??

4.2.11 Actinide Processing and Recovery

Actinide-processing and recovery operations at TA-55 share the primary objective of processing source material for the purpose of recovering actinides for reuse or stabilization, including special recovery line (SRL), decontamination of Oralloy hemishells, and other processing and recovery activities. The actinide sources come from various installations around the DOE Weapons Complex, including LANL, and the dismantling and processing capabilities at TA-55 include unique processing facilities. A wide spectrum of actinides with varying isotopic concentrations is associated with the source terms, which usually represent one-of-a-kind operations. A few of the source materials contain tritium, and special precautions are used in those cases to ensure that any tritium releases meet DOE guidelines.

Decontaminating Oralloy, a fissile material, involves removing plutonium and americium from the highly enriched uranium surface of hemishells. The clean Oralloy can be shipped to the Oak Ridge Y-12 Plant, the nation's designated site for storing Oralloy until final disposition is decided.

To date, selected equipment used for decontaminating Oralloy hemishells has been installed and demonstrated. Oralloy decontamination operations support pit surveillance, SRL, and ARIES. SRL operations have begun, but no pits have been processed. ??

In the period covered by the no-action alternative (1996-2006), SRL, Oralloy decontamination, and other processing and recovery operations will move beyond the demonstration phase to process. The Laboratory plans to process 1-2 pits/month using SRL. Between 15 and 20 pits a month will be decontaminated with the Oralloy decontamination process. Up to 100 kg/yr of actinides will be processed through other processing and recovery activities.

Operations could expand because of increased emphasis on simulated weapons R&D, production disassembly, and cleanup work around the DOE Weapons Complex. Oralloy decontamination operations could be expanded to make LANL the center for Oralloy decontamination for the nation, leading to the processing of contaminated items from other sites, such as RFETS. Oralloy components could also be prepared in long-term disposition packages so that the Oak Ridge Y-12 Plant would only need to store items as received. Expanded operations would result in the processing up to1 pit/ wk (SRL). Oralloy decontamination would be used to decontaminate 28-48 pits/month. Up to 400 kg/yr of actinides will be processed through other processing and recovery activities.

As part of the CMIP(TRP), AGEX and SRL would be moved to the CMR Building in the Expanded Operations Alternative (Demuth 1996).

This section probably needs a re-write as much has probably changed since 2000.

4.2.12 Energy Programs

This category or programs includes a variety of similar programs involving research and development of nuclear fuels used in various national and international programs dealing with terrestrial nuclear power, space nuclear power and propulsion, waste transmutation, and special-purpose reactors. Under these Laboratory-directed research and development (LDRD) programs, small amounts of a wide variety of fuels are fabricated and studied, including ceramic oxide, carbide, and nitride fuels, cement fuels, metallic fuels and molten-salt fuels. These fuels contain a variety of actinides, including plutonium and uranium, some of which are fissile and some of which are not. Activities will range from basic research and development to the fabrication of prototype fuel for lead test assemblies.

In the event that larger quantities of fuel are required either for testing or for use in prototype reactors, significantly more fuel may be fabricated. In this situation, certain pieces of new equipment might be installed in gloveboxes or might replace older equipment.

4.3 Discussion of Operational Capabilities as They Support Programs

4.3.1 Processing Technologies

4.3.1.1 Description

Some of the most frequently used capabilities at TA-55 are the aqueous processing technologies. Here, nitrate- and/or chloride-based systems are used to recover plutonium (actinides in general? I'm thinking of Uranium here) from various residues to produce purified plutonium oxide for conversion to metal and to ensure that the resulting wastes are minimized and in a form suitable for further treatment or disposal. The aqueous process includes pretreatment, dissolution, anion exchange, precipitation, calcination, and evaporation. A wide array of specialized equipment is available at TA-55 to support these operations.

Pyrochemical (molten salt) techniques are used to prepare and purify plutonium metal. Electrorefining converts impure plutonium metal to high-purity plutonium metal. Molten salt extraction processes are used to separate americium from plutonium metal. These processes also can be used in tandem with the ARIES, where retired pits are processed and the plutonium contents are recovered. Multicycle direct oxide reduction provides an effective method for converting plutonium oxides to metal.

The advanced test line for actinide separations (ATLAS) is a research tool used to develop and demonstrate state-of-the-art methods to reclaim and purify actinides from processing residues. ATLAS also can produce pure plutonium oxide for subsequent conversion to metal with minimum use of reagents and minimum waste generation. The ATLAS technology is housed in six interconnected gloveboxes and a dedicated drop box. It can recover actinides from a wide range of feed types, including high- and low-purity oxides, ash, pyrochemical salts, and metal conversion residues. Operations are currently conducted in gloveboxes located primarily in the 400 Area of PF-4.

4.3.1.2 Programs Supported

Processing technologies at TA-55 are used to support nuclear materials stabilization and packaging, pit fabrication, pit surveillance, material disposition, EM technology support, neutron source materials recovery/radioactive source recovery program, actinide processing and recovery programs, and energy programs.

4.3.1.3 Radioactive Materials

Hazardous radioactive materials of concern for processing technologies include the plutonium isotopes ^{239}Pu, ^{240}Pu, ^{241}Pu, and ^{242}Pu and other actinides, such as uranium? neptunium and americium. The isotopes of plutonium, along with ^{241}Am, are present in different mixtures in weapons-grade plutonium. Although all of these isotopes are hazardous because they are alpha particle emitters, ^{239}Pu is of particular concern because of its large neutron cross section and high concentration in weapons-grade plutonium and the resultant potential for criticality.

4.3.1.4 Nonradioactive Toxic or Hazardous Substances

Nonradioactive toxic/hazardous substances used in processing technologies include but not limited to, nitric acid, hydrochloric acid, a variety of chemical reagents acid, hydrogen fluoride gas, hydrogen gas, chlorine gas, and nitrogen and argon piped to gloveboxes to provide an inert environment for handling reactive materials.

4.3.1.5 Hazardous Energy Sources

Other safety concerns in processing technologies include hazards involving the use of industrial equipment such as a furnace, hydraulic crusher, magnetic separator V-blender, and various cutting tools. Steam lines also present potential hazards.

4.3.2 Plutonium Metallurgy

4.3.2.1 Description

Plutonium metallurgy at TA-55 provides the knowledge base for technologies relevant to fabrication, testing, and surveillance of plutonium and plutonium components. These technologies are particularly relevant to the nuclear weapons program. To support the weapons program, TA-55 fabricates weapons components, studies metallurgical and physical properties of plutonium and other actinide materials, and provides technical support to ensure the reliability and safety of the weapons stockpile. Weapons fabrication activities are directed at improved manufacturing methods, including casting, machining, assembly, and inspection technologies used to produce weapons-quality plutonium components. Research and development are also aimed at improving welding and bonding processes and developing special coatings to resist plutonium metal attack. Pit surveillance represents a major stockpile-related responsibility for TA-55, which includes evaluating site-return pits, storing associated shelf-life pits, establishing a pit database, and developing new diagnostic tools to increase understanding of pit characteristics and behavior. Special devices at PF-4 for studying the mechanical properties of plutonium at high strain rates include a 40-mm launcher and a Kolsky Bar. Operations are currently conducted in gloveboxes located primarily in the 300 Area of PF-4.

4.3.2.2 Programs Supported

Plutonium metallurgy capabilities at TA-55 are used to support the pit fabrication, pit surveillance, material disposition, plutonium research and development and support of SSM, actinide processing and recovery, and energy programs. Plutonium metallurgy also provides minor services to the nuclear material stabilization and packaging program.

4.3.2.3 Radioactive Materials

Hazardous radioactive materials of concern for plutonium metallurgy include the plutonium isotopes discussed in the Processing Technologies Section above, and tritium. Tritium is present as metal tritides and as a gas. If it is not contained in the process equipment, the gaseous form will be released to the atmosphere though the building ventilation system and stack. In the tritide form, tritium has a propensity for exchange with hydrogen in atmospheric water and, if not contained in process equipment, it will be subsequently released to the atmosphere through the building ventilation system and stack.

4.3.2.4 Nonradioactive Toxic or Hazardous Substances

Nonradioactive toxic/hazardous substances used in plutonium metallurgy include nitrogen and argon piped to gloveboxes to provide an inert environment for handling reactive materials.

4.3.2.5 Hazardous Energy Sources

Other safety concerns in plutonium metallurgy include hazards involving the use of industrial equipment such as a hydraulic press, furnace, forklift, and rotating machinery. Other equipment that presents a safety concern includes a 40-mm launcher, Kolsky Bar, Class IV laser, and a high-voltage RF system.

4.3.3 Actinide Research and Development

4.3.3.1 Description

A core capability at TA-55 is fundamental and applied research in plutonium and actinide chemistry. This work is needed to support nuclear materials processing at TA-55 and to support such areas as environmental restoration throughout the DOE Weapons Complex. Current areas of research include organoactinide chemistry, plutonium chlorination and fluorination, plutonium thermochemical studies, process control and diagnostic development, actinide spectroscopy, waste gas treatment, chemical and physical separation of plutonium, and purification technology.

Typically, concepts and prototypes are generated in PF-3 (or elsewhere in LANL), followed by introduction of the processes at PF-4. Operations are currently conducted in Buildings PF-3 and PF-4. Should ARTIC be discussed here?

4.3.3.2 Programs Supported

Actinide R&D at TA-55 supports the nuclear material stabilization and packaging, pit fabrication, pit surveillance, material disposition, EM technology support, actinide processing and recovery, and energy programs.

4.3.3.3 Radioactive Materials

Hazardous radioactive materials of concern for actinide R&D are the same as those described under Plutonium Metallurgy.

4.3.3.4 Nonradioactive Toxic or Hazardous Substances

Nonradioactive toxic/hazardous substances used in actinide R&D include nitrogen and argon piped to gloveboxes to provide an inert environment for handling reactive materials.

4.3.3.5 Hazardous Energy Sources

Other safety concerns in actinide research and development include hazards involving the use of laboratory equipment such as a Class IV laser, furnace, cryogenic equipment, and magnetic equipment. High-amperage DC power supplies, high-voltage power supplies, and steam lines also present potential hazards.

4.3.4 Actinide Ceramics and Fabrication

4.3.4.1 Description

The capability exists at TA-55 to process and fabricate ^{238}Pu. This technology *has been* used to develop and produce radioisotope heat sources for both terrestrial and space applications. Heat sources developed at LANL have been used on NASA spacecraft, including Pioneer 10 and 11, Voyager 1 and 2, Galileo, and the Ulysses deep-space explorations. A multitude of processes and operations are used for fabricating and assembling the ^{238}Pu heat sources, starting with the receipt of ^{238}Pu at TA-55 through the fabrication, assembly, testing, and delivery of the heat source capsules to the customer. Should a discussion of any changes to 238 operations be put here also?

TA-55 also houses capabilities to develop and test advanced nuclear fuels. This work involves fabrication of uranium- and plutonium-based ceramic fuels, studies of the properties and behavior of these fuels, and postirradiation examination. Research is conducted on the properties and structure of metals, oxides, carbides, nitrides, and other compounds. Operations conducted in fabricating ceramic-based fuel pellets and pins include preparing powder, pressing, sintering, annealing, and welding.

4.3.4.2 Programs Supported

Actinide ceramics and fabrication capabilities support the material disposition, ^{238}Pu operations, ^{238}Pu and heat sources, and energy programs. Currently, the actinide ceramics and fabrication capacity of TA-55 is primarily dedicated to heat source production and ^{238}Pu operations programs.

4.3.4.3 Radioactive Materials

Hazardous radioactive materials of concern are primarily ^{238}Pu. Although all plutonium isotopes are hazardous because they are alpha particle emitters, ^{238}Pu is especially hazardous because of its high specific activity and its presence as an oxide in respirable particle sizes in the heat source material.

4.3.4.4 Nonradioactive Toxic or Hazardous Substances

No toxic or hazardous substances are used in significant quantities.

4.3.4.5 Hazardous Energy Sources

Other safety concerns in actinide ceramics and fabrication include hazards involving the use of industrial equipment such as a hot press, cold press, furnace, forklift, rotating machinery, and welding equipment.

4.3.5 Nuclear Materials Control, Accountability, and Storage

4.3.5.1 Description

A nuclear materials measurement and accountability system is used at TA-55. The operations include nuclear materials accounting, nuclear materials management and modeling, a measurement support operation, operation of an NDA laboratory, nuclear materials packaging and transfer, and nuclear materials storage. 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 packaging and transfer operation receives nuclear material at the facility and transfers shipments out of the facility. The nuclear materials storage operation-provides a safe storage location for the actinide materials at the plutonium facility. Operations are currently conducted in the TA-55 vault, material-handling and accountability rooms in the basement, and throughout the first floor of PF-4.

4.3.5.2 Programs Supported

Nuclear materials control, accountability, and storage capabilities are used by all of the TA-55 programs. The nuclear materials stabilization program makes the greatest demands on the nuclear materials control, accountability, and storage capabilities of TA-55.

4.3.5.3 Radioactive Materials

The hazardous radioactive materials of concern for nuclear materials control, accountability, and storage are plutonium (See plutonium metallurgy above), highly enriched uranium (HEU), and other actinides such as neptunium and americium. HEU is a criticality hazard and in some processes is present as a constituent in a pyrophoric material.

4.3.5.4 Nonradioactive Toxic or Hazardous Substances

No toxic or hazardous substances are used in significant quantities.

4.3.5.5 Hazardous Energy Sources

Other safety concerns in MC&A storage include hazards involving the use of industrial equipment such as a forklift, crane, and electrical equipment.

4.3.6 Waste Treatment

4.3.6.1 Description

There are capabilities in the plutonium facility to treat, package, store, and transport the radioactive waste produced as part of TA-55 operations. Liquid wastes are converted to solids or are piped to the Laboratory's radioactive liquid waste treatment facility at TA-50. Some TRU wastes are immobilized with cement in 55-gal. drums. Other TRU waste is consolidated in 15- or 30-gal. drums or is packaged in waste boxes. Low-level wastes also are packaged in PF-4, where care is taken to avoid combining hazardous wastes with radioactive waste to form undesirable mixed wastes. Solid wastes of all types are stored temporarily at TA-55 until they are shipped to on-site waste storage or disposal locations, primarily TA-54.

4.3.6.2 Programs Supported

Waste treatment capabilities support all programs at TA-55 except nonproliferation technologies.

4.3.6.3 Radioactive Materials

Waste treatment hazards could involve any of the radioactive materials found in TA-55. However, these materials are typically not present in large amounts or high concentrations in process wastes.

4.3.6.4 Nonradioactive Toxic or Hazardous Substances

No toxic or hazardous substances are used in significant quantities.

4.3.6.5 Hazardous Energy Sources

Other safety concerns in waste treatment include hazards involving the use of industrial equipment such as a crane, forklift, and cement-mixing equipment.

4.3.7 TA-55 Facilities Support

4.3.7.1 Description

The infrastructure and supporting systems at TA-55 are essential for maintaining the operating reliability, safety, and environmental integrity of the site. The supporting systems for PF-4 include

- a confinement system that consists of three layers of confinement to prevent accidental releases of nuclear materials;
- a ventilation system that contains four zones, all of which are maintained at a lower pressure than the outside air;
- a conveyor system that transports contaminated materials and equipment to almost any point on the first floor;

- a criticality detection system that monitors operations on the main processing floor of the plutonium facility, as well as in the basement vault, to detect gamma energy released from fission of special nuclear material;
- a continuous air-monitoring system that samples and analyzes air from multiple points throughout PF-4 laboratory areas, basement, ductwork, and exhaust stacks; and
- radioactive liquid waste piping that transports low-level radioactive waste to the radioactive liquid waste treatment facility at TA-50.

The supporting systems for the entire TA-55 site, including PF-4, include the following.

- two water storage tanks having capacities of 100,000 and 500,00 gal.;
- fire detection system consisting of smoke detectors, thermal detectors, manual pull stations, drop-box alarm stations, and flow and pressure switches;
- fire suppression system consisting of a wet-pipe, automatic sprinkler protection system fed by two 150,000-gal. tanks;
- chilled-water systems for air tempering, heat absorption, and glovebox equipment supply;
- glovebox vacuum system consisting of wet vacuum, dry vacuum, and ultrahigh vacuum;
- instrument air supplying 100-psig compressed air;
- process steam and condensate;
- acid, caustic, industrial, and sanitary waste lines; and
- process gases (i.e., argon, helium, oxygen, nitrogen, 6% hydrogen/94% argon, etc.

Support system operations currently are conducted throughout the basement of PF-4 and are provided to all processing rooms.

4.3.7.2 Programs Supported

Facilities support capabilities are used by all programs.

4.3.7.3 Radioactive Materials

Radioactive material could appear in the PF-4 ventilation system should a release occur from the HEPA filters. These materials could originate from any of the processes described.

4.3.7.4 Nonradioactive Toxic or Hazardous Substances

Nonradioactive toxic/hazardous substances used in facilities support include central supplies of nitric acid, hydrochloric acid, hydrogen fluoride gas, hydrogen gas, and chlorine gas, plus bulk quantities of nitrogen and argon piped to gloveboxes to provide an inert environment for handling reactive materials.

4.3.7.5 Hazardous Energy Sources

Other safety concerns in facility support include hazards involving the use of industrial equipment such as a diesel generator, forklifts, furnaces, and other heavy machinery. High-voltage equipment, electrical switchgear, and steam lines also present potential hazards.

5.0 References

Cunningham1996: Cunningham, Paul T. and A.E. Whiteman, "Los Alamos National Laboratory Stockpile Management Program - FY96 Technical Task Plans," January 1996.

Demuth 1996: "Floorspace Requirements for Capability Maintenance and Improvement Project (CMIP)," Los Alamos National Laboratory Memorandum from N. Demuth to C. Zerkle TSA-7:96-11, March 15, 1996 Los Alamos, New Mexico.

DOE 1994, "Criteria for Safe Storage of Plutonium Metals and Oxides," DOE-STD-3013-94, December 1994.

DOE 1998: "Pit Disassembly and Conversion Demonstration Environmental Assessment and Research and Development Activities," US Department of Energy, Office of Fissile Materials Disposition, DOE/EA-1207, Washington, D.C. (August 1998).

DOE 1999a: "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).

DOE 1999b: "Record of Decision: SWEIS in the State of New Mexico," 64FR50797, Washington, D.C. (09/19/99).

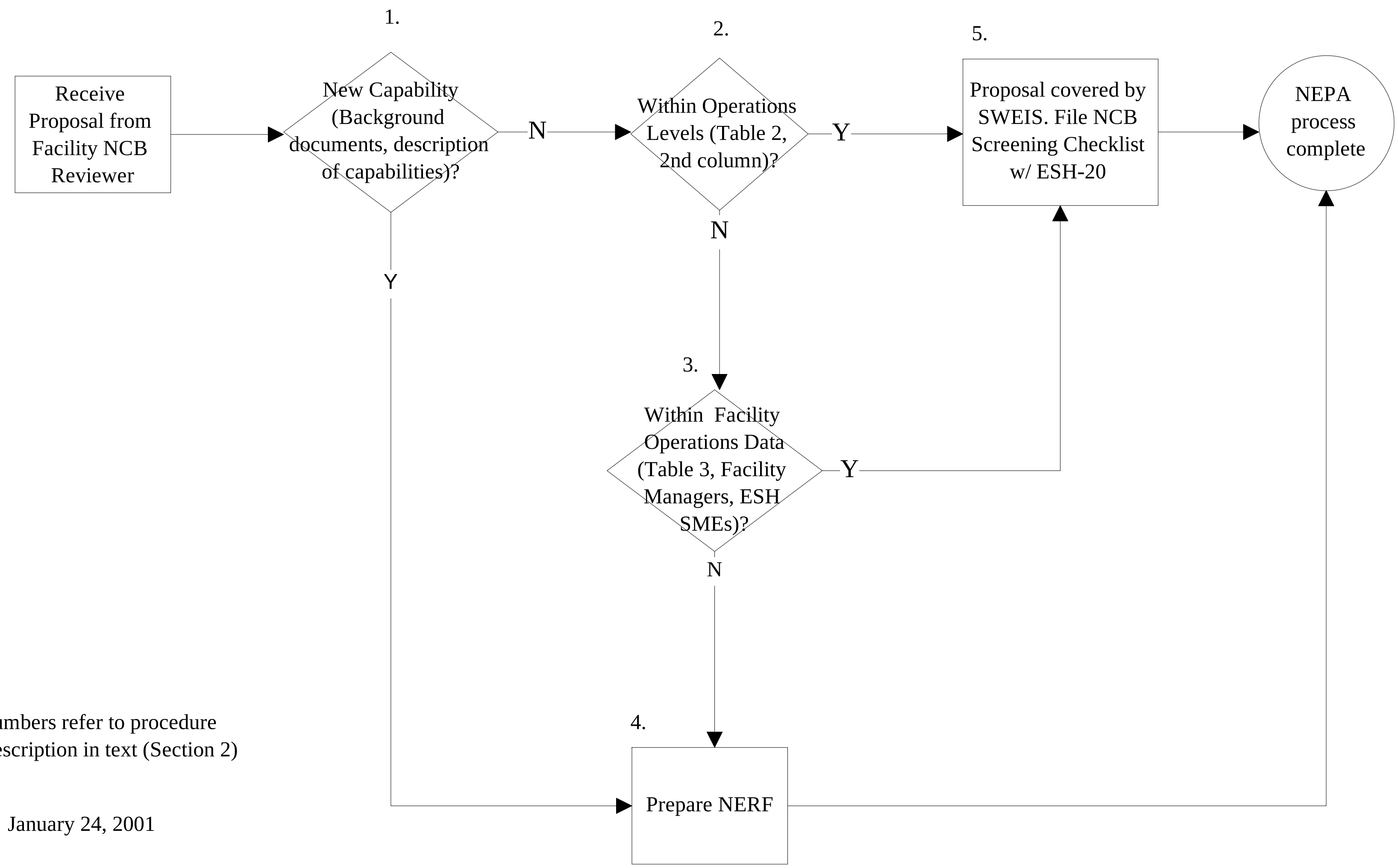
LANL 1996: "Background Information for TA-55 for Site-Wide Environmental Impact Statement, Los Alamos National Laboratory. Transmitted to Mr. Thomas Anderson, GRAM, Inc. by Doris Garvey Project Leader, LANL Site-Wide Environmental Impact Statement, December 2, 1996.

LANL 1999c: "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: "NEPA Determination Document, TA-55 Plutonium Complex"

Attachment 1: ESH-20 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 ESH-20?	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 ESH-20 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 ESH-20 NCB staff:

NEPA:	Name	Date	Comment:
Biological Resources:	Name	Date	Comment:
Cultural Resources:	Name	Date	Comment:
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).
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.	Pits will be destreuctively and non-destructively as required. (I purposely left out a set number but one can be assigned if so desired).
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 600 kgs/yr of actinides. Is this sufficient or should the number be 800 kg? Tritium separation activity stays at TA-55. Support for hydrodynamic testing stays at TA-55.
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			None of this happens at CMR?
Actinide materials and science processing and R&D			All stays at 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:

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

(a) 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.

(b) 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.

(c) 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]."

(d) 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."

(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, actinide R&D, and hydrodynamic testing support, and tritium separations.

(f) 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	NA
PF-4 modifications:			
Phase 1	Yes	Yes	?
Phase 2	No	Yes	?
Phase 3	No	No	?
Dedicated transportation corridor	No	No	Probably not necessary
Relocation of processes to CMR	No	No	Yes, if CMRR is constructed but will probably be after 2011
New Office Building	[b]	Yes [c]	Yes, 2 have been built since 2000 and a third (PF-1) annex is scheduled to start in the near future.
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
For CMR are any of the above listed things going to happen? I doubt it but…			

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

NMT-7 will work on waste projections

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.

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