EIS

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Subject: Target Fab NEPA doc

Attachments: 7_Target_Fabrication.doc

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Kirk, attached is the updated Target Fabrication NEPA Determination Document

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Title: ESH-20 NEPA Determination Document 7
TA-35 Target Fabrication Facility

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 Target Fabrication Facility (TA-35), 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 Target Fabrication Facility (TA-35) operates 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.

Table 1. Principal Buildings and Structures of TA-35 Target Fabrication Facility

Technical Area	Principal Buildings and Structures
TA-35	Target Fabrication Facility 35-213

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.

Table 2. TA-35 Target Fabrication Facility[a]

Capability	Operational Examples
1. Precision Machining and Target Fabrication	1.1 Provide targets and specialized components for about 6100 laser and physics tests/year, including a 20% increase over 1995 levels in high-explosive pulsed-power target operations, and including about 100 high-energy-density physics tests.
2. Polymer Synthesis	2.1 Produce polymers for targets and specialized components for about 6100 laser and physics tests/year, including a 20% increase over 1995 levels in high-explosive pulsed-power target operations, and including about 100 high-energy-density physics tests.
3. Chemical and Physical Vapor Deposition	3.1 Coat targets and specialized components for about 6100 laser and physics tests/year, including a 20% increase over 1995 levels in high-explosive pulsed-power target operations, including about 100 high-energy-density physics tests, and including support for pit rebuild operations at twice 1995 levels.

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

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

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 the Target Fabrication Facility (TA-35) facilities and capabilities from the SWEIS document and the background documentation. The supporting documentation on the Target Fabrication Facility (TA-35) 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. TA-35 Target Fabrication Facility Operations Data

Parameter	Units [a]	SWEIS ROD
Radiological Air Emissions:	Ci/yr	Negligible
NPDES Discharge:[b]		
• 04A-127	MGY	0
Wastes:		
• Chemical	kg/yr.	3800
• Low-level waste[c]	m^3/yr	10
• Mixed low-level waste	m^3/yr	0.4
• TRU waste/Mixed TRU 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 Target Fabrication Facility

This section provides information directly from the SWEIS. Section 3.1 is a description of the Target Fabrication Facility from Chapter 2 of the SWEIS. Section 3.2 is a description of the capabilities 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 Target Fabrication Facility (TFF) is approximately 61,000 square feet (5,667 square meters) of floor space with approximately 48,000 square feet (4,459 square meters) of laboratory area and 13,000 square feet (1,208 square meters) of office area (Figure 1). TFF is a two-story structure sited at TA-35 (Building 213) immediately to the east of TA-55, directly north of TA-50. Laboratories and offices occupy both the ground (lower) floor and the upper floor. In general, the structure is reinforced concrete. Vibration sensitive areas are supported on isolated concrete slabs. The HVAC system maintains a negative pressure (i.e., a pressure that is less than the pressure of the atmosphere outside the building) in the laboratories with both room air and hood exhaust vented to the atmosphere through filtered and, until 1995, monitored exhaust stacks. In 1995, monitoring was terminated when it was determined through analyses that monitoring was not required because of low facility chemical and radioactive material inventories. Sanitary waste is piped to the sanitary waste disposal plant near TA-46. Radioactive liquid waste and liquid chemical waste are shipped to TA-50 using a direct pipeline.

TFF maintains a beryllium machining capability used to manufacture structural shapes from beryllium. TFF is not a nuclear facility. Tritium was removed from the facility in 1993; however, operations involving tritium-contaminated materials are ongoing. Tritium contamination levels are low and are controlled below levels that would make this a nuclear facility. Depleted uranium coatings are no longer applied at TFF. Although a large number of chemicals are used, they are used in small quantities. TFF is designated as a moderate hazard chemical facility. The design for earthquake loads is in accordance with current applicable standards. Transportation in and out of the TFF consists of occasional deliveries and waste pickup typical of a research and development facility.

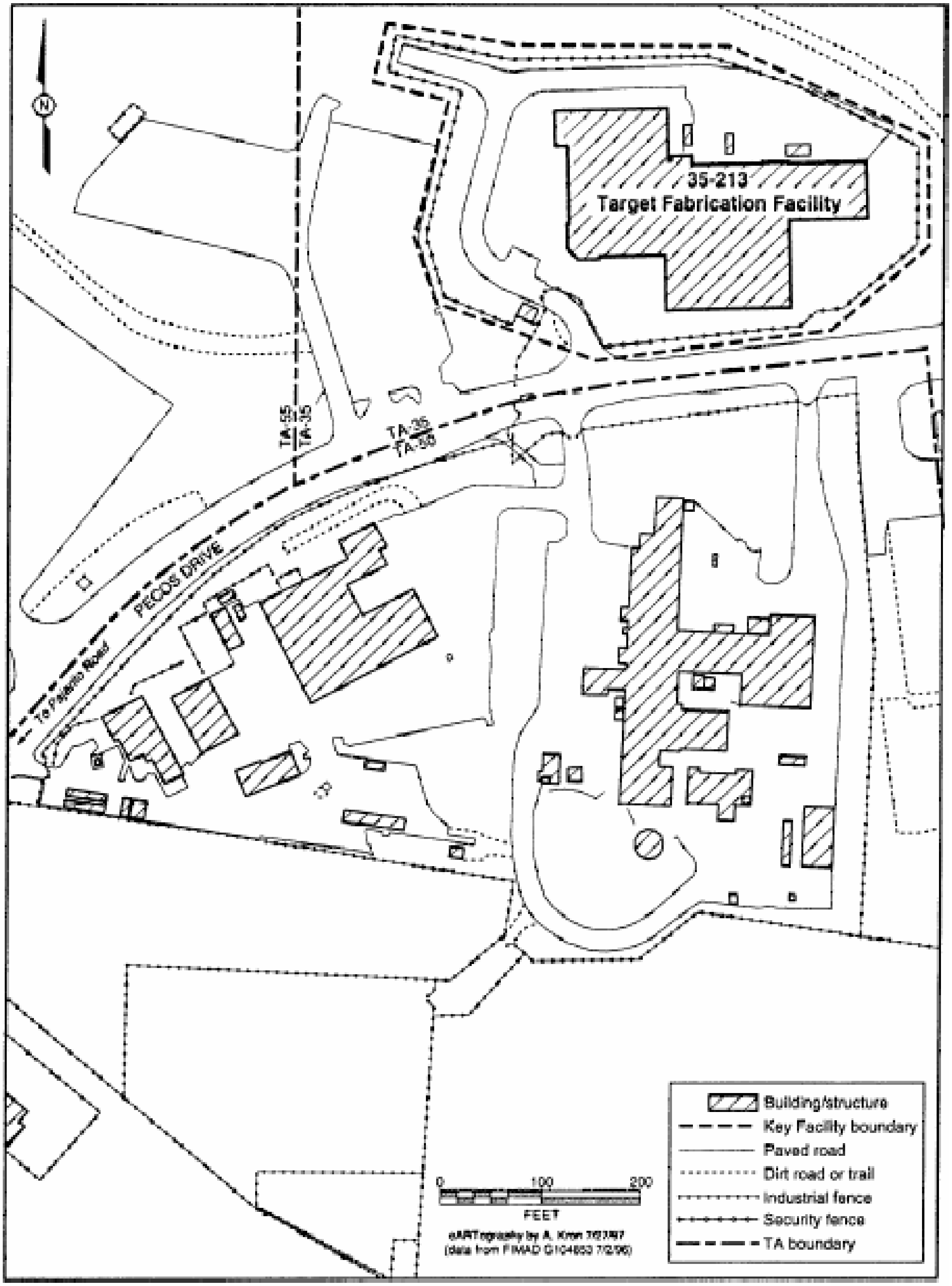


Figure 1. Target Fabrication Facility at TA-35

TFF houses the equipment and personnel for precision machining, physical vapor deposition, chemical vapor deposition, polymer sciences, and assembly of targets for inertial confinement fusion and physics experiments. These capabilities are complemented by personnel and equipment capable of performing high technology material science, effects testing, characterization, and technology development.

3.2 SWEIS Description of Capabilities (Baseline)

The three primary activities located at TFF are described below. The manner in which these activities would vary under the SWEIS Expanded Operations Alternative is described in Section 3.3.

3.2.1 Precision Machining and Target Fabrication

Precision machining operations produce sophisticated devices consisting of very accurate part shapes and often-optical quality Surface finishes. A variety of processes are used to produce the final parts, which include conventional machining, ultra-precision machining, lapping, and electron discharge machining. Dimensional inspections are performed during part production using a variety of mechanically and optically based inspection techniques.

3.2.2 Polymer Synthesis

Polymer synthesis science formulates new polymers, studies their structure and properties, and fabricates them into various devices and components. Capabilities exist at TFF for developing and producing polymer foams by organic synthesis, liquid crystalline polymers, polymer host dye laser rods, microfoams and composite foams, high energy density polymers, electrically conducting polymers, chemical sensors, resins and membranes for actinide and metal separations, thermosetting polymers, and organic coatings. The materials and devices are typically prepared using solvents at temperatures ranging from 68° to 302°F (20° to 150°C) or by melt processing at temperatures from room temperature up to 572°F (300°C). A wide variety of analytical techniques are used to determine the structure and behavior of polymers, including spectroscopy, microscopy, x-ray scattering, thermal analysis, chromatography, rheology, and mechanical testing.

3.2.3 Chemical and Physical Vapor Deposition

Chemical vapor deposition (CVD) and chemical vapor infiltration (CVI) are processes used to produce metallic and ceramic bulk coatings, various forms of carbon (including pyrolytic graphite, amorphous carbon, and diamond), nanocrystalline films, powder coatings, thin films, and a variety of shapes up to 3.5 inches (9 centimeters) in diameter and 0.5 inches (1.25 centimeters) in thickness. CVD and CVI coating processes are routine operations that use a variety of techniques such as thermal hot wall, cold wall and fluidized bed techniques, laser assisted, laser ablation, radio frequency and microwave plasma techniques, direct current glow discharge and hollow cathode, and organometalic CVD techniques. The CVD process is used to produce thin film metallic, carbide, oxide, sulfide and nitride coatings. TFF scientists have also studied infiltrated materials using isothermal, thermal gradient, forced flow and plasma techniques. Polymer processing and extensive characterization is performed in conjunction with this work and occasionally, highly toxic substances such as nickel carbonyl, iron carbonyl, or arsenic hydride are handled.

Physical Vapor Deposition capabilities at TFF can apply layers of various materials on sophisticated devices with high precision. These layers, applied by various coating techniques, include a wide range of metals and metal oxides as well as some organic materials. Beryllium coatings applied to substrates by magnetron sputtering (performed in a specially ventilated vacuum chamber with HEPA filtered exhaust) is an example of physical vapor deposition performed at TFF.

3.3 SWEIS Description of Capabilities (Preferred Alternative)

The following is a description of activities under the Expanded Operations (preferred) Alternative that was adopted in the ROD for the SWEIS (DOE 1999b).

3.3.1 Precision Machining and Target Fabrication

LANL would provide targets and specialized components for approximately 2,400 laser and physics tests per year, including a 10 to 20 percent annual growth in DoD and high explosives pulsed-power target operations for the next 10 years. This level of operations would include a 20 percent increase (over No Action Alternative levels) in high explosives pulsed-power target operations and approximately 100 high-energy density physics tests per year.

3.3.2 Polymer Synthesis

LANL would produce polymers for targets and specialized components for approximately 2,400 laser and physics tests per year, including a 10 to 20 percent annual growth in DoD and high explosives pulsed-power target operations for the next 10 years. This level of operations would include a 20 percent increase (over No Action Alternative levels) in high explosives pulsed-power target operations and approximately 100-high energy density physics tests per year.

3.3.3 Chemical and Physical Vapor Deposition

LANL would coat targets and specialized components for approximately 2,400 laser and physics tests per year, including a 10 to 20 percent annual growth in DoD and high explosives pulsed-power target operations for the next 10 years. This level of operations would include a 20 percent increase (over No Action Alternative levels) in high explosive pulsed-power target operations and approximately 100 high-energy density physics tests per year. This also would support plutonium pit manufacturing operations.

4.0 Background Document Information for TA-55

This section presents information from the “Background Information for the TA-35 Target Fabrication Facility” (LANL 1996).

4.1 Background Document Description of Facilities

The Target Fabrication Facility (TFF), is located in TA-35, about 1.25 miles southeast of the central technical area (TA-3) off Pajarito Road on Pecos Road. It is immediately to the east of TA-55 and directly north of TA-50. TFF (Bldg. 35-213) is a restricted area surrounded by a security fence with controlled access but is no longer classified as a Nuclear Facility. The last of the SNM material, Tritium, was completely removed in 1993.

The two-story structure is approximately 61,000 square feet with approximately 48,000 square feet of laboratory area and 13,000 square feet of office area. In general, the structure is reinforced concrete with isolated concrete floor slabs for vibration sensitive equipment. The heating, ventilation, and air conditioning system maintains a negative pressure in the laboratories with both room air and hood exhaust vented to the atmosphere through filtered and monitored exhaust stacks. Sanitary waste is piped to the sanitary waste disposal plant near TA-46. Radioactive liquid waste and liquid chemical waste is shipped to TA-50.

The Target Fabrication Facility laboratories and shops are specialized in precision machining, polymer science, physical vapor deposition, chemical vapor deposition, and target assembly supported by a program base from industrial collaborations, energy, environment, nuclear weapons and conventional defense.

4.2 Discussion of Missions/Programs Under Expanded Operations Alternative

Nine major programs performed at Target Fabrication Facility are described in this section. This section describes the operations levels under the SWEIS Preferred Alternative selected in the ROD, which is the Expanded Operations Alternative for this key facility. For each of the capabilities, the operations levels under the No Action Alternative is described, followed by the changes for the Expanded Operations Alternative.

4.2.1 Inertial Confinement Fusion (ICF) Program

The Physical Vapor Deposition (PVD) processes that are used for the ICF Program are e-beam evaporation and magnetron sputtering. These processes are used to generate coatings of various materials to form targets or target components that are used in ICF experiments. Under the No Action Alternative, chemical vapor deposition (CVD) will remain at the same level and continue to concentrate on low temperature, organometalic based processes. Inertial Confinement Fusion targets for Nova and Omega laser will remain at the same level for personnel and precision machinery with precision machining (PM) operations. Polymers performs synthesis of foams for target fabrication, development of new foam technologies, and development and application of organic coatings technologies in support of target fabrication.

Under the Expanded Operations Alternative, the assembly expands operations for the target fabrication. Most likely this will manifest itself in more work containing beryllium and tritium as well as experiments using cryogenic liquids (primarily helium). Physical vapor deposition expansion into ion-beam processes would be warranted in a larger ICF program. CVD would expand the number of organometalic processes used of ICF target production. PM would require one additional machinist and a possibility of an additional precision turning machine. PVD and

CVD would expand the types of processing but facilities and staffing would be the same as the No Action Alternative.

4.2.2 High Energy Density Physics (HEDP) Program

The PVD process e-beam evaporation with some complicated fixturing or flow-through ion deposition are used to generate load foils, switch foils, liners and other specialized components for the HEDP program experimental requirements. There are no chemical vapor deposition activities performed for HEDP. This would continue under the No Action Alternative. High Energy Density Physics will remain at the same level for personnel and precision machinery including SBSS program with PM operations. Polymers performs synthesis of foams for target fabrication, development of new foam technologies, and development and application of organic coatings technologies in support of target fabrication.

Under the Expanded Operations Alternative, assembly expands operations for the target fabrication. Most likely this will manifest itself in more work containing beryllium and tritium as well as experiments using cryogenic liquids (primarily helium) is very likely. Physical vapor deposition would see further expansion into ion-beam processes in a larger HEDP Program. CVD expands the types of processing it applies for specialty coatings for HEDP experiments. These include organometallic-based deposition, conventional processing, laser assisted, plasma assisted and hybrid techniques. One additional machinist would be needed in PM and would be shared with half time with expanded operations in the ICF program. Polymers would experience increased operations to support increased target fabrication. PVD and CVD would expand the types of processing but staffing is the same as the No Action Alternative.

4.2.3 Department of Defense (DoD) Programs

All of the PVD processes (e-beam, ion-assist, flow-through ion, ion sputtering, magnetron sputtering and thermal evaporation) are used in our DoD programs to achieve the desired structure and electrical properties in the deposited dielectric films. CVD processes currently used for DoD programs include plasma-assisted and organometalic based processing. This would continue under the No Action Alternative. Assembly and PM activities are not supported by DoD Programs and would continue as such under the No Action Alternative. Polymers performs work under joint MOU to develop new high energy density polymers and develops new high performance composite materials for aerospace applications.

Physical vapor deposition DoD programs currently use all of the PVD processes, but under the Expanded Operations Alternative, an enlarged program could also require combinations of these processes and simultaneous co-deposition of various materials. Expansion of CVD in DoD programs would see large growth organometallic-based deposition, conventional processing, laser assisted, plasma assisted and hybrid techniques. Operations redirected toward advanced materials and manufacturing, and environmentally conscious manufacturing for compound semiconductors, sensors, barrier layers and separations technologies. PVD and CVD would expand the types of processing and staffing increases over the No Action alternative. Polymers activities for high performance composites increased 20%. DoD programs do not support Assembly and PM and expanded operations are unlikely.

4.2.4 Industrial Partnership Office (IPO) Programs

Physical vapor deposition IPO programs, such as thermal barrier coatings, optical amplifier (doped glass) coatings, and coating deposition modeling require e-beam, magnetron sputtering and flow-through ion deposition in order to achieve the desired operational characteristics of the coatings. Chemical vapor deposition IPO programs involve on organometalic based thin-film phosphors, organometalic based deposition of erbium oxide coatings for fire resistance, molybdenum sulfide coatings and plasma-assisted CVD-diamond coatings for cutting tool applications. Assembly and PM activities are not supported by IPO Programs and would continue as such under the No Action Alternative. Polymers develops new materials for industrial use in structural applications and studies the changes in materials properties with aging for improved lifetime prediction.

Under the Expanded Operations Alternative, physical vapor deposition IPO programs, such as the optical amplifier glass coatings would expand to include all of the PVD ion deposition processes, including multiple simultaneous processes. CVD would expect growth in funds-in type IPO programs. These would be technology demonstration projects in advanced materials and processing that use virtually all types of CVD processing. PVD and CVD would expand the types of processing but staffing is the same as the No Action alternative. Polymers experiences a significant expansion in activities related to technology transfer. These include efforts to develop or modify current technologies for industrial use in all areas, including chemical sensors and separations, catalysis, high performance structural materials, processing techniques, and materials characterization. IPO programs do not support Assembly and PM and expanded operations are unlikely.

4.2.5 Laboratory-Directed Research and Development (LDRD) Programs

Physical vapor deposition LDRD programs involve e-beam deposition for membrane research and magnetron sputtering for colossal magneto- resistance coatings. Chemical vapor deposition LDRD programs involve new organometalic routes to oxide and nitride thin films, new organometalic routes to new catalysts and inorganic membrane research for gas separations. Assembly and PM activities are not supported by LDRD Programs and would continue as such under the no action alternative. Physical vapor deposition LDRD membrane program could be expanded to include ion beam processes to achieve textured surfaces. CVD expanded operation in LDRD programs would be small and involve the development of new processing technologies. Facilities and staffing are not expected to grow. LDRD programs do not use PM and expanded operations in this area are unlikely. Polymers studies fundamental mechanisms associated with material aging, basic development of new polymeric materials including nanostructured materials, polymer electrolytes, novel foams, structural materials, and "smart" materials, and develops new catalysis technologies.

Under the Expanded Operations Alternative, Physical vapor deposition LDRD membrane program could be expanded to include ion beam processes to achieve textured surfaces. CVD expanded operation in LDRD programs would be small and involve the development of new processing technologies as well as using all current techniques. Polymer activities are similar to No Action alternative, with operations increased 20%. Staffing is the same as the No Action alternative. LDRD programs do not support Assembly and PM and expanded operations are unlikely.

4.2.6 Energy Technologies (ET) Programs

Physical vapor deposition ET program in high temperature superconducting tapes involves oriented buffer layer deposition by means of ion assisted, ion-beam sputtering and a subsequent laser ablation deposition of the YBCO HTSC material. Chemical vapor deposition ET program involves CVD and CVI of carbon-based porous materials for C1 through C3 separations from hydrogen. Assembly and PM activities are not supported by ET Programs and would continue as such under the No Action Alternative. Polymers develops new energy efficient processing technologies, including magnetic field processing.

Under the Expanded Operations Alternative, physical vapor deposition ET superconductor program could be expanded to include in situ monitoring techniques such as RHEED (reflection high energy electron diffraction) to determine degree of surface film orientation. CVD expansion in ET programs would include materials for separation technologies, sensors, high temperature materials and protective coatings. These would be technology demonstration projects in advanced materials and processing that use virtually all types of CVD processing. Polymers experiences significant increase in research on energy efficient synthesis and processing, including development of new catalysis technologies and new techniques for fabrication of polymer composites. An expansion in the types of processing will occur. A small growth in staffing is expected over the No Action alternative. ET programs do not support Assembly and PM and expanded operations are unlikely.

4.2.7 Nuclear Material Stockpile Management (NMSM) Program

Using PVD, our Pit Rebuild program involves the use of e-beam deposition to deposit an alpha barrier material on a pit component. NMSM does not support activities that use PM and CVD operations. This would continue under the No Action Alternative. Polymers develops new techniques for measuring changes in materials properties with aging and measurement of aging in materials as it relates to weapons aging and supports weapons surveillance activities by characterization of field-return parts.

Under the Expanded Operations Alternative, Physical vapor deposition Pit Rebuild program could be expanded to include PVD pit-coating production capability for NMSM. CVD processing expands in advanced separations technology for hydrogen isotopes and in pit rebuild that use virtually all types of CVD processing. In Polymers, aging studies are expanded to develop predictive capabilities and surveillance activities double. There is no increase in staffing but there is an increase in types of processing performed. NMSM programs do not support Assembly and PM and expanded operations are unlikely.

Physical vapor deposition Pit Rebuild program could be expanded to include PVD pit-coating production capability for NMSM. CVD processing expands in advanced separations technology for hydrogen isotopes. Facilities and staffing do not grow. NMSM programs do not use PM and expanded operations in this area are unlikely.

4.2.8 Environmental Management (EM) Programs

EM does not support activities in Assembly, PVD, CVD and PM. This would continue under the No Action alternative. Polymers develops new technologies for monitoring and clean-up of hazardous wastes. These include research into new membranes and columns for separations, research into new materials for sensors, and demonstration of sensors in field operation.

Under the Expanded Operations Alternative, protective coating layers could be deposited by PVD to provide environmental protection for waste containers to assist EM. CVD expansion in EM programs centers on the need for sensors and separations technologies, as well as protective coating for waste container life extension that use virtually all types of CVD processing. In Polymers, activities described under No Action alternative double. There is no increase in staffing but there is an increase in types of processing performed. EM programs do not support Assembly and PM and expanded operations are unlikely.

4.2.9 Nuclear Weapons Technology (NWT) (excluding ICF and HEDP)

CVD has a jointly funded program DoD-NWT program that uses plasma assisted CVD. Polymers performs work jointly funded by DoD-NWT to develop new high energy density polymers and works on non-invasive characterization techniques as well as sensors for SBSS. These would continue at the same level in the No Action alternative. NWT does not support activities in Assembly, PVD and PM. This would continue under the No Action Alternative.

Under the Expanded Operations Alternative, thermal barrier coatings on weapons cases may become part of an expanded program with NWT through a WSA (weapons support agreement). Advanced CVD processing for process replacement sees significant growth. CVD would see significant expansion of HEDM activities. There is an increase in both staffing and types of processing performed. Polymers sees an increase in advanced materials and processing with an increase in staffing likely. NWT programs do not support Assembly and PM and expanded operations are unlikely.

4.3 Discussion of Operational Capabilities as They Support Programs

4.3.1 Precision Machining

4.3.1.1 Description

Precision Machining produces sophisticated devices requiring very accurate part shapes and often optical quality surface finishes. A variety of processes are used to produce the final parts which include conventional machining, ultra-precision machining, lapping, and Electron Discharge Machining. Dimensional inspections must also take place during the part production process. A variety of mechanically and optically based inspection techniques are employed to make these inspections. Electronic and beam balances are used to gather weight information that also is often required.

4.3.1.2 Programs Supported

Programs Supported as indicated in Table 4. Precision Machining is used to support Inertial Confinement Fusion and High Energy Density Physics programs.

Table 4. Summary of Program/Missions and Capabilities at the Target Fabrication Facility at TA-35

Program/Mission	Capabilities				
	Precision Machining	Polymer Synthesis	Physical Vapor Deposition	Chemical Vapor Deposition	Target Assembly
Inertial Confinement Fusion	X	X	X	X	X
High-Energy Density Physics	X	X	X		X
DoD Programs		X	X	X	
Industrial Partnership Programs		X	X	X	
Laboratory-Directed Research and Development	X	X	X	X	X
Energy Technologies		X	X	X	
NMSM		X	X		
Environmental Management		X			
NWT (excluding ICF and HEDP)	X	X	X	X	X

(4/19/96)
X indicates that the program contributes significant funding to the capability.

4.3.1.3 Radioactive Materials

Radioactive Materials are not produced in the Precision Manufacturing Section.

4.3.1.4 Nonradioactive, Toxic, or Hazardous Substances

Nonradioactive Toxic or Hazardous Substances are produced in the Precision Manufacturing Section in the form of machining small Beryllium parts, that are either sputter coated on a substrates, or out of raw material. This is not a continuous operation, usually done two to three times a year.

4.3.2 Polymer Science

4.3.2.1 Description

Polymer Science synthesizes new polymers, studies their structure and properties, develops novel characterization methodologies, and fabricates materials into various devices and components. Significant capabilities exist in organic synthesis, polymer foams, liquid crystalline polymers, electrically conducting polymers, chemical sensors, resins and membranes for actinide and metal separations, thermosetting polymers, magnetic field processing, organic coatings, and polymer rheology and processing. The materials and devices are typically prepared using either solvents at temperatures ranging from -20 to 150˚ C or by melt processing at temperatures from room temperature up to 300˚ C. A wide variety of analytical techniques are used to determine their structure and behavior, including spectroscopy, microscopy, x-ray and neutron scattering, thermal analysis, chromatography, rheology, and mechanical testing.

4.3.2.2 Programs Supported

Programs supported as indicated in Table 4. PVD is used to support Inertial Confinement Fusion, High Energy Density Physics, DoD Programs, Industrial Partnerships, LDRD, Energy Technologies, Environmental Management and NWT.

4.3.2.3 Radioactive Materials

Operations may include placement of organic and/or polymer coatings onto tritium filled capsules in support of ICF and HEDP. Environmental programs will utilize various radioactive actinides to test separation technologies and sensor technologies. These operations can involve the generation of both radioactive and mixed waste. As part of our surveillance programs we characterize potentially radioactive polymers and plastics obtained from stockpile returns.

4.3.2.4 Nonradioactive, Toxic, or Hazardous Substances

Operations include the use of organic and inorganic compounds and elements which can be carcinogenic, toxic, pyrophoric, air and/or moisture sensitive, corrosive, reactive with subsequent generation of heat. These substances are used in all aspects of operations within Polymer Science. Operations in support of NWT, NMSM, and DoD programs may also utilize high explosives and high explosive formulations. These materials are used in operations involving monomer and polymer synthesis, formulation, and characterization activities.

4.3.3 Physical Vapor Deposition

4.3.3.1 Description

The Physical Vapor Deposition facilities at TFF apply, with high precision, layers of various materials on sophisticated devices. Many different PVD processes, such as e-beam, magnetron sputtering, ion assisted, ion sputtering and flow-thru ion deposition are utilized to apply coating layers. These layers, applied by the various coating techniques, include a wide range of metals, oxides and other compounds. The Electroplating Facility at TFF does electrochemical surface modification of various metals including precision electrochemical deposition of metals. The coatings are used for surface property modification and electroforming of free standing shapes.

4.3.3.2 Programs Supported

As indicated in Table 4, Physical Vapor Deposition at TFF is used to support Inertial Confinement Fusion and High Energy Density Physics, DoD Programs, IPO, LDRD, Energy Technologies and NMSM programs.

4.3.3.3 Radioactive Materials

Radioactive materials are not being deposited by PVD in the TFF.

4.3.3.4 Nonradioactive, Toxic, or Hazardous Substances

Beryllium coatings are sputter deposited onto suitable substrates by magnetron sputtering in a specially ventilated vacuum chamber, with HEPA filtered exhaust. These coatings are required by the ICF program. Toxic or Hazardous materials used in Electroplating process at TFF include but may not be limited to cyanide, arsenic, strong acids, strong bases and beryllium compounds. These substances are used in Electroplating baths and are in liquid form.

4.3.4 Chemical Vapor Deposition

4.3.4.1 Description

With chemical vapor deposition (CVD) and chemical vapor infiltration (CVI), we have been involved in virtually all aspects of these processes. Both CVD and CVI coating processes are routine operations at Los Alamos. During this work, we use thermal hot wall, cold wall and fluidized bed techniques, laser assisted, laser ablation, RF and microwave plasma techniques, DC glow discharge and hollow cathode, and organometalic CVD (OMCVD) techniques. Los Alamos has used these techniques to produce metallic and ceramic bulk coatings and many forms of carbon including pyrolytic graphite, DLC, amorphous carbon and diamond. In addition, we have deposited and extensively studied nanocrystalline films, as well as, powder coatings, thin films, and monolithic shapes up to 9 cm in diameter and 1.25 cm in thickness. At Los Alamos, we have used OMCVD to produce thin film metallic, carbide, oxide, sulfide and nitride coatings. We are currently adapting OMCVD to fluidized bed and CVI processing. The Los Alamos effort in infiltrated materials includes the use of isothermal, thermal gradient, forced flow and plasma techniques. Matrix materials include a variety of metals and ceramics infiltrated into various weaves and shapes of graphite, SiC, B, Mo, W, Ti, Al_2O_3, foams and aerogels. In addition, we recently developed a microwave-based inverted thermal gradient technique. Along with the processing, extensive characterization is performed.

4.3.4.2 Programs Supported

Programs supported as indicated in Table 4. CVD supports Inertial Confinement Fusion, DoD, IPO, LDRD, ET and NWT.

4.3.4.3 Radioactive Materials

Radioactive materials are not currently being deposited by CVD in the TFF. Expanded operations may require include placement of CVD coatings onto tritium filled capsules in support of ICF and HEDP. EM, NWT, NMSM and IPO programs may use various radioactive precursors and coatings.

4.3.4.4 Nonradioactive, Toxic, or Hazardous Substances

Toxic or hazardous substances from CVD processing are typically associated with chemical precursors and cleaning of the deposition apparatus. These include acids, bases and organic substances that are contaminated with the residues of the processing. Occasionally, programmatic requirements require handling highly toxic substances, air sensitive compounds, pyrophoric materials and highly flammable substances. With many of the organometallic we use, toxicological or hazardous properties are not well known. We are currently developing Be coatings with an OMCVD processing.

4.3.5 Target Assembly

4.3.5.1 Description

Polymer Science synthesizes new polymers, studies their structure and properties, and fabricates them into various devices and components. Significant capabilities exist in organic synthesis, polymer foams, liquid crystalline polymers, electrically conducting polymers, chemical sensors, resins and membranes for actinide and metal separations, thermosetting polymers, magnetic field processing, organic coatings, and polymer rheology and processing. The materials and devices are typically prepared using either solvents at temperatures ranging from -20 to 150˚ C or by melt processing at temperatures from room temperature up to 300˚ C. A wide variety of analytical techniques are used to determine their structure and behavior, including spectroscopy, microscopy, x-ray scattering, thermal analysis, chromatography, rheology, and mechanical testing.

4.3.5.2 Programs Supported

As indicated in Table 4, Target Assembly at TFF supports Inertial Confinement Fusion and High Energy Density Physics programs.

4.3.5.3 Radioactive Materials

There are plans to produce targets containing sub-Curie amounts of tritium in the next few years. Coatings or other processing of millimeter-sized spheres containing the tritium would take place in the TFF. The filling of these spheres would not take place at the TFF, only subsequent processing and assembly.

4.3.5.4 Nonradioactive, Toxic, or Hazardous Substances

Toxic or hazardous substances are used in the fabrication of targets. Typically the quantities, like the targets themselves, are quite small. Beryllium foils and millimeter-size parts are common to many of these targets. Hazardous chemicals such as the common solvents acetone, toluene and alcohols and the less common ethylene dichloride or tetrahydrofuran. Other materials such as lead, bismuth, uranium, chromium are occasionally requested for targets. The quantities here are typically measured in milligrams or micrograms.

5.0 References

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: Site Wide Environmental Impact Statement for Continued Operation of the Los Alamos National Laboratory in the State of New Mexico," 64FR50797, Washington, D.C. (September 19,1999).

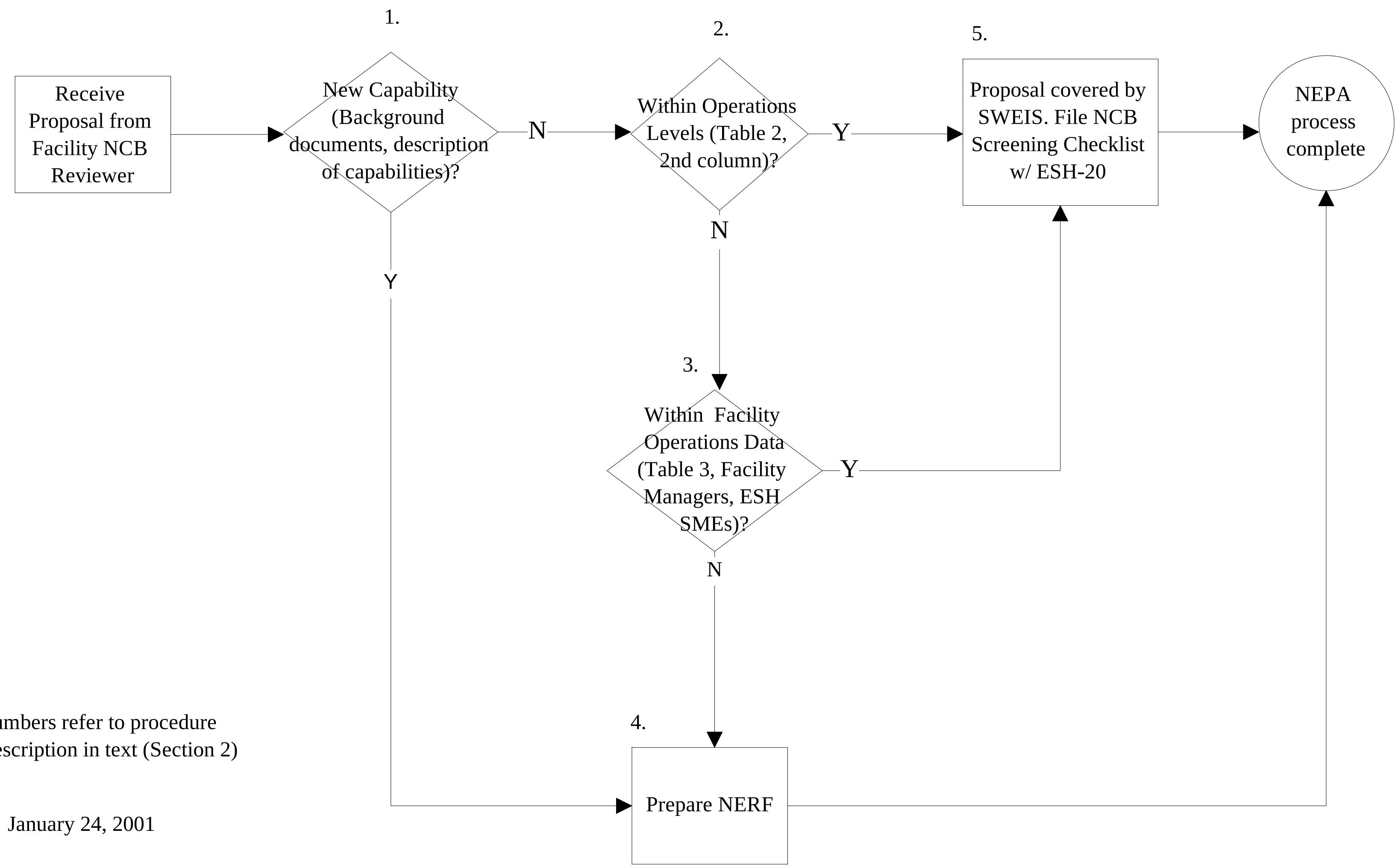
LANL 1996: "Background Information for TA-35 Target Fabrication Facility for Site-Wide Environmental Impact Statement, Los Alamos National Laboratory," transmitted to Mr. Thomas Anderson, GRAM, Inc., by Doris Garvey, Project Leader, LANL Site-Wide Environmental Impact Statement (December 2, 1996).

LANL 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 7, TA-35 Target Fabrication Facility,” LA-UR-01-1273.

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: