EIS

From: John Isaacson [isaacson@lanl.gov]
Sent: Friday, June 03, 2005 2:35 PM
To: KIRK.W.OWENS@saic.com
Cc: ewithers@doeal.gov; torig@lanl.gov; sradz@lanl.gov; janecky@lanl.gov
Subject: HE Processing NEPA Determination Document

Attachments: 9_High_Explosives_Processin.doc; High_Explosives_Process_DXC.doc

9_High_Explosives_Processin.do... High_Explosives_Process_DXC.do...

Kirk, attached are two pieces to the HE Processing NEPA Determination Document. Table 2 is updated capabilities for ESA, and the full document has been edited by DX for their piece.

Thanks, JI
--

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

Attachment 2: NCB Screening Checklist

Table 2. High Explosives Processing Facility [a]

Capability	Operational Levels[b]
1. High Explosives Synthesis and Production	1.1 Continue synthesis research and development, produce new materials, and formulate explosives as needed. 1.2 Increase production of materials for evaluation and process development. 1.3 Produce material and components for directed stockpile production.
2. High Explosives and Plastics Development and Characterization	2.0 Evaluate stockpile returns 2.2 Increase efforts in development and characterization of new plastics and high explosives for stockpile improvement. 2.3 Produce material and components for directed stockpile production.
3. High Explosives and Plastics Fabrication	3.1 Continue traditional stockpile surveillance and process development. 3.2 Supply parts to Pantex for surveillance, stockpile rebuilds, and joint test assemblies. 3.3 Increase fabrication for hydrodynamic and environmental testing.
4. Test Device Assembly	4.1 Increase test device assembly to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and increased research and development. Approximately 100 major assemblies per year.
5. Safety and Mechanical Testing	5.1 Increase safety and environmental tests related to stockpile assurance. Improve predictive models. 5.2 Approximately 15 safety and mechanical tests per year.
6. Research, Development, and Fabrication of High-Power Detonators.	6.1 Operations to support assigned stockpile stewardship management activities; manufacture up to 40 major product lines per year. 6.2 Support DOE complex for packaging and transportation of electro-explosive devices.

a: Source: Modified from SWEIS 1998 Yearbook (LANL 1999).
b: The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility. Amounts projected by the ROD are 100,000 pounds of explosives and 20,000 pounds of mock explosives processed per year.

LA-UR-01-3040

Title: ESH-20 NEPA Determination Document 9

High Explosives Research and Development and Processing Facilities

Los Alamos
NATIONAL LABORATORY

Table of Contents

Tables

Figures

1.0 Introduction

This document describes the *National Environmental Policy Act of 1969* (NEPA) operational envelope for operations, capabilities, and parameters analyzed for High Explosives Research and Development and Processing Facilities, 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 the High Explosives Research and Development and Processing Facilities (HE processing facilities) operate within the bounds of the impacts projected by the SWEIS, the facilities are in compliance with NEPA. If there is potential to exceed projected impacts, further NEPA review would be required.

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

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

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

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

Table 1. Principal Buildings and Structures of the High Explosives Processing Facilities

Technical Area	Principal Buildings And Structures
TA-08	Nondestructive Testing/Radiography: 08-22, 23, 24, 70 Storage, Radiography Sources: 08-65
TA-09	Offices, Laboratories: 9-21, 32, 33, 34, , 37, 38, 42, 45, 46, 48 Note: TA-9-35 and 43 are scheduled for D&D. Currently not in service. Service Magazines: 9-22, 23, 24, 25, 26, 27, 208 Shop Buildings: 9-28, 214 Storage: 9-30 Solvent Storage: 9-31 Magazines: 9-36, 39, 44, 47, 49, 53, 53, 54, 55, 204 Thermal Cycle Facility: 9-40 Receiving and Shipping Building: 9-50 Detonator Storage: 9-51
TA-11	Control Buildings: 11-2, 3, 4 Air Gun Building: 111-24 Drop Tower: 11-25 Vibration Test Building: 11-30 Air Compressor Building: 11-33 Magazine: 11-36 Weapon Burn Test Facility: 11-0
TA-16	Instrumentation/Testing: 16-54 Magazine: 16-58 Storage Buildings: 16-164, 208, 332 Dark Room: 16-222 Process Buildings: 16-260, 306 Rest Houses (HE Magazines): 16-261, 263, 267 HE Assembly/Rest House: 16-265 Inspection Building: 16-280 Rest House/HE Shipping: 16-281 Rest House/Museum: 16-283 Rest House/HE Receiving: 16-285 Mock Explosives Prep (being vacated): 16-302 Rest House (being vacated): 16-303 Plastics Building: 16-304, 305, 307 Solvent Storage: 16-339 Explosives Process Building: 16-340 Rest Houses: 16-341, 345, 411, 413, 415, 435, 437
TA-22	Detonation Systems Laboratory: 22-90, 91, 93 Solvent Storage Shed: 22-95 HE Storage Building: 22-66, 67, 68, 69 Advanced Development Laboratory: 22-34 HE Process Building: 22-8 Magazines: 22-7, 15, 16, 17, 18, 19, 20, 21, 22, 23 High Power Detonator Facility: TA-22-115 Hydrotest Design Facility: TA-22-120
TA-28	Magazines, Protective Force: 28-1, 2, 3 Magazine, Explosives: 28-4 Magazine: 28-5
TA-37	Standard HE Magazines: 37-2 through 26

Table 2. High Explosives Processing Facility [a]

Capability	Operational Levels[b]
1. High Explosives Synthesis and Production	1.1 Continue synthesis research and development, produce new materials, and formulate and performance test and evaluate explosives as needed. 1.2 Increase production of materials for evaluation and process development. 1.3 Produce material and components for directed stockpile, military, and security interest production.
2. High Explosives and Plastics Development and Characterization	2.0 Evaluate stockpile returns and materials of specific interest 2.2 Increase (40%) efforts in development and characterization of new plastics and high explosives for stockpile , military, and various security interest improvement. 2.3 Produce material and components for directed stockpile production.
3. High Explosives and Plastics Fabrication	3.1 Continue traditional stockpile surveillance and process development. 3.2 Supply parts to Pantex for surveillance, stockpile rebuilds, and joint test assemblies. 3.3 Increase fabrication for hydrodynamic and environmental testing. 3.4 Fabricate materials for specific military ans security interest testing
4. Test Device Assembly	4.1 Increase test device assembly to support stockpile related hydrodynamic tests, joint test assemblies, environmental and safety tests, and increased research and development. Approximately 100 major assemblies per year.
5. Safety and Mechanical Testing	5.1 Increase (50%) safety and environmental tests related to stockpile assurance and new materials development. Improve predictive models. 5.2 Hundreds of safety and mechanical tests per year.
6. Research, Development, and Fabrication of High-Power Detonators.	6.1 Increase operations to support assigned stockpile stewardship management activities; manufacture up to 40 major product lines per year. 6.2 Support DOE complex for packaging and transportation of electro-explosive devices.

a: Source: Modified from SWEIS 1998 Yearbook (LANL 1999).
b: The total amount of explosives and mock explosives used across all activities is an indicator of overall activity levels for this Key Facility. Amounts projected by the ROD are 82,700 pounds of explosives and 2910 pounds of mock explosives.

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 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 HE processing facilities and capabilities from the SWEIS document and the background documentation. The supporting documentation on the HE processing 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 tritium facilities and capabilities from the SWEIS (Section 3 of this document) and from the background documents (Section 4 of this document).

   a. If this is a new capability, go to 4.
   b. If this is not a new capability, go to 2.
2. Does the proposal fit within one of the operations levels for that capability in the SWEIS? Compare description to second column of Table 2.
   a. If the proposal is within the operations levels for that capability, go to 5.
   b. If the proposal is not within the operations examples, go to 3.
3. Is the proposal within the facility operations data envelope? Work with the facility manager and other Environment, Safety, and Health subject matter experts (SMEs) to calculate if the proposal is within the envelope of facility operations data (Table 3).
   a. If the proposal is within the facility operations data envelope, go to 5.
   b. If the proposal is not within the facility operations data envelope, go to 4.
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. High Explosives Processing Facility Operations Data

Parameter	Units [a]	SWEIS ROD
Radioactive Air Emissions:		
• Uranium-238	Ci/yr	9.96×10^{-7}
• Uranium-235	Ci/yr	1.89×10^{-8}
• Uranium-234	Ci/yr	3.71×10^{-7}
NPDES Discharges:[b]		
• Number of outfalls		11
• Total Discharges	MGY	12.4
• 02A-007 (TA-16)	MGY	7.4
• 03A-130 (TA-11))	MGY	0.04
• 05A-054 (TA-16)	MGY	3.6
• 05A-055 (TA-16)	MGY	0.13
• 05A-066 (TA-09)	MGY	0.74
• 05A-067 (TA-09)	MGY	0.33
• 05A-068 (TA-09)	MGY	0.06
• 05A-069 (TA-11)	MGY	0.01
• 05A-071 (TA-16)	MGY	0.04
• 05A-096 (TA-11)	MGY	0.01
• 05A-097 (TA-11)	MGY	0.01
Wastes:		
• Chemical	kg/yr	13,000
• Low-level waste	m^3/yr	16
• Mixed low-level waste	m^3/yr	0.2
• TRU waste/Mixed transuranic waste	m^3/yr	0

a: Ci/yr = curies per year; MGY = million gallons per year.
b: NPDES is National Pollutant Discharge Elimination System.

3.0 SWEIS Data for HE Processing Facilities

This section provides information directly from the SWEIS. Section 3.1 is a description of high explosive research and development and processing facilities from Chapter 2 of the SWEIS. Section 3.2 is a description of the capabilities at these facilities at the time the SWEIS was written, while Section 3.3 is a description of the capabilities under the preferred alternative as selected under the Record of Decision.

3.1 SWEIS Description of Facilities

The High Explosives (HE) Research and Development and Processing Facilities are located in parts of TA-8, TA-9, TA-11, TA-16, TA-22, TA-28, and TA-37 (Figures 1 through 8). These facilities were originally designed and built for production-scale operations during the early and mid 1950s and produced HE components for nuclear weapons in the U.S. stockpile reserve for several years (Table 1). LANL has historically upgraded and modernized processing equipment in these facilities to provide prototype HE components to meet the needs of the Nevada Test Site (NTS) program, hydrodynamic tests at LANL, detonator design and production, and other HE activities. Over the last few years, LANL has typically fabricated an average of 1,000 to 1,500 HE parts a year. With reductions in funding, many operations are being consolidated to reduce the number of buildings that must be maintained and the number of workers required.

TA-9 facilities with over 60,000 square feet (5,574 square meters) of floor space support HE synthesis, formulation, and characterization operations, as well as HE-related analytical chemistry, safety testing, process development, and stockpile surveillance. TA–16 facilities with over 280,000 square feet (26,013 square meters) of space support formulation, casting, pressing, machining, assembly, and a range of quality assurance operations. In addition, two beryllium operations are performed at TA–16. TA–11 comprises 12 buildings with 9,300 square feet (864 square meters) in which various environmental and safety tests are performed. The four principal buildings at TA–22, known as Los Alamos Detonator Facility (LADF), contain 50,000 square feet (4,650 square meters) supporting fabrication, testing, and surveillance of explosive detonation systems. In addition, LADF provides DOE-wide support for packaging and transportation of electro-explosive devices. TA–28 and TA–37 are magazine storage areas. The HE facilities at TA-8 occupy buildings with 14,500 square feet (1,347 square meters) in which nondestructive testing operations are performed.

All existing HE fabrication structures meet current applicable earthquake standards. Structures containing HE and those in which HE operations are conducted are constructed with 2-foot (0.6-meter) thick, steel-reinforced concrete walls designed to mitigate the effects of an accidental explosion. Most facilities include support areas for offices; break rooms; restrooms; electrical equipment; heating, ventilation, and air conditioning equipment; maintenance; and in-process staging for materials, components, tooling, and supplies.

TA-16 is categorized as a moderate hazard facility because of the presence of chlorine and a tritium facility. (WETF, described in ESH-20 NEPA Determination Document 2, is a separate “key” facility but is in the same TA as some of the HE processing facilities described here.) Two projects related to HE operations during the next 5 to 10 years were analyzed in the *Relocation of the Weapons Components Testing Facility Environmental Assessment* (DOE 1995a) and in the *Environmental Assessment, High Explosive Wastewater Treatment Facility* (DOE 1995b) (operational in October 1997). Another project is the TA-16 Steam Plant Conversion, a maintenance and refurbishment project that was completed and operational in September 1996.

Several permitted outfalls exist at TA-8, TA-9, TA-11, and TA-16. These outfalls are slated for modification as stated in the *Effluent Reduction Environmental Assessment* (DOE 1996). Six of the outfalls will be eliminated completely, four outfalls are slated for waste stream consolidation, two outfalls are slated for outfall reduction, and one will decrease discharge rates as stated in the

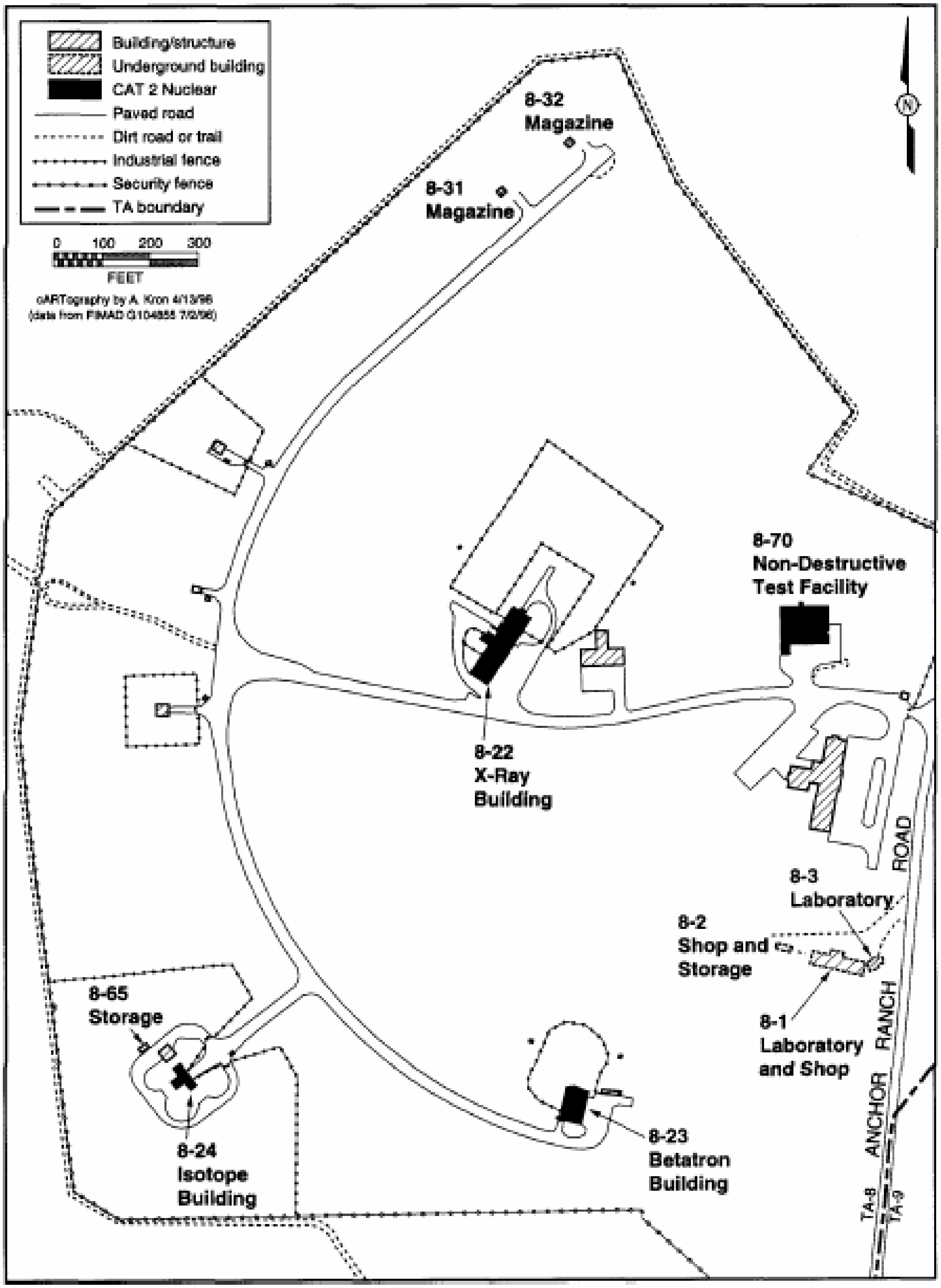


Figure 1. TA-8 High Explosives Processing

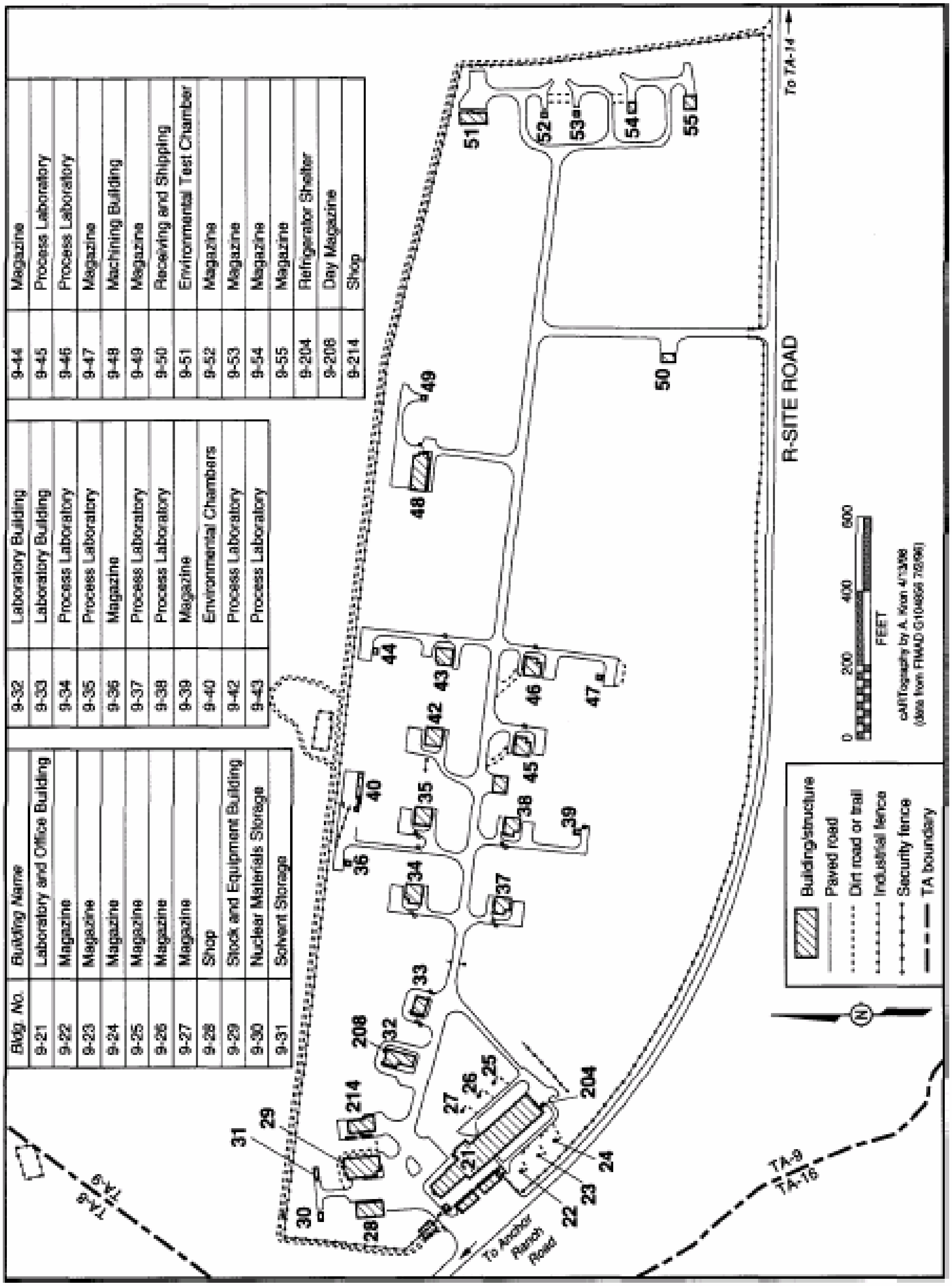


Figure 2. TA-9 High Explosives Processing

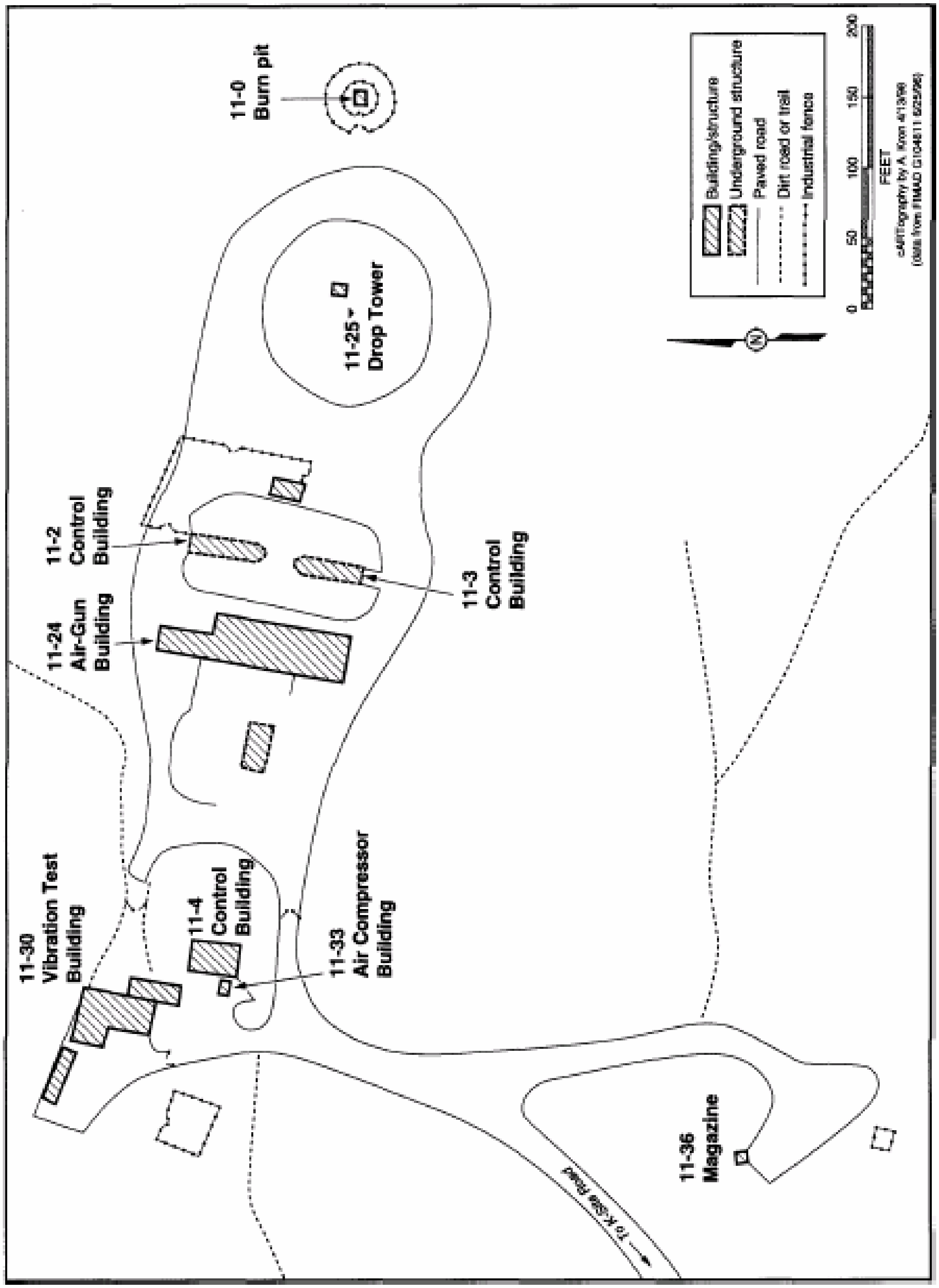


Figure 3. TA-11 High Explosives Processing

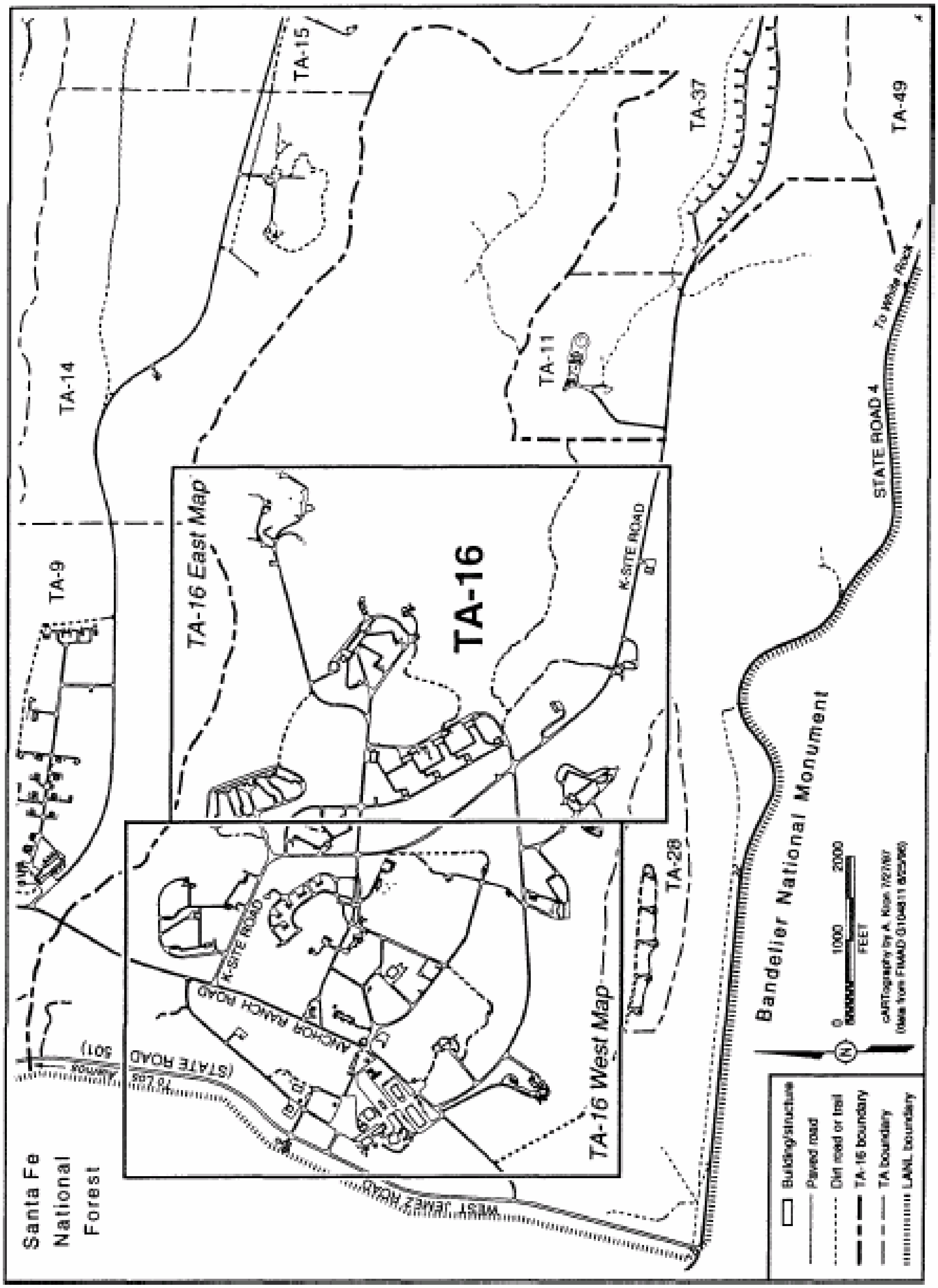
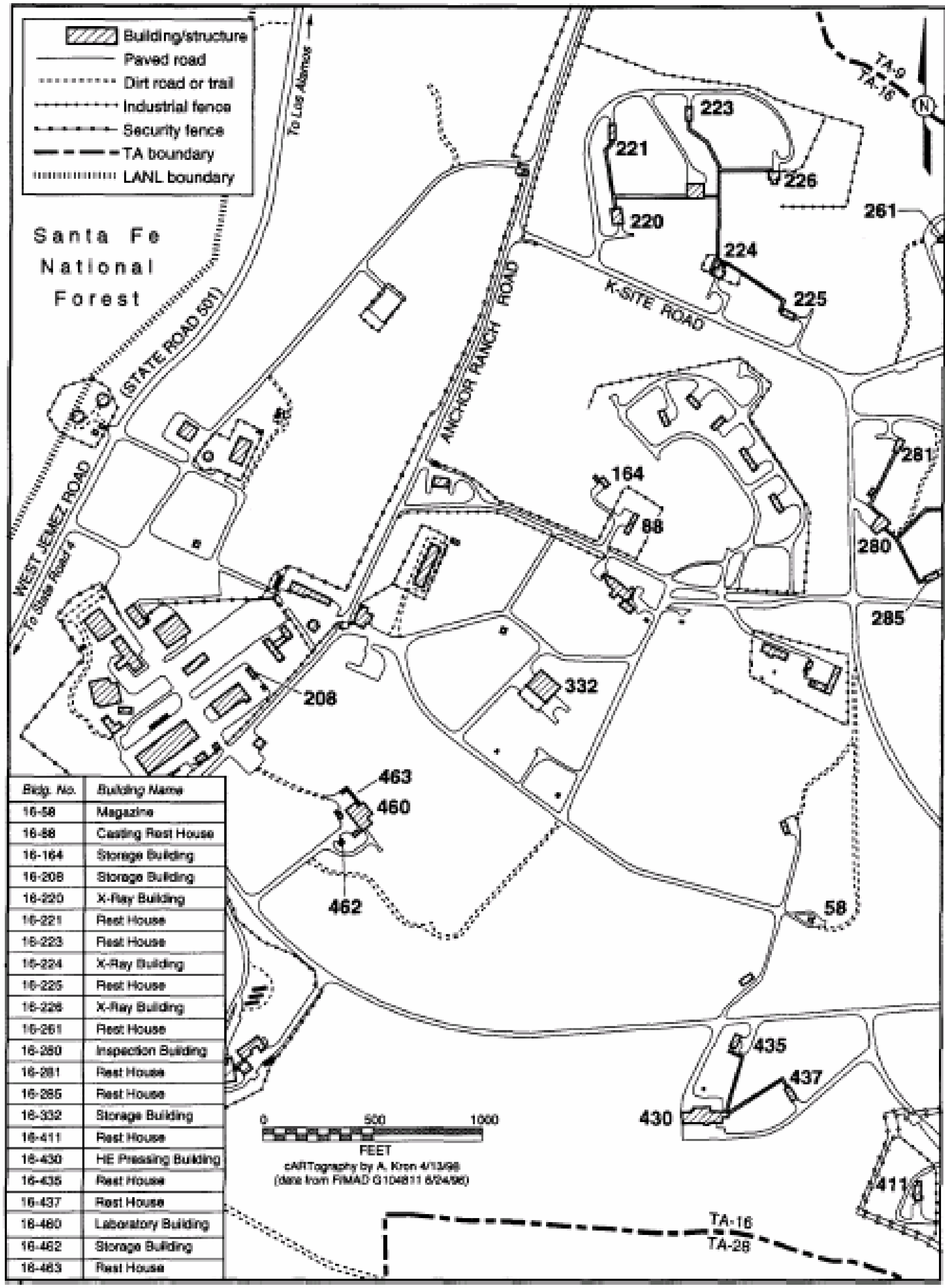
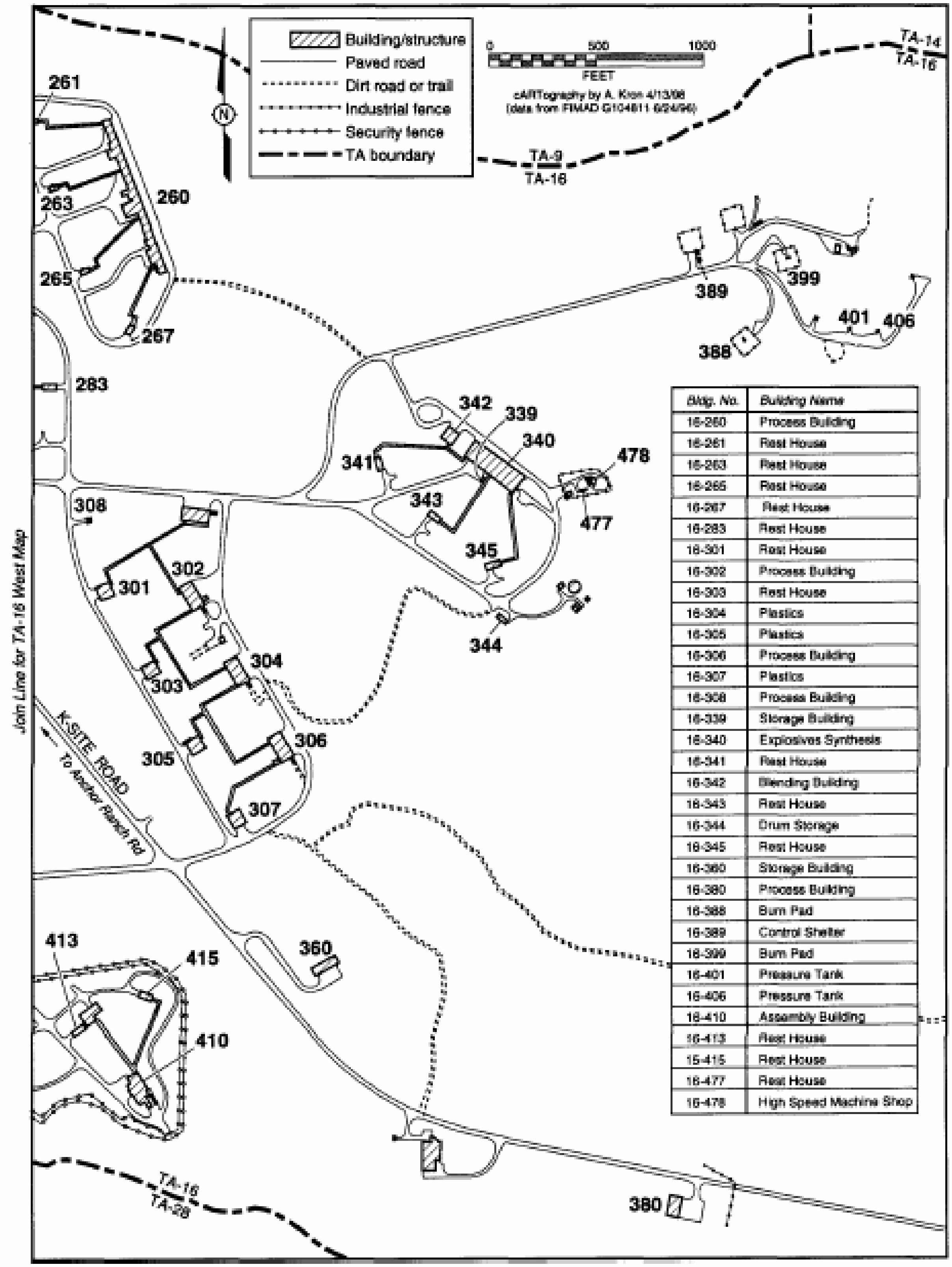


Figure 4. TA-16 High Explosives Processing



Bldg. No.	Building Name
16-58	Magazine
16-88	Casting Rest House
16-164	Storage Building
16-208	Storage Building
16-220	X-Ray Building
16-221	Rest House
16-223	Rest House
16-224	X-Ray Building
16-225	Rest House
16-226	X-Ray Building
16-261	Rest House
16-280	Inspection Building
16-281	Rest House
16-285	Rest House
16-332	Storage Building
16-411	Rest House
16-430	HE Pressing Building
16-435	Rest House
16-437	Rest House
16-460	Laboratory Building
16-462	Storage Building
16-463	Rest House

Figure 5. TA-16 West High Explosives Processing



Bldg. No.	Building Name
16-260	Process Building
16-261	Rest House
16-263	Rest House
16-265	Rest House
16-267	Rest House
16-283	Rest House
16-301	Rest House
16-302	Process Building
16-303	Rest House
16-304	Plastics
16-305	Plastics
16-306	Process Building
16-307	Plastics
16-308	Process Building
16-339	Storage Building
16-340	Explosives Synthesis
16-341	Rest House
16-342	Blending Building
16-343	Rest House
16-344	Drum Storage
16-345	Rest House
16-360	Storage Building
16-380	Process Building
16-388	Burn Pad
16-389	Control Shelter
16-399	Burn Pad
16-401	Pressure Tank
16-406	Pressure Tank
16-410	Assembly Building
16-413	Rest House
15-415	Rest House
16-477	Rest House
16-478	High Speed Machine Shop

Figure 6. TA-16 East High Explosives Processing

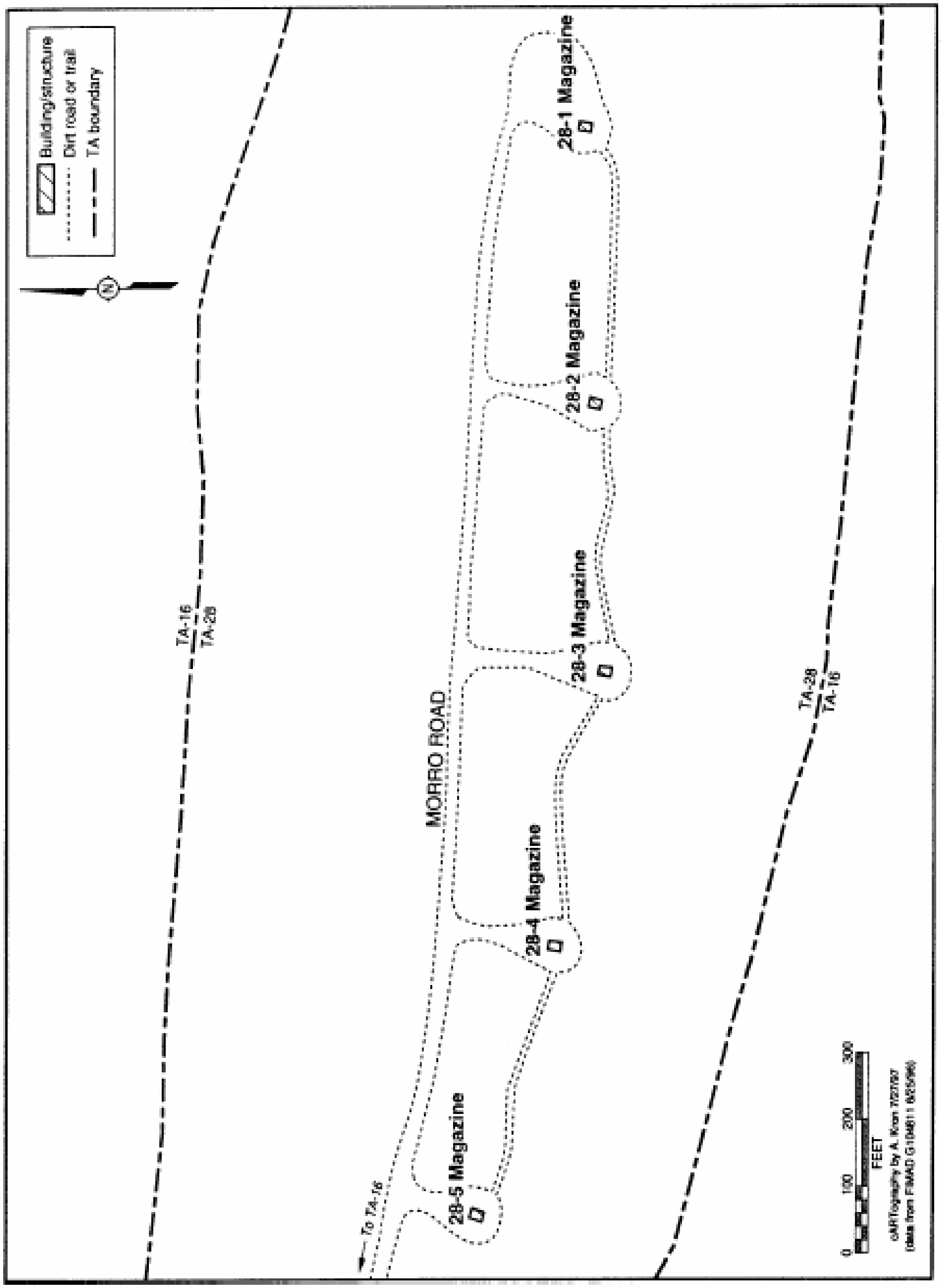


Figure 7. TA-28 High Explosives Processing

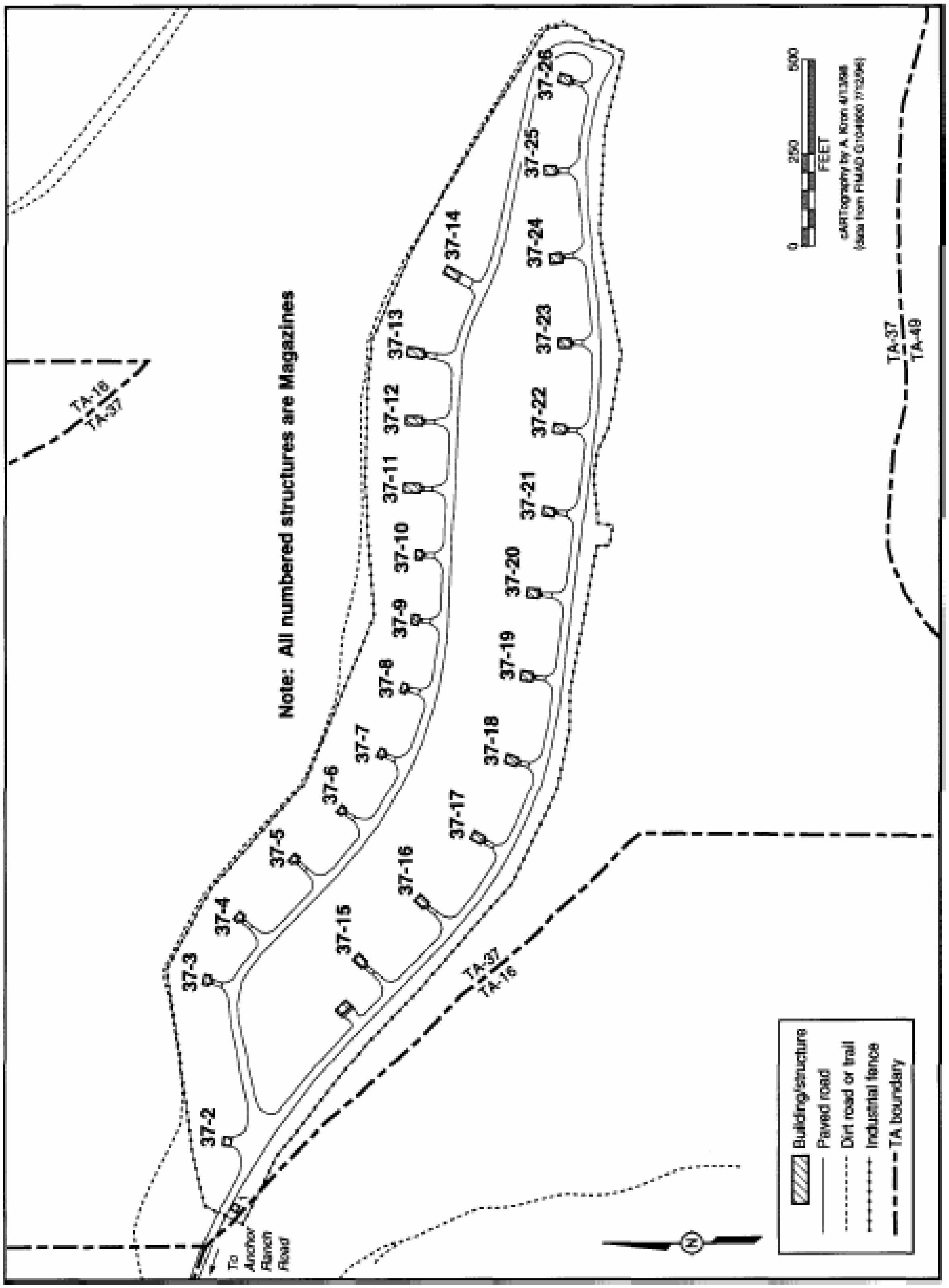


Figure 8. TA-37 High Explosives Processing

HE Wastewater Treatment Facility EA, and four will be decontaminated, but will continue to discharge. The disposition of the remaining outfalls will not change.

The HE processing facilities include support infrastructure for shipping, receiving, storage, packaging, and transportation. All receiving activities are conducted at TA-16, with storage at TA-28 and TA-37.

These facilities also include disposal facilities that are permitted by the State of New Mexico for disposal of HE waste and HE contaminated materials. A large flash pad is used to thermally remove HE contamination from other materials prior to burial. Two aboveground burning trays are used to destroy HE scrap and residue. Two sand filters remove water from sump sludge for drying and burning. One aboveground tray burns oil contaminated with HE. An incinerator is available for disposal of trash from the HE areas; such trash is presumed to be contaminated with HE due to association with HE processes. All water is filtered for HE and treated with activated carbon for solvent removal. Chemical oxygen demand, suspended solids, and acidity (pH) are measured prior to authorizing release to the environment. Non-HE hazardous wastes and LLW are trucked to the LANL waste management facilities.

3.2 SWEIS Description of Capabilities

The major HE processing activities and their principal locations are described below.

3.2.1 High Explosives Synthesis and Production

These activities include explosive-manufacturing capabilities such as synthesizing new explosives and manufacturing pilot-plant quantities of raw explosives and plastic-bonded explosives. These operations allow LANL to develop and maintain expertise in explosive materials and processes that are essential for long-term maintenance of stockpile weapons and materials. Most of the HE synthesis and small-scale production activities are conducted at TA–9. War Reserve detonator testing and production is conducted at TA–22, as discussed below under Research, Development, and Fabrication of High-Power Detonators.

3.2.2 High Explosives and Plastics Development and Characterization

These activities provide characterization data for any explosives application in nuclear weapons technology. Information on initiation and detonation properties of HE coupled with non-HE component information for modeling is essential to the design and safety analysis of a weapon. These activities are conducted at TA-9 and TA-40. A wide range of plastic and composite materials are used in nuclear weapons such as adhesives, potting materials, flexible cushions and pads, thermoplastics and elastomers. It is also necessary to have a thorough understanding of the chemical and physical properties of these materials to model weapons behavior. Most of the materials characterization work is conducted at TA-9, TA–16, and TA-40.

3.2.3 High Explosives and Plastics Fabrication

HE powders are typically compacted into solid pieces and machined to final specified shapes. Some small pieces are pressed into final shapes, and some powders, based upon their properties, are melted into stock pieces. Fabrication of plastic materials and components is a core capability associated with HE processing. Efforts are focused on weapons needs, but a wide variety of plastic and composite materials may be fabricated. Most of the HE and plastics fabrication is performed at TA-9 and TA-16.

3.2.4 Test Device Assembly

Test devices are assembled, ranging from full-scale nuclear explosive-like assemblies (where fissile material has been replaced by inert material) to material characterization tests. Assembly operations for the largest test devices are performed in TA-16. Smaller test assemblies may be prepared at the explosives testing support facilities at TA-9, TA-22, and TA-40. Radiography examinations of the final assembly are done at TA-8.

3.2.5 Safety and Mechanical Testing

Capabilities exist for measuring mechanical properties of explosives samples, including tensile, compression, and creep properties (i.e., change of materials shapes over time). Test assemblies can be instrumented with strain gages, pressure gages, or other diagnostic equipment. Safety testing, such as HE handling tests, drop tests, and impact tests, are used to evaluate abnormal conditions. Accelerated aging tests are conducted at TA-9. Most safety, mechanical, and environmental testing is conducted in laboratory and test buildings at TA-9, TA-11, and TA-16.

3.2.6 Research Development and Fabrication of High-Power Detonators

Capabilities at TA-22 include detonator design; printed circuit manufacture; metal deposition and joining; plastic materials technology; explosives loading, initiation, and diagnostics; lasers; and safety of explosives systems design, development, and manufacture. Detonators, cables, and firing systems for tests are built in this program. This also includes support to the DOE complex for packaging and transportation of electro-explosive devices.

The Los Alamos Detonator Facility (LADF) (Figure 9) (Buildings 90, 91, 93, and 34) houses the research, development, and fabrication capabilities for detonation systems. This facility consists of three connected buildings, one of which, Building 90, is an office wing connected to Building 91 by a corridor. Building 91 is designated as the inert half of the facility, meaning there are no high explosives processed there. The printed circuit manufacturing, cable fabrication, and electronics work is done in this facility.

In Buildings 93 and 34, bulk explosive powder is formed into detonator subassemblies and incorporated into final assemblies that are then measured, inspected, and prepared for storage or test firing. The area around the HE building (93 and 34) is enclosed by a fence with a locked gate, and access to the building is limited to authorized personnel. Small-scale testing activities are also performed in Building 34.

A facility may be constructed in the future as a separate detonator production facility. This action, which was analyzed in the Nonnuclear Consolidation EA (DOE 1993), was delayed from its original schedule; it is currently uncertain when this action might be undertaken.

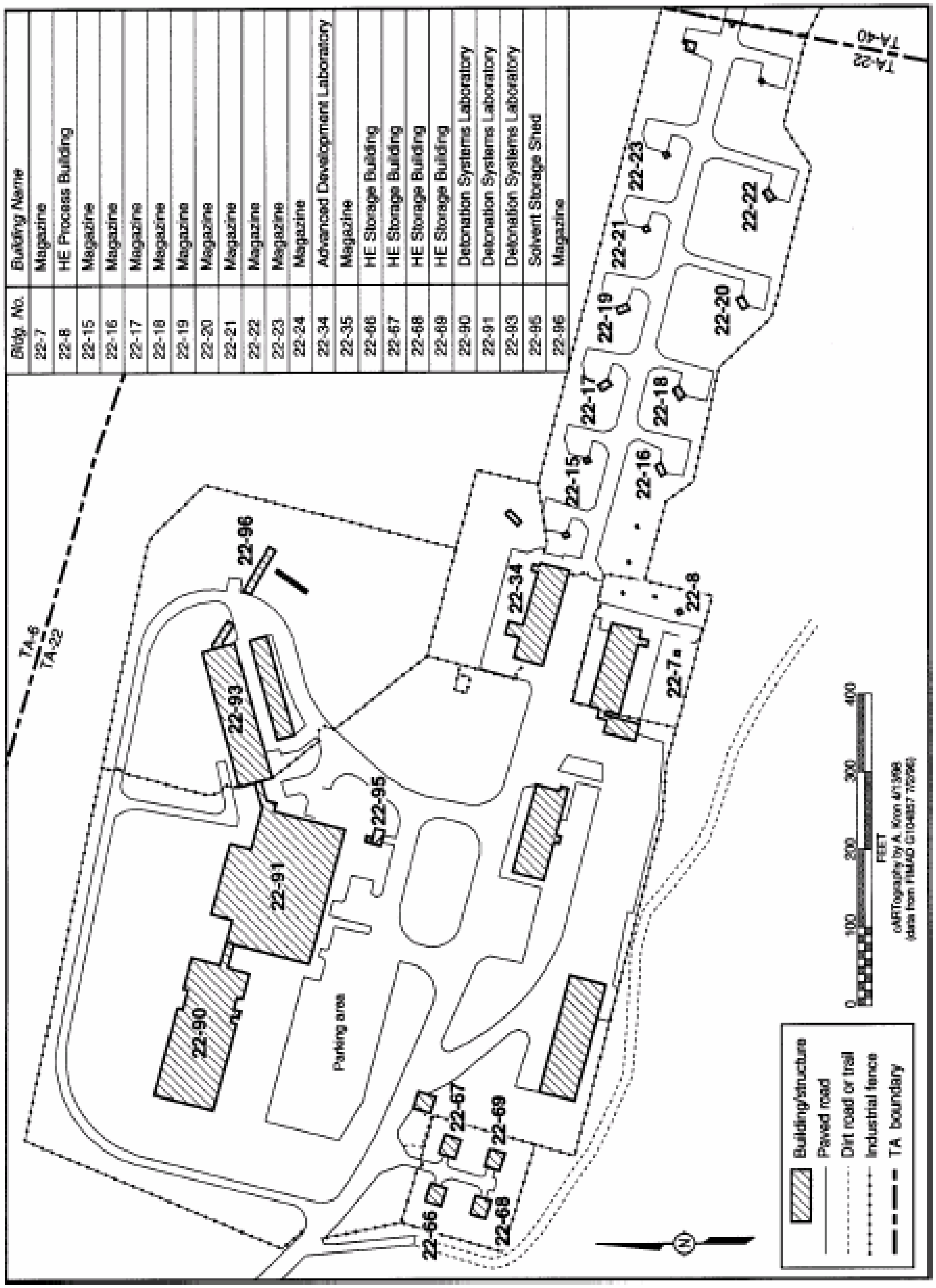


Figure 9. TA-22 Los Alamos Detonator Facility

4.0 Background Document Information for HE Processing

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

4.1 Description of High-Explosives-Processing Facilities

The high-explosives- (HE-) processing facilities, located at TAs-8, -9, -11, -16, -28, -37, at Los Alamos National Laboratory (LANL), were designed and built for production-scale operations during the early and mid-1950s and, in fact, produced HE components for nuclear weapons in the US stockpile [also known as the war reserve (WR)] for several years. LANL has continually upgraded and modernized processing equipment in these facilities to provide prototype HE components to meet the needs of the Nevada Test Site (NTS) program and of hydrodynamic tests at Los Alamos. Using the existing HE-manufacturing infrastructure along with state-of-the-art processing equipment, LANL has continued to produce the high-quality, complex HE components used in these test programs. Over the last few years, LANL has typically fabricated an average of 1,000 to 1,500 HE parts per year, a level of production far below the original design capacity. Current levels of funding cannot support full operations, thus many operations are being consolidated to reduce the number of buildings that must be maintained and the number of workers required.

LANL's full range of HE-processing capabilities includes HE storage magazines, HE synthesis, formulation, pressing, machining, assembly, shipping and receiving of HE and HE devices; quality assurance (QA) processes; and stringent disposal requirements. Additionally, TAs-16, -11 and -9 have facilities for characterizing HE and for performing environmental and safety tests on HE and HE assemblies.

Los Alamos HE facilities were designed in accordance with Department of Defense (DoD) Ammunition and Explosives Safety Standards, DoD 6055.9 (now referenced in the DOE Explosives Safety Manual, DOE/EV/06194). Operations are segregated by hazard class. Class I processes, the most hazardous, were designed to be conducted remotely so that an accidental detonation vents the high pressure and fragments via a frangible wall away from inhabited areas. As a result of safety requirements, HE-processing buildings are well separated from one another. TAs-11, -16, -28, and -37 are contiguous, and the TA-8 and -9 facilities are located nearby. These facilities are dispersed over a total area of 2.8 mi^2.

HE-processing facilities are generally separated from other operations and all are within restricted areas that require DOE badges for access through security check stations. Access to all buildings is further controlled by locks on building entrances that require specially controlled keys. The TA-11, -16, and -37 explosives-processing areas are contiguous, and access to these areas is further restricted by a computer-controlled access gate. All HE areas are patrolled by protective force guards.

4.1.1 TA-9

TA-9 facilities (Figure 2), including administrative support and HE storage, comprise 41 buildings with over 60,000 ft^2, which support HE synthesis, formulation, and characterization operations up to pilot scale; HE-related analytical chemistry; small-scale safety testing; process development; and stockpile surveillance. Building 20 is an office building. Building 21 contains offices, laboratories, and chemical storage. Six buildings (Buildings 22-27) are small, reinforced-concrete structures used to store small, frequently used HE samples. Building 32 contains four laboratories and a mass spectrometer used to analyze gas samples. The laboratories drain into a HE sump outside the building. Ten buildings (34, 35, 37, 38, 40, 42, 43, 45, 46, and 48) are reinforced-concrete structures with process rooms and bays with blow-out walls. Part of Building 40 is underground to provide added protection in the event of an explosion. Building 42 is located near a service road but is separated from it by an earthen barricade. There are 8 HE storage magazines (Buildings 36, 39, 44, 47, 49, 53, 54, and 55). The remaining buildings are miscellaneous storage buildings, shops, and shelters.

HE waste from the sump is collected**,** pumped out, and burned at the TA-16 burn pads. Supernatant water from the sump is currently discharged to the environment, but this practice will be discontinued in the near future.

4.1.2 TA-16

TA-16 facilities comprise 78 buildings with over 280,000 ft^2. Large-scale HE formulation, casting, pressing, machining, assembly, mechanical and safety testing**,** and an extensive range of quality assurance (QA) operations are supported here. TA-16 also receives, stores, packages, and transports HE for the entire Laboratory.

4.1.2.1 Large-Scale Explosives Formulation and Fabrication (Buildings 339-345)

The fabrication plant has large-scale, high-explosive capabilities for manufacturing and processing HE powders and for conducting specialty-explosive-loading operations. Some small special test devices are also assembled in TA-16-340.

4.1.2.2 High-Explosives Fabrication and Inspection

The high-explosives fabrication and inspection facility consists of Buildings 260, 261, 263, 265, 267, 430, 435, and 437. TA-16-260 and -430 house high-explosives fabrication processes. All other buildings above are staging magazines. Machined components required for weapons research and development and for full weapons test assemblies are fabricated to dimensional specifications. Casting operations provide cast HE components for testing, as well as mock HE for use in weapons systems training and for tests that require mockups of components with the physical properties of HE as substitutes for actual HE components. HE-pressing operations consolidate plastic-bonded explosives into solid charges or into stock pieces for machining components for hydrotests and other HE testing.

Operations also include HE inspection and planned real-time component radiography to guarantee integrity and to ensure quality for design intent. Quality assurance functions include measuring the dimensions and density of HE components and test devices using coordinate measuring equipment. Radiography is currently done in TA-16-220, but these operations will be consolidated and moved to TA-16-260 by 1997.

4.1.2.3 High-Explosives Receiving and Storage

To comply with DoD and DOE regulations, all high explosives and energetic materials shipped into the Laboratory must be received at the HE-Receiving Facility, Building 280**.** TA-16-281 and -285 are staging magazines only. The magazines store bulk high explosives and a limited number of HE components until they are required for future processing.

4.1.2.4 High-Explosives Treatment and Disposal

This facility (Buildings 386-389) disposes of HE and HE-contaminated wastes generated at the Laboratory. Current techniques used for disposal include open-air burning for solid HE, “flashing” (that is, heating to above the decomposition temperature of explosives by open burning of fuel) discarded equipment and noncombustible materials, and incineration for combustible HE-contaminated waste. HE-contaminated water, solvents, and oil are also treated in this processing area. All treated effluent is sampled and analyzed to ensure that it meets regulatory requirements.

4.1.2.5 Test Device Assembly

Local hydrotesting and operations involving assembling devices before they are sent to Nevada are performed in Buildings 410 and 411. The other buildings are staging magazines. The facility, which sometimes warehouses nuclear material and classified parts, has two large walk-in vaults with two-man control. When extra security is provided, Building 411 can be used for storing special nuclear materials (SNM), and Building 410 can accommodate a safe, secure transport vehicle overnight. Administrative buildings and functions outside the designated HE-processing area are not included in this compilation.

4.1.2.6 Development and Fabrication of Plastic Materials

This facility consists of Buildings 304, 305, 306, and 307. A wide range of plastic materials and composite materials is developed and fabricated here to directly support weapons programs. These buildings were constructed for HE operations but have been converted to accommodate non-HE functions.

4.1.2.7 Biochemistry

In the past, Building TA-16-460 served as the explosives analytical chemistry facility. Those operations have been transferred to TA-9, and Building 460 has been reassigned to CST-18 for research on biochemistry. Although Building 460 lies within the TA-16 HE exclusion area, because biochemistry is not a capability that supports the major programs addressed in this key facility report, its operations are not discussed.

4.1.3 Other HE Facilities

Also included in this compilation are a few HE facilities at TAs-11, -37, -28, and -8. TAs-11, -28, and -37 are contiguous with TA-16, and their operations are well integrated with those at TA-16. TA-11 comprises 12 buildings with 9,300 ft^2 total floor space in which various environmental and safety tests are performed. TA-37 is an HE storage area of 25 DoD-style magazines only. TA-28 is a smaller, older magazine area with 5 magazines. The HE facilities at

TA-8 are confined to 5 buildings with 14,500 ft^2. Nondestructive testing operations are performed here.

Appendix 1 is a listing of all the buildings in these sites that are currently involved in HE operations or have been so involved in the past.

4.1.3.1 TA-8

The HE-related facilities at TA-8 are confined to five buildings containing 14,500 ft^2 of floor space. Radiography and other nondestructive testing that support HE operations and pit evaluation are performed here**.**

4.1.3.2 TA-11

TA-11 comprises 12 buildings, plus a drop tower facility, which together contain 9,300 ft^2 floor space. Various environmental and safety tests for weapons are performed here. These tests include acceleration and shock testing, vibration and climatic testing, and simulated accident testing involving drops and fuel fires. An additional building may be constructed at TA-11 within the next 5-10 years to better accommodate warhead conditioning and evaluation.

4.1.4 Explosive Storage Areas

TA-37 is an HE storage area that contains only 25 DoD-style magazines. TA-28 is a smaller, older magazine area with 5 magazines.

4.2 Discussion of Missions/Programs and Operational Capabilities Under the Expanded Operations Alternative

4.2.1 Description of Missions

This section discusses 10 Laboratory missions served by the HE-processing facilities.

Stockpile Stewardship and Management
This mission relates directly to the Stockpile Stewardship and Management Program, which includes elements funded by DOE for production base support and other elements that are traditional research and development activities of the Laboratory. The program includes stockpile maintenance and surveillance, enhanced surveillance, assessment and certification, refurbishment, and process development for HE and plastics elements. The program also directly influences the Weapon-Specific research and development Support and the Aboveground Experiments missions (described below) by determining the types and numbers of tests that must be performed for each of the stockpile programs.

Refurbishment of War Reserve Weapons
HE, plastics, and other organic materials degrade more quickly than most other weapon materials. It is prudent to be well prepared to refurbish stockpile weapons at a reasonable rate as stockpile weapons approach 30-40 years of age. A production capability to accomplish this task should be prepared to remedy unanticipated stockpile problems, to produce new weapons, and to modify existing weapons as well. New HE and plastic components would be manufactured at Los Alamos, but replaced parts would be disposed at Pantex. Some stockpile return HE will be processed for additional evaluation and testing.

Weapons-Specific Research and Development Support

The Stockpile Management and Stewardship Program will designate weapons-specific teams to identify needs for specific action relating to existing stockpile weapons such as hydrotesting, performing military characteristics/stockpile target sequence- (MC_S/STS-) related tests, evaluating components, and recertifying war reserve (WR) weapons. If a need is identified to develop a new weapon, to make a major modification in an existing weapon, or to perform research and development on existing stockpile weapons, the action will also be accomplished by a task-specific team.

Dismantlement

Pantex will continue to dismantle retired stockpile weapons and dispose of the components. Los Alamos' role is to support operations at Pantex by developing process improvements. Characterizing stockpile materials, particularly the safety thereof, and developing improved disposal methods are the primary activities involving Los Alamos HE facilities.

Most dismantlement activities at both Pantex and Los Alamos will be completed by the end of FY00. Consequently, although activities between now and 2000 must be covered in the SWEIS, dismantlement program activities will be completed well before the end of the period covered by the SWEIS.

Surety Technology

Surety technology includes three major elements: surety assessment, supporting research and development, and technology development. Surety assessment includes DOE studies such as the *NESSs* required for all DOE nuclear explosive operations, joint (with DoD) assessments of nuclear detonation, and SNM scatter risks from warheads in weapon systems. This work has little impact on experimental facilities at the Laboratory.

Supporting research and development includes a suite of activities aimed at providing data on which to base assessments of warhead response to abnormal environments. This part of the program includes work that is strongly dependent on experiments and on the facilities in or with which they are conducted. Facilities in ESA provide for the fabrication of components and their assembly into full-scale mock warheads.

The third element of the program is technology development. Advanced development of surety components is carried out with the aid of many experimental facilities, including the HE-processing and testing facilities.

Materials and Manufacturing Technology

This program supports HE-processing operations that are essential to many other Laboratory missions by funding much of the facility support. Safety considerations require that many HE functions be separated by large distances and that personnel be well protected from hazardous operations. Considerable infrastructure is required to maintain and periodically upgrade selected facilities or capabilities. By underwriting facility costs, the Laboratory can continue to ensure compliant operation of the facility.

Aboveground Experiments

The goal is to ensure continued safety and reliability of the stockpile through hydrodynamic testing and analysis. All major hydrodynamic testing is coordinated in this program. About half the tests are directly related to stockpile issues and about half relate to physics issues, new ideas, and general safety issues.

The full range of physics design and hydrotest capabilities are required in this program. Phermex, and eventually DARHT, are key facilities, but other firing sites and diagnostic techniques are used as well. Full-scale weapon tests, smaller-scale tests, basic physics tests, materials property tests, and fully confined tests with plutonium are included. Within 10 years, 75% of all shots that involve hazardous materials will be contained to further reduce material scatter. Waste from these shots will be recovered and packaged for disposal through whatever waste-handling system exists at the time.

<u>ARG/NEST Support</u>
The Accident Response Group (ARG) and the Nuclear Emergency Search Team (NEST) develop and maintain capabilities to respond to emergencies involving nuclear weapons and improvised nuclear devices (e.g., those devised by terrorists). TA-16 facilities support this mission in a number of ways: simulated devices are fabricated for use in ARG exercises, and team members are trained in operational procedures.

<u>DoD Munitions Support and Work for Others</u>
The HE facilities support a number of small projects related to DoD munitions and joint projects with other agencies.

<u>Environmental Restoration Program Support</u>
The ER Program is characterizing various contaminated sites and buildings around the Laboratory site. TA-9 personnel support this program by analyzing many of the samples taken from these sites and buildings, particularly those that may contain explosives.

4.2.2 Discussion of Missions/Programs Under the Expanded Operations Alternatives

4.2.2.1 Stockpile Stewardship and Management

Under the No Action Alternative traditional stockpile stewardship and management would continue at normal levels. LANL will supply HE and plastic parts to refurbish (at Pantex) WR surveillance units, including JTUs and flight tests. Replaceable components from all the stockpile returns, primarily HE and plastics, will be returned to Los Alamos for evaluation, and some components will be destructively tested. About 50% of main-charge HE will be recycled.

Enhanced surveillance will concentrate on improving techniques for predicting the effects of aging on stockpile weapons and on developing more complete and more realistic methods for testing sample weapons and components from the stockpile. Three high-fidelity joint test assemblies with HE will be fabricated and assembled at Los Alamos and will be shipped to appropriate facilities for testing. Joint tests are typically conducted with SNL and DoD at DoD facilities. Some tested units will be returned to Los Alamos for disassembly and evaluation.

Los Alamos will continue to improve manufacturing, assembly, disassembly, and testing techniques at a moderate pace. Characterization of new materials is an important aspect of the manufacturing process because suppliers often discontinue production of materials now in use. Some stockpile return HE will be processed for additional evaluation and testing.

Up to 4,000 kg of new HE will be processed yearly to support this mission, and 1,000 kg of stockpile return HE also will be processed. Plastic components and other supporting materials will be supplied as required. About 1,000 kg HE scrap will be produced.

Stockpile hydro shots and environmental tests relating to WR recertification will be required, but these functions are responsibilities of the aboveground experiments and weapon-specific research and development programs, respectively, to ensure overall continuity.

Under the Expanded Operations Alternative, the HE facilities would supply HE and plastic parts for refurbishing an increased number of WR surveillance units. Enhanced surveillance activities would increase, particularly in the areas of realistic testing (including JTUs, high-fidelity flight tests, hydrotests, and WR recertification efforts). Effort would increase in process development, particularly for replacement materials. Some stockpile return HE would be processed for additional evaluation and testing. Up to 5,500 kg of new HE would be processed into parts yearly to support this mission. An additional 1,500 kg of stockpile return HE would be processed, producing a total of ~1,200 kg HE scrap. Plastic components and other supporting materials will be supplied as required.

4.2.2.2 Refurbishment of War Reserve (WR) Weapons

LANL will supply HE and plastic parts for refurbishing WR weapons at an increased rate, with all appropriate quality assurance and testing for WR components. For instance, an increased rate would be necessary to refurbish the stockpile W76 within a reasonable time. Up to 24,000 kg of new HE would be processed into parts yearly to support this mission, producing ~4,000 kg HE scrap. Plastic components and other supporting materials will be supplied as required.

4.2.2.3 Weapons-Specific Research and Development Support

Under the No Action alternative, R&D efforts to characterize and improve existing stockpile weapons will continue at the current rate. On the average, this activity will consist of one hydrotest, two full-scale engineering tests, and several component tests per year. WR weapon recertification will be similar to a modern Phase 3 development program, including hydrotests (see Section 4.2.2.7), full-scale tests related to MC/STS requirements, and several component tests.

Under the Expanded Operations Alternative, efforts to upgrade stockpile weapons would be increased, leading to at least one new weapon development or one major modification to an existing stockpile weapon. WR recertification would continue at the level in the no-action alternative. Up to 1,000 kg each of HE and mock HE would be processed into parts yearly to support this mission, producing ~1,400 kg of scrap. Plastic components, and other supporting materials would be supplied as required.

4.2.2.4 Dismantlement

Under the no action alternative, safety testing of stockpile returns will continue at the rate of about 30/yr, including units processed to determine mechanical properties. Development and demonstration of improved waste disposal methods, primarily for HE and HE-contaminated materials, will continue at the current level of effort. Up to 1,000 kg of stockpile return HE will be processed and tested to support this mission, producing ~900 kg of scrap HE. All dismantlement will be completed by FY00.

Under the Expanded Operations Alternative, Los Alamos efforts in safety testing stockpile HE and in developing waste disposal processes would be accelerated and completed by the end of FY98. Up to 1,500 kg of stockpile return HE would be processed and tested to support this mission, producing ~1,300 kg scrap HE.

4.2.2.5 Surety Technology

Under the no action alternative, characterization of HE in abnormal environments will continue with generic tests and two or three full-scale tests per year. Development of improved initiation systems will require preparing special PETN [pentaerythritol tetranitrate] and TATB [triaminotrinitrobenzene] powders, as well as a supply of pressed pellets and PBX [plastic bonded explosive] test charges. Fire- resistance tests on pits will require HE or mock HE. Advanced technology tests will require several HE or mock HE charges per year. Multipoint safety work and joint Laboratory/DoD safety assessment tests will also require HE or mock HE charges. Up to 700 kg/yr of HE and 200 kg/yr of mock HE will be processed into parts to support this mission, producing ~400 kg of scrap. Plastic components and other supporting materials will be supplied as required

Under the Expanded Operations Alternative, increased effort in safety-related HE behavior would result in more generic and full-scale tests over a period of perhaps 5-10 yr. Eventually, effort in this safety area would decrease and shift to other surety issues. Effort would also increase in multipoint safety, advanced technology, and joint Laboratory/DoD assessment. In addition to weapon-like HE charges, several hundred HE pellets and small HE charges would be required. Up to 1,000 kg of HE and 300 kg of mock HE would be processed into parts yearly to support this mission, producing 800 kg/yr of scrap. Plastic components and other supporting materials would be supplied as required.

4.2.2.6 Materials and Manufacturing Technology

Other weapons-related programs with increased activity will fund an increasing share of facilities costs, which will offset declining funding from research and development. The combined funding from this program and the other weapons-related programs will help maintain and improve essential HE capabilities, although the Materials and Manufacturing Technology Program in itself will have no direct effect on level of effort or materials processes.

4.2.2.7 Aboveground Experiments

Under the no action alternative, the hydrotest program will support the stockpile management and weapon-specific research and development missions with a number of major hydrotests each year. Developing improved evaluation techniques and establishing baseline performance of stockpile weapons with modern test diagnostics will be first priority for several years. Basic research and development efforts will also be supported in this program. These dynamic experiments will investigate a wide range of subjects from basic science and material properties to safety-related issues. Fully contained dynamic experiments with plutonium will be used in both the stockpile and research and development programs.

In addition to the large hydrotests described above, about 100 special HE charges per year will be used for a variety or purposes. Up to 2,000 kg HE will be processed into parts yearly to support this mission, producing about 400 kg of scrap HE. Plastic components and other supporting materials will be supplied as required.

Under the Expanded Operations Alternative, the number of hydrotests would be increased to support the Stockpile Stewardship and Management and Weapon-Specific research and development programs. Use of special HE charges would increase also. Up to 3,000 kg HE would be processed into parts yearly to support this mission, producing ~800 kg/yr of scrap HE. Plastic components and other supporting materials will be supplied as required.

4.2.2.8 ARG/NEST Support

Mock explosive, plastic, and other weapon-like parts will be fabricated for devices used in Accident Response Group (ARG)/Nuclear Emergency Search Team (NEST) exercises and for training purposes. Some HE parts will be used in advanced development work and training. Some excess DoD trainers will be disassembled, refurbished, and used for training DoD explosive ordnance disposal (EOD) teams. Two buildings within the TA-16 explosives area will be used for training EOD teams, as well as ARG/NEST personnel. Up to 20 kg of mock explosive and various other parts will be used yearly to support this mission.

4.2.2.9 DoD Munitions Support and Work for Others

Process development work on dismantling conventional HE munitions, waste minimization, and waste stream treatment will continue. HE parts requested by investigators will be prepared. This work has minimal impact on overall operations and is expected to continue at about the same level of effort, although specific projects may change. However, some weapons work previously funded by DOE may become directly funded by DoD. This work is discussed adequately in preceding sections.

4.2.2.10 Environmental Restoration Program Support

Analytical chemistry support and help in identifying explosives-contaminated items, areas, and buildings will continue at the current level of effort.

4.2.2.11 Summary of Requirements Under the Expanded Operations Alternative

Programs as defined in the Expanded Operations Alternative largely determine the operations and level of effort in the HE-processing facilities. Specific operations in each facility must be examined to accurately estimate environmental impacts. However, the total quantity of HE processed and the total HE waste generated is a good overall indicator. The Expanded Operations Alternative requires processing up to 37,500 kg of explosives and 1,320 kg of mock explosive. Up to 9,500 kg of explosives scrap would be generated.

4.3 Discussion of Operational Capabilities as They Support Programs

The nine core capabilities at the HE-processing facilities (primarily TAs-9 and -16) are described below. Each of the missions described earlier is compared with these core capabilities to assess the ability to meet program requirements

HE-processing operations have been consolidated and downsized during the past several years of declining funding. A number of buildings have been closed, and operations have been terminated or transferred to other buildings to reduce infrastructure costs. Some of these buildings have been, or will be, assigned to other programs. Some other buildings are scheduled for decommissioning. In addition, a number of unusable buildings constructed during the 1940s are scheduled for decommissioning. Appendix 1 lists all buildings in the HE-processing areas and gives their current status.

4.3.1 HE Synthesis and Production

4.3.1.1 Description

A full range of explosive-manufacturing capabilities from synthesizing new explosive molecules through manufacturing pilot-plant quantities of raw explosives and plastic-bonded explosives is available. New explosives with improved properties can be identified and prepared in small quantities for evaluation. Those materials that show promise can be developed and characterized more completely in weapon application. Special-purpose explosives can be custom-formulated for specific uses. For materials that find widespread weapons use, manufacturing technology can be transferred to the private sector for large-scale production, as was done with the insensitive explosive TATB. There is a wide range of specialized equipment and essential support capability available to support these operations.

These operations also develop and maintain expertise in explosive materials and processes that are essential for long-term maintenance of stockpile weapons and materials. Data generated during development of explosives are used to prepare material specifications and to establish a baseline to judge long-term aging effects.

The facilities and equipment are sufficient to support even the Expanded Operations Alternative, although more personnel would be required. Reduced funding would require further consolidation and some loss of capability eventually.

HE development and characterization are done in Buildings, TAs-9-21, -34, -37, -40, and -42 and in TA-16-340 and -301.

In addition, the HE fabrication facilities at both TA-9 and TA-16 are used to prepared samples and test assemblies. Test firing is done at the DX Division firing sites. The environmental impacts of these elements of the HE Development and Characterization are best included with those facilities.

4.3.1.2 Programs Supported

This capability supports, directly or indirectly, all stockpile-related programs. Special raw explosives, like PETN used in detonators and plastic-bonded explosive, are supplied for parts fabrication. The expertise maintained in this area is used in Stockpile Management and New Production.

4.3.1.3 Radioactive Materials

Radioactive materials are not used in the HE synthesis, production and characterization facilities although some analytical chemistry instruments generate very low levels of radiation for diagnostic purposes.

4.3.1.4 Nonradioactive Toxic or Hazardous Materials

Small quantities of a wide variety of acids, bases, solvents and other chemical reagents are used in laboratory scale synthesis activities. Larger quantities of selected chemicals are used in pilot plant synthesis of raw explosives and in processing raw explosives into engineering materials.

This class of materials is used in a number of laboratories at TAs-9, -21, -45, and -46 and in buildings at TA-16-339 through -345. The organization that uses these chemicals maintains a detailed inventory list.

Barium nitrate is used as an inert filler in one specialty explosive, Baratol, and in some mock explosives.

Of course explosives are hazardous materials.

4.3.2 HE and Plastics Development and Characterization

4.3.2.1 Description

<u>HE</u>
Explosives that have or may have application in nuclear weapons are thoroughly characterized. Many properties are important depending on the specific explosive and application.

Initiation and detonation properties and appropriate information for modeling is essential to the design and to safety analysis. As numerical models are improved new data is often required even for well-characterized explosives. Mechanical and other physical properties are likewise essential to engineering design and evaluation. Chemical and stockpile durability information is important for both new designs and stockpile surveillance. Obviously the full range of safety properties is important in processing, fabrication and stockpile environments.

Substitute materials for stockpile explosives are also developed and characterized to expedite a relatively quick fix if a major problem is discovered in a stockpile explosive. New weapons or weapon components also may require new or specially designed explosives. Development of improved processes for preparing high explosives and for disposing of high-explosives waste is also included. A wide range of specialized processing, testing and diagnostic equipment is available to support this capability.

These operations also develop and maintain expertise in explosive testing, properties and databases that are essential for long-term maintenance of stockpile weapons and materials. Data generated during development of explosives is used in preparing material specifications and establishes a baseline to judge long-term aging effects. Development of improved processes for WR production, surveillance and maintenance is also an ongoing effort.

The facilities and equipment are sufficient to support even the Expanded Operations Alternative, although more personnel would be required. Reduced funding would require further consolidation and some loss of capability eventually.

Plastics
A wide range of plastic and composite materials are used in nuclear weapons. Adhesives, potting materials, flexible cushions and pads, thermoplastics and elastomers are used in many essential components. Many of these components must retain their original properties, or nearly so, for a very long time. It is essential to have a thorough understanding of the chemical and physical properties of these materials and components.

A number of functions are included in this capability. Newly marketed materials are screened for possible weapon applications, and selected new materials are evaluated. As weapon needs are identified by design or surveillance engineers, prototype components are fabricated and evaluated. Parts for weapon development programs and even WR weapons can be fabricated, although large-scale manufacturing has typically been done by Allied Signal. Materials are thoroughly characterized and WR specifications are prepared. Data generated during component development establishes a baseline to judge long-term aging effects. There is a wide range of specialized equipment and essential support capability to support these operations.

These operations also develop and maintain expertise in specialized plastics and composite materials and associated processes that are essential for long-term maintenance of stockpile weapons and materials. This capability is also utilized in developing improved stockpile processes and in surveillance efforts.

Plastics are developed and characterized in TA-16-304, -305, and -306. The facilities and equipment are sufficient to support even the Expanded Operations Alternative, although more personnel would be required. Reduced funding would require further consolidation and some loss of capability eventually.

4.3.2.2 Programs Supported

This capability supports all nuclear weapons related programs as shown in Table 2-2. Materials and parts are developed and characterized for new applications or as replacements for materials no longer commercially available. The expertise maintained in this area is utilized in stockpile related activities as well as dismantlement and in developing improved processes for WR production.

4.3.2.3 Radioactive Materials

Radioactive materials are not used in HE and plastics development/characterization facilities.

4.3.2.4 Nonradioactive Toxic or Hazardous Materials

Toxic or hazardous materials, other than common cleaning solvents, are not used in HE development and characterization. Of course explosives themselves are hazardous.

The prepolymer components of a number of plastics used in weapons, particularly polyurethanes, polyisocyanurates, phenolics, epoxies and polyimides, have some toxicity or hazardous properties. Cured (polymerized) materials typically are not hazardous or toxic. Some other chemical reagents and solvents are also used in plastics work. The Group that uses these materials maintains a detailed inventory list. Some hazardous chemical waste is produced in these operations.

This class of materials is processed in TA-16-304, -305, -306 and -307.

4.3.3 HE and Plastics Fabrication

4.3.3.1 Description

<u>HE</u>

High explosive powders are typically compacted into solid pieces and machined to final specified shape. Some small pieces are pressed to final shape and some materials, based on TNT, are melt-cast into stock pieces. A wide range of modern presses and machine tools is available to support programs requiring HE parts. Material handling and set up is done manually, but all operations considered hazardous are performed remotely with the operators in a protected area. Numerically controlled machines make it possible to quickly machine complex parts and complex features into ordinary weapon charges. Various quality assurance activities have been integrated into manufacturing processes and are essential support for this capability.

HE and mock HE pressing is done in buildings TA-16-430 and TA-9-35. HE and mock HE machining is done in buildings TA-16-260 and TA-9-48.

The current facilities and equipment are sufficient to meet the No Action Alternative, but a few more personnel may be required. Expanded Operations would require somewhat more equipment, primarily NC machine tools, and more personnel. The additional machine tools could be readily installed in the existing machining building, TA-16-260. Reduced operations would require further consolidation and loss of capability. Reconstituting these capabilities at a later date would be costly and time consuming.

<u>Plastics</u>

Fabrication of plastic materials and components is a core capability loosely associated with HE processing. Efforts are clearly focused on weapons needs, but a wide variety of plastic and composite materials can be fabricated. Plastics operations that directly support HE fabrication and weapons research and development programs are included in this capability. Fabrication of war reserve materials and components is currently assigned to the Kansas City Plant, and that function is not included here. Presses, roll mills, mixers, autoclaves, injection molding machines, RF plasma generators, selective laser sintering, filament winders and supporting equipment are available.

Plastics fabrication is done in buildings TA-16-304, -305, -306 and -307. Machining of plastic parts is done in TA-16-260 and TA-9-28.

Current facilities are sufficient to meet even the Expanded Operations Alternative, although some additional equipment and personnel would be required. Reduced funding would cause loss of capability.

4.3.3.2 Programs Supported

HE and plastic parts are fabricated for use in nearly all stockpile related programs and the various weapons research and development programs as shown in Table 2-2. Manufacturing technology developments can be utilized in WR production.

4.3.3.3 Radioactive Materials

Radioactive materials are not used in HE and plastic fabrication although radiographic machines are used for non-destructive testing.

4.3.3.4 Nonradioactive Toxic or Hazardous Materials

No hazardous or toxic materials, other than common organic solvents, are used in fabrication of explosives. Baratol, a cast explosive containing barium nitrate, is occasionally processed. Some explosives notably TNT, also have some toxicity. TNT and Baratol are processed in TA-16-260.

Fabrication of polymerized solid plastic materials into parts likewise involves no hazardous or toxic materials. Use of unpolymerized materials in preparing plastic stock, parts, foams or adhesives can involve the same materials discussed in Section 2.2.2.4. Uncured plastics are processed in TA-16-304, -305, -306 and -307. Uncured adhesives are used in TA-16-260, -410, -411 and -340.

4.3.4 Test Device Assembly

4.3.4.1 Description

Test devices from full scale nuclear explosive-like assemblies (NELAs) to small material characterization tests can be assembled. More formality of operations is required for the more complex and expensive test units. Appropriate quality assurance measures are integrated into the assembly process and are an essential element for safety, reliability and documentation.

Generic equipment and tooling is available for routine assembly operations but special tooling is often custom built for large, complex assemblies.

Most test device assembly is done in buildings TA-16-410 and 411, but small devices can be assembled in building TA-16-340.

Facilities and generic equipment are sufficient to meet even expanded operations, although more personnel would be required for an increased work load.

4.3.4.2 Programs Supported

Test devices are assembled for use in all nuclear weapons programs at Los Alamos as shown in Table 2-2. Improvements in assembly/disassembly can be utilized in WR surveillance and production.

4.3.4.3 Radioactive Materials

Radioactive materials are not chemically processed in any HE facilities, but some are handled during assembly and testing operations. Natural uranium, depleted uranium and “binary,” the alloy of 94% uranium /6% niobium, components are inspected, assembled and tested.

Occasionally highly enriched uranium components and plutonium components are utilized. Plutonium components are always hermetically sealed within other non-radioactive materials. Components containing tritium are also handled occasionally.

Some low level radioactive waste can be infrequently generated from wiping (cleaning) the mildly radioactive components.

4.3.4.4 Nonradioactive Toxic or Hazardous Materials

Some test assemblies contain beryllium and beryllium oxide, lithium hydride or deuteride or Fogbank (composition is classified information) part, ordinarily within a sealed container. However, these solid materials may be handled in the assembly process. It is possible, but very unlikely, that a very small quantity of waste regulated under the Resource Conservation and Recovery Act could result. Again, explosives recognized as hazardous and some small quantities of common solvents may be used as a cleaning aid.

4.3.5 Quality Assurance

4.3.5.1 Description

A wide range of quality assurance capabilities supports all aspects of HE processing. Many quality functions are directly integrated into the processes, but some specialized functions require their own facilities.

Analytical chemical analysis and routine lab scale safety testing take place at TA-9-21 and -32. Routine radiography of HE parts will soon be done in one of the bays in building TA-16-260. Radiography of test assemblies typically takes place at TA-8. Other specialized nondestructive testing (NDT) capabilities, including neutron and micro-focus radiography, ultrasonics, acoustic emission, thermal imaging and magnetic particle techniques, are also available at TA-8. Metrology functions are routinely performed in TA-16-260, -340, -410, and -411. Temperature controlled inspection areas are available.

Facilities and equipment are sufficient to meet even expanded operations requirements, although some additional personnel would be required. Reduced operations would require sacrifice of some of the specialized NDT capabilities.

4.3.5.2 Programs Supported

Various quality assurance functions support all programs shown in Table 2-2 as appropriate.

4.3.5.3 Radioactive Materials

Radioactive materials are not used in quality assurance, except as radiation sources as described below, but standard radiographic machines with a wide range of energies are used for NDT. These machines are located at TA-8 and TA-16-260.

Certain standard radioisotopes are used as sources for some NDT work also. These sources are contained in industry-standard “pigs” and are stored in TA-8-65 when not in use.

4.3.5.4 Nonradioactive Toxic or Hazardous Materials

Very small quantities of a wide range of acids, bases and other chemical reagents are used in analytical chemistry. A listing of these materials is maintained by the using Group. Analytical chemistry is performed at TA-9, primarily in Building 21.

Small quantities of some common organic solvents, such as alcohol, may be used in a number of buildings at TA-9 and TA-16.

4.3.6 Safety and Mechanical Testing

4.3.6.1 Description

Capabilities exist for measuring mechanical properties of explosive samples such as tensile, compression and creep. Test assemblies can be instrumented with strain gauges, pressure gauges or other diagnostics. Most of this work is done at TA-16-301, -410, 411, or TA-8-22 and -23.

Safety testing, such as HE-handling tests, weapons drop and impact tests, fire tests and similar abnormal environment tests, are performed at TA-11. Normal weapon environmental testing (WH conditioning) takes place at TA-11.

Existing facilities are sufficient to meet no action requirements, although a few more personnel may be required. Expanded operations, particularly in enhanced surveillance, would require additional equipment and perhaps renovation of an existing building or construction of a new building at TA-11. Reduced operations would require further consolidation and eventual loss of capability.

4.3.6.2 Programs Supported

This capability is utilized as needed on a case-by-case basis in all programs listed in Table 2-2 with the exception of ER Program analytical chemistry support.

4.3.6.3 Radioactive Materials

Mechanical testing of weapon assemblies can involve the same materials described in Section 4.3.4.3. These tests are performed on the entire assembly and the radioactive components contained within the test package. Any disassembly is performed at TA-16-410 or -411, so these materials are not directly handled in the test facilities.

Safety testing can involve dropping test units on hard targets or “burning” the unit in a controlled fuel or propellant fire. Test units may contain natural uranium, depleted uranium and the uranium/niobium alloy. Standard radioisotopic sources may be used for radiography but are never involved in testing.

4.3.6.4 Nonradioactive Toxic or Hazardous Materials

Mechanical testing of weapons can involve the same materials described in Section 4.3.4.4. The hazardous materials are contained within the test package. Any disassembly is performed at TA-16-410/411 so that these materials will not be exposed at the test facilities.

In safety testing the package can be broken open and some components are burned. Jet fuel, wood, flake explosive, or propellant are used as fuel to induce burning of the weapon HE, simulating a catastrophic accident. It is possible, though unlikely, that the HE will detonate. Plastic materials also burn or decompose, and electrical components melt. The state issues an annual permit for air emissions from these burn tests.

4.3.7 HE Receiving, Transportation, and Storage

4.3.7.1 Description

Support infrastructure for shipping, receiving, storage, packaging and transportation of HE is provided to support all HE processing and testing operations. All HE materials entering the Laboratory must be inspected. All transportation, packaging and storage regulations, as well as rules for handling SNM, classified parts and NELAs, must be strictly followed. TA-16-280, -281, and -285 are used for HE packaging, receiving and shipping. TA-28 is the main HE storage area, but all other magazines listed in Appendix 1 are used for short-term storage.

4.3.7.2 Programs Supported

All programs involving HE are supported to the extent required.

4.3.7.3 Radioactive Materials

No radioactive materials are used in HE receiving, transportation and storage, but test devices which contain the radioactive materials discussed in Section 4.3.4.3 are transported within the HE processing areas and to the various testing groups.

4.3.7.4 Nonradioactive Toxic or Hazardous Materials

All HE material shipped into the Laboratory is received, handled, stored and transported. Materials produced within the Laboratory are also stored and transported as well. HE waste and other wastes are also transported within the explosives processing areas.

4.3.8 Waste Treatment

4.3.8.1 Description

Disposal facilities (TA-16- 386 through -389) are in place and permitted for disposal of HE waste and HE contaminated materials. A large flash pad thermally decontaminates items subject to trace HE contamination prior to burial. Two burning trays are used to destroy HE scrap and residue. Two sand filters remove water from sump sludge for drying and burning. One tray burns contaminated oil. An incinerator burns HE-contaminated combustible wastes. All water is filtered for HE and treated with activated carbon for solvent removal; water quality indicators are measured prior to returning the water to the environment.

Non-HE wastes are packaged and handled through the Laboratory-wide disposal infrastructure. Ordinary sanitary waste is treated in a standard sewage treatment facility at TA-3.

Uncontaminated trash from the HE-processing area is disposed in the county’s sanitary landfill.

Facilities and equipment are sufficient to meet even the Expanded Operations Alternative, although a few more personnel would be required. These operations must be adequate by law so reduced funding would have to be absorbed in other program elements.

4.3.8.2 Programs Supported

All HE processing facilities, and thus all programs, are supported to the extent required.

4.3.8.3 Radioactive Materials

No radioactive materials are processed as part of the HE waste treatment system.

4.3.8.4 Nonradioactive Toxic or Hazardous Materials

All forms of HE waste are treated at TA-16. Solid pieces, sump waste, HE contaminated equipment are treated. Some of the solvents themselves are classed as hazardous materials even when not contaminated with HE.

Some ash produced in the disposal operation qualifies as hazardous material and must be disposed properly.

4.3.9 Facility Support

4.3.9.1 Description

A facilities support infrastructure is available to help keep facilities in top operating condition. Utilities, heating and ventilating, plumbing and electrical systems are maintained and upgraded as necessary. Direct process support functions, such as machine control systems, process utilities and facility safety systems, are also maintained, repaired and upgraded as necessary.

Facility support must be scaled to meet the level of operations. Expanded operations will require more personnel and maintenance expenditures. With reduced operations, more buildings must be abandoned to significantly reduce costs.

4.3.9.2 Programs Supported

All HE facilities and operations, and thus all programs, are supported to the extent necessary.

4.3.9.3 Radioactive Materials

No radioactive materials are used in the facility support function.

4.3.9.4 Nonradioactive Toxic or Hazardous Materials

No toxic or hazardous materials, other than ordinary construction materials such as paint and electrical components, are used in the facility support function. Some of the older buildings contain asbestos insulating materials. It is also necessary to deal with HE contaminated equipment and piping. Normal construction and maintenance requires welding, soldering, etc.

5.0 References

DOE 1993: “Nonnuclear Consolidation Environmental Assessment, Nuclear Weapons Complex Reconfiguration Program,” U. S. Department of Energy, DOE/EA-0792, Washington, D.C., June 1993.

DOE 1995a: “Relocation of the Weapons Components Testing Facility Environmental Assessment,” U.S. Department of Energy, DOE/EA-1035, Washington, D.C., January 1995.

DOE 1995b: “Environmental Assessment, High Explosives Wastewater Treatment Facility,” U.S. Department of Energy, DOE/EA-1100, Los Alamos, New Mexico, August 1995.

DOE 1996: “Environmental Assessment for Effluent Reduction,” U.S. Department of Energy, Los Alamos Area Office. DOE/EA-1156. Los Alamos, New Mexico, July 3, 1996.

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., September 19, 1999.

LANL 1996: “Background Information for Explosive Processing for Site-Wide Environmental Impact Statement, Los Alamos National Laboratory,” transmitted to Mr. Thomas Anderson, GRAM, Inc., by Doris Garvey, Project Leader, on December 2, 1996.

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

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

LANL 2000b: Facility NCB Reviewer Determination Document, High Explosives Research and Development and Processing Facilities, LA-UR-01-1273, March 6, 2001.

Appendix 1

Tech Area - Building		Capability/Operations/Status	Total area ft^2
TA-16			
16-7	Machine Shop	D&D Candidate	4,590
16-27	Storage Building	D&D Candidate	4,000
16-54	Instrumentation/Test. Build.	Robotics Testing	3,190
16-58	Magazine	DX Explosives Storage	300
16-59	Magazine	D&D Candidate	1,200
16-80	Old Casting Building	D&D Candidate	300
16-88	Casting Rest House	VL&E Museum	1,910
16-89	Storage Building	D&D Candidate	1,680
16-90	Storage Building	Old HE Machining Line - D&D	2,160
16-91	Storage Building	Old HE Machining Line - D&D	1,320
16-92	Storage Building	Old HE Machining Line - D&D	1,260
16-93	Storage Building	Old HE Machining Line - D&D	1,540
16-99	Storage Building	Old HE Machining Line - D&D	890
16-101	Guard House	D&D Candidate	180
16-164	Storage Building	VL&E Storage	250
16-220	X-Ray Building)		2,930
16-221	Rest House)		1,240
16-222	Dark Room Building)	Operations transferred	4,150
16-223	Rest House)	Available for possible reassignment	1,010
16-224	X-Ray Building)		1,830
16-225	Rest House)		1,010
16-226	X-Ray Building)		1,830
16-260	HE Process		40,340
16-261	Rest House		890
16-263	Rest House		890
16-265	HE Assembly/Rest House		**?**
16-267	Rest House		1,070
16-277	Equipment Storage Cubicle		200
16-278	Equipment Storage Cubicle		200
16-280	HE Packaging & Transportation		5,420
16-281	Rest House/HE Shipping		1,000
16-283	Rest House/Museum		1,000
16-285	Rest House/HE Receiving		1,000
16-286	Coffee House		350
16-301	Rest House/HE Environmental Testing		3,840
16-300	Mock Explosive Preparation Building)	Operations transferred.	12,820
16-302	HE Casting)	Reassign	12,840
16-303	Rest House		3,840
16-304	Plastics Building		12,820
16-305	Plastics Building		3,840
16-306	Process Building		12,820
16-307	Plastics Building		3,840
16-308	Storage Building		300
16-319	Office Building		330
16-332	Process Equip./Storage Warehouse		10,000

Appendix 1

16-339	Solvent Storage Building		
16-340	Explosives Process Building		23,210
16-341	Rest House		1,000
16-342	HE Blending Building	Reassign	5,380
16-343	Rest House		1,000
16-344	Material Storage		760
16-345	Rest House		1,000
16-360	Mechanical Maintenance Building		3,720
16-370	Metal Forming Building	Operations Transf./Avail. for reassignment	1,990
16-380	HE Inspection Building	Operations Transf./Avail. for reassignment	3,810
16-389	Control Shelter/HE burning		230
16-390	Basket Washing Building		610
16-400	Truck Washing Building		1,180
16-410	HE Assembly Building		9,580
16-411	Rest House		2,310
16-413	Rest House		1,100
16-414	Storage Building		5,370
16-415	Rest House		1,250
16-430	HE Pressing Building		14,830
16-435	Rest House		1,000
16-437	Rest House		1,000
16-460	Laboratory Building	Operations Transf./Avail. for reassignment	12,920
16-462	Storage Building	Operations Transf./Avail. for reassignment	340
16-463	Rest House	Operations Transf./Avail. for reassignment	330
16-476	Control Building	D&D Candidate/P site	240
16-477	Rest House	D&D Candidate/P site	210
16-478	Machine Shop	D&D Candidate/P site	1,090
16-515	Process Building	D&D Candidate/V site	3,120
16-516	Process Building	D&D Candidate/V site	640
16-518	Storage Building	D&D Candidate/V site	3,190
16-519	Storage Building	D&D Candidate/V site	730
16-520	Test Building	D&D Candidate/V site	660

TA-8

8-120	ARG Building (Weaver)		4,000
8-22	NDT/Radiography		6,220
8-23	NDT/Radiography/Beta		2,240
8-26	Storage		580
8-65	Storage, Radiography sources		171
8-70	NDT/Radiography		5,510

TA-11

11-1	Storage Building		620
11-2	Control Building		770
11-3	Control Building		730
11-4	Control Building		710
11-24	Air-Gun Building		3,720
11-25	Drop Tower	Not a Building	
11-30	Vibration Test Building		1,200

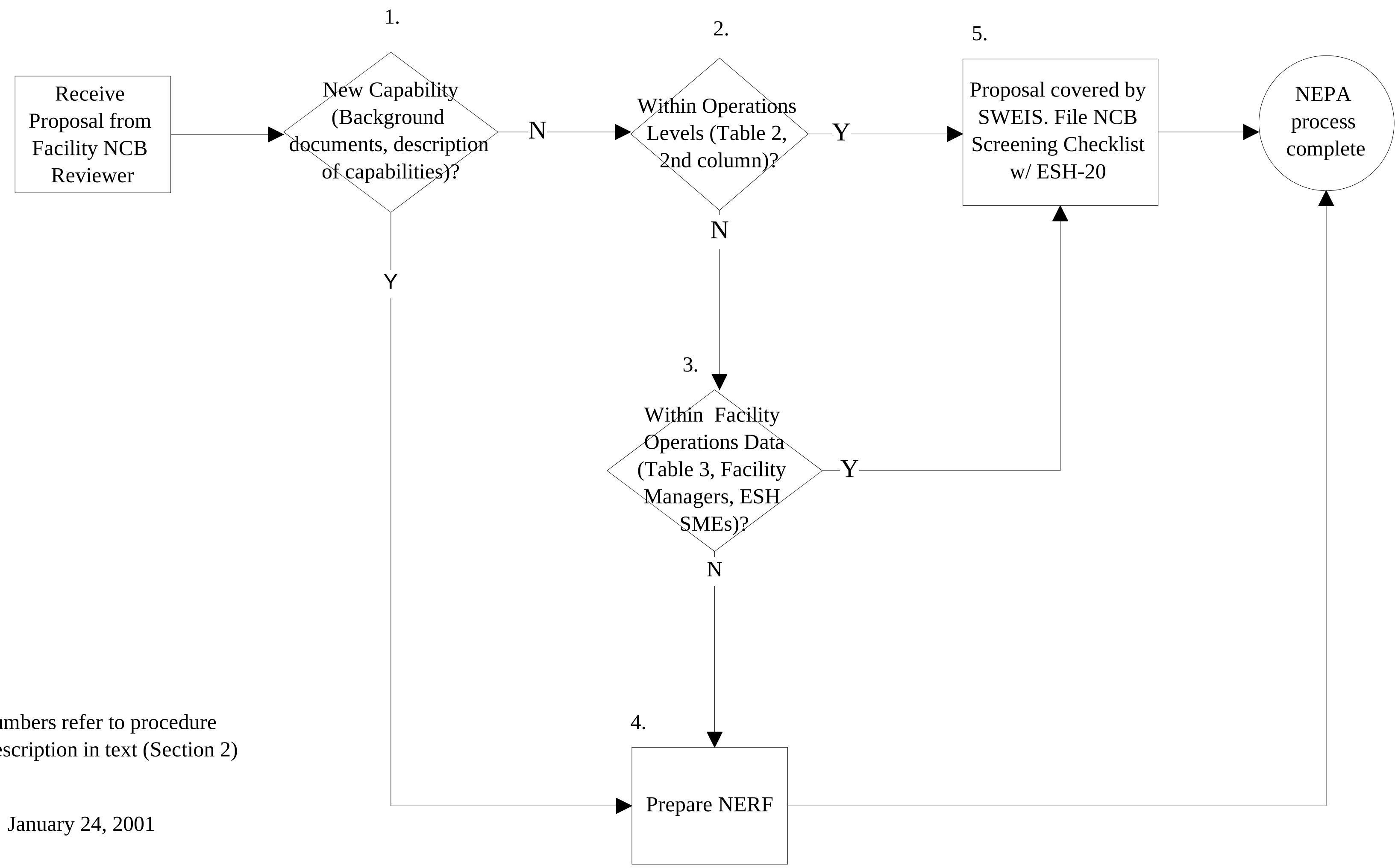
Appendix 1

11-33	Air Compressor Building		70
11-36	Magazine		40
11-45	Instrumentation Building		80
11-55	Shed		60
11-65	Weapon Burn Test Facility	Not a building	---
TA-37			
37-1	Small Office Building		145
37-2	Standard HE Magazine		154
37-3	Standard HE Magazine		336
37-4	Standard HE Magazine		336
37-5	Standard HE Magazine		336
37-6	Standard HE Magazine		336
37-7	Standard HE Magazine		336
37-8	Standard HE Magazine		336
37-9	Standard HE Magazine		336
37-10	Standard HE Magazine		336
37-11	Standard HE Magazine		1,008
37-12	Standard HE Magazine		1,008
37-13	Standard HE Magazine		1,008
37-14	Standard HE Magazine		1,008
37-15	Standard HE Magazine		660
37-16	Standard HE Magazine		660
37-17	Standard HE Magazine		660
37-18	Standard HE Magazine		660
37-19	Standard HE Magazine		660
37-20	Standard HE Magazine		660
37-21	Standard HE Magazine		660
37-22	Standard HE Magazine		660
37-23	Standard HE Magazine		660
37-24	Standard HE Magazine		660
37-25	Standard HE Magazine		660
37-26	Standard HE Magazine		660
37-27	Non HE Storage Building		741
TA-28			
28-1	Magazine, Protective Force		100
28-2	Magazine, Protective Force		100
28-3	Magazine, Protective Force		100
28-4	Magazine, DX-Div. Explosives		100
28-5	Magazine, ESA-Div.		200
TA-9			
9-20	Office Building		189
9-21	Laboratory & Office Building		23,763
9-22	Service Magazine		10
9-23	Service Magazine		10

Appendix 1

9-24	Service Magazine	10
9-25	Service Magazine	10
9-26	Service Magazine	10
9-27	Service Magazine	10
9-28	Fabrication	2,808
9-29	Office/Library	4,678
9-30	SNM Storage	242
9-31	Solvent Storage	330
9-32	Laboratory Building	2,556
9-33	Laboratory Building	843
9-34	Process Laboratory	1,768
9-35	Process Laboratory	1,911
9-36	Magazine	210
9-37	Process Laboratory	1,599
9-38	Process Laboratory	1,599
9-39	Magazine	203
9-40	Thermal Cycle Facility	923
9-42	Process Laboratory	1,908
9-43	Process Laboratory	1,768
9-44	Magazine	210
9-45	Process Laboratory	1,599
9-46	Process Laboratory	1,768
9-47	Magazine	210
9-48	HE Machining Building	3,557
9-49	Magazine	210
9-50	Receiving & Shipping Building	576
9-51	Detonator Storage	209
9-52	Magazine	209
9-53	Magazine	209
9-54	Magazine	400
9-55	Magazine	869
9-204	Magazine	49
9-208	Service Magazine	36
9-214	Carpenter Shop	2,405
9-272	Office	1,701
9-273	Office	1,698

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: