Final Environmental Assessment for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production DOE/EA-1532

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ACRONYMS AND ABBREVIATIONS

ACL	Administrative Control Level
AED	Albuquerque Economic Development
ALARA	As-Low-As-Reasonably-Achievable
CFR	Code of Federal Regulations
Ci	Curie(s)
CO	carbon monoxide
DOE	Department of Energy
DOE-STD	DOE Standard
EA	environmental assessment
EDE	effective dose equivalent
EMD	Emergency Management Department
EPA	U.S. Environmental Protection Agency
ES&H	Environment, Safety, and Health
ft	foot or feet
ft^3	cubic foot or feet
HAP	hazardous air pollutant
HC	Hazard Category
HEPA	high-efficiency particulate air
HWMF	Hazardous Waste Management Facility
KAFB	Kirtland Air Force Base
kg	kilogram(s)
LANL	Los Alamos National Laboratory
LCF	latent cancer fatality
LFL	lower flammable limit
lb	pound(s)
m	meter(s)
m^3	cubic meter(s)
MEI	maximally exposed individual
mrem	millirem(s)
MSA	metropolitan statistical area
MT	metric tonne(s)
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants Program
NGPF	Neutron Generator Production Facility
NNSA	National Nuclear Security Administration
NTS	Nevada Test Site
OSHA	Occupational Safety and Health Administration
PHS	Primary Hazard Screening
PPE	personal protective equipment
RMWMF	Radioactive and Mixed Waste Management Facility
RWP	radiological work permit
SNL/NM	Sandia National Laboratories/New Mexico
TA	technical area

TCS	tritium capture system
TEDE	total effective does equivalent
TPY	ton(s) per year
U.S.	United States
WETF	Weapons Engineering Tritium Facility
VOC	volatile organic compound
yr	year(s)

1.0 PURPOSE AND NEED FOR AGENCY ACTION

The United States (U.S.) Department of Energy/National Nuclear Security Administration (DOE/NNSA) has been streamlining and consolidating the Nuclear Weapons Complex for many years to be more efficient and meet the production requirements of the Department of Defense. As part of the consolidation, the Pinellas Facility in Florida was closed and the processes to fabricate neutron generators, the external initiators for nuclear weapons, were transferred from Pinellas to Sandia National Laboratories/New Mexico (SNL/NM) except for the target loading process that was transferred to an existing facility at Los Alamos National Laboratory (LANL), also in New Mexico.

Neutron generators use tritium and must be replaced periodically because the radiological half-life of tritium is 12.26 years (yr). At the time that processes were transferred from Pinellas, FL, the threshold above which a facility would be considered a Hazard Category 3 (HC-3) nuclear facility was 1,000 Curies (Ci) of radioactive material. The decision to transfer target loading to LANL was related to the threshold limits at the time and the fact that the SNL/NM Neutron Generator Production Facility (NGPF) did not qualify as a HC-3 nuclear facility. The HC-3 nuclear facility threshold limit is now 16,000 Ci and can be met by the SNL/NM NGPF. The targets are prepared at SNL/NM and shipped to LANL for loading of tritium and then shipped back to SNL/NM as low-level, radioactive material for assembly into neutron tubes. NNSA is considering relocating the target loading processes to SNL/NM to consolidate all neutron generator activities and, in particular, the development and production capabilities of neutron tube targets.

As part of NNSA's continued streamlining and consolidation of the Nuclear Weapons Complex, the neutron generator target development and production processes that reside at SNL/NM and LANL need to be consolidated. The proposed consolidation at SNL/NM would further simplify, and increase the efficiency of, the neutron generator manufacturing program (target loading, neutron tube and neutron generator production) by centralizing all neutron generator development and manufacturing processes at one place as well as eliminating lead times associated with the packaging and transportation of targets from LANL to SNL/NM.

This Environmental Assessment (EA) for the Proposed Consolidation of Neutron Generator Tritium Target Loading Production describes the Proposed Action and alternatives and associated environmental consequences in the following chapters:

- Chapter 2.0, No Action and Proposed Action Alternatives
- Chapter 3.0, Affected Environment
- Chapter 4.0, Environmental Consequences
- Chapter 5.0, References

2.0 NO ACTION AND PROPOSED ACTION ALTERNATIVES

This chapter describes the No Action Alternative and the Proposed Action assessed for the Consolidation of Neutron Generator Tritium Target Loading Production at SNL/NM, in Albuquerque, NM. The No Action Alternative (Section 2.1) would involve continued neutron tube production at SNL/NM Building 870 using targets loaded with tritium at LANL. The Proposed Action (Section 2.2) would involve relocating target loading operations from LANL to SNL/NM. Building modifications and renovations to one existing facility would be necessary to facilitate the changes in production.

The following alternatives were considered but eliminated from detailed analysis:

- ♦ Construction of a new facility at SNL/NM – Given the availability of an existing facility with the necessary configuration at SNL/NM, construction of a new facility is not considered reasonable. The efficiencies of conducting all neutron generator work in one facility would not be realized. The packaging and transportation of targets between facilities would still be required, and therefore this alternative does not meet the purpose and need for agency action.
- ♦ Relocation to another existing facility – No facilities are available in which the target loading operations could be conducted without extensive facility modification. The efficiencies of conducting all neutron generator work in one facility would not be realized. This alternative is not considered reasonable because it does not meet the purpose and need for agency action.

SNL/NM is located within Kirtland Air Force Base (KAFB), which encompasses land owned by NNSA and portions of the U.S. Forest Service withdrawn land. KAFB is surrounded geographically by the City of Albuquerque to the north, the Manzanita Mountains to the east, the Pueblo of Isleta to the south, and the Albuquerque International Sunport and University of New Mexico land held in trust by the New Mexico State Land Office to the west.

The locations of the SNL/NM technical areas in relation to KAFB and the State of New Mexico are shown in Figure 2-1. The location of the manufacturing of neutron tubes is in Building 870, the proposed target loading project location in Technical Area (TA)-I of SNL/NM, shown in Figure 2-2.

Figure 2-1. Location of Sandia National Laboratories/New Mexico

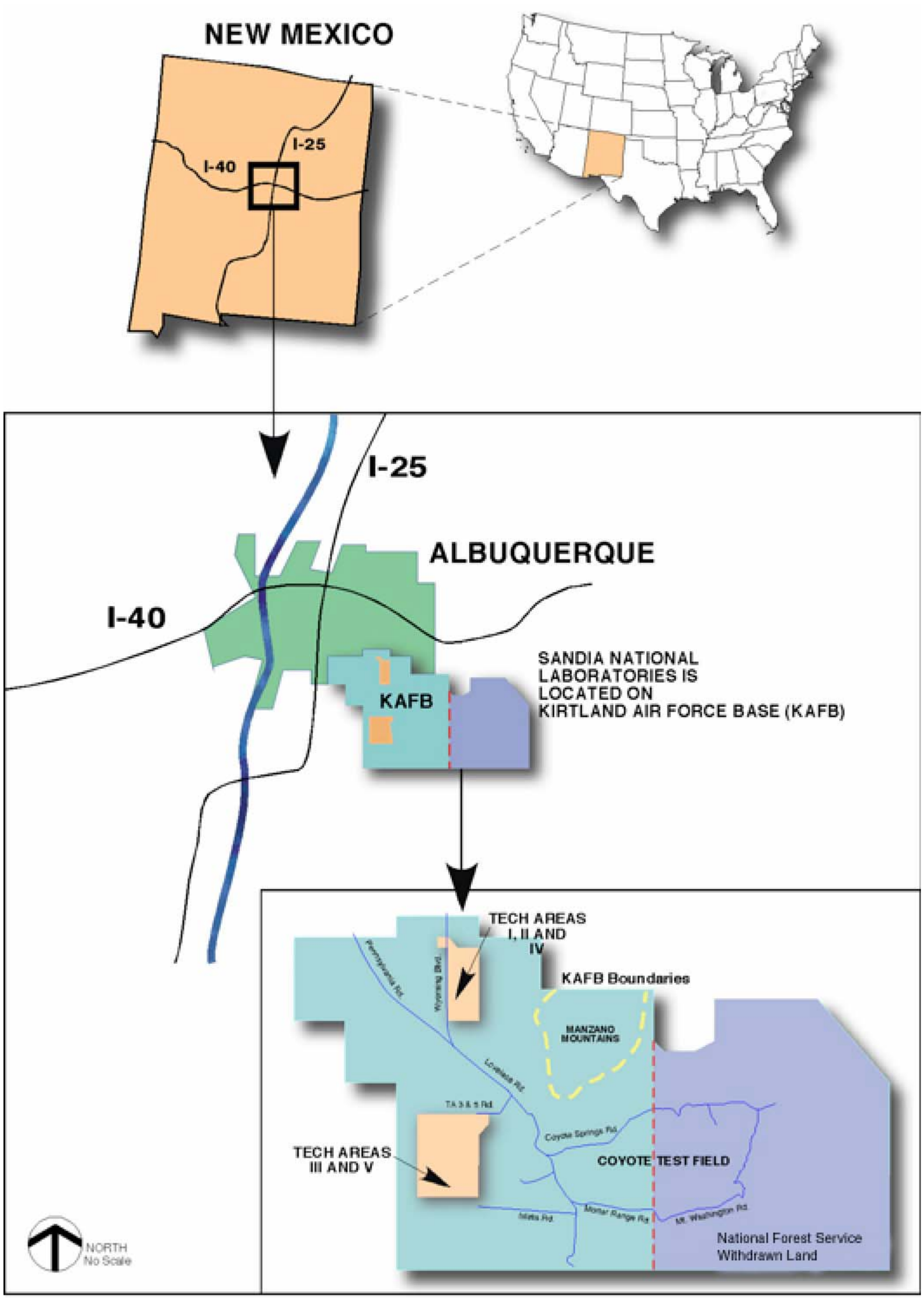
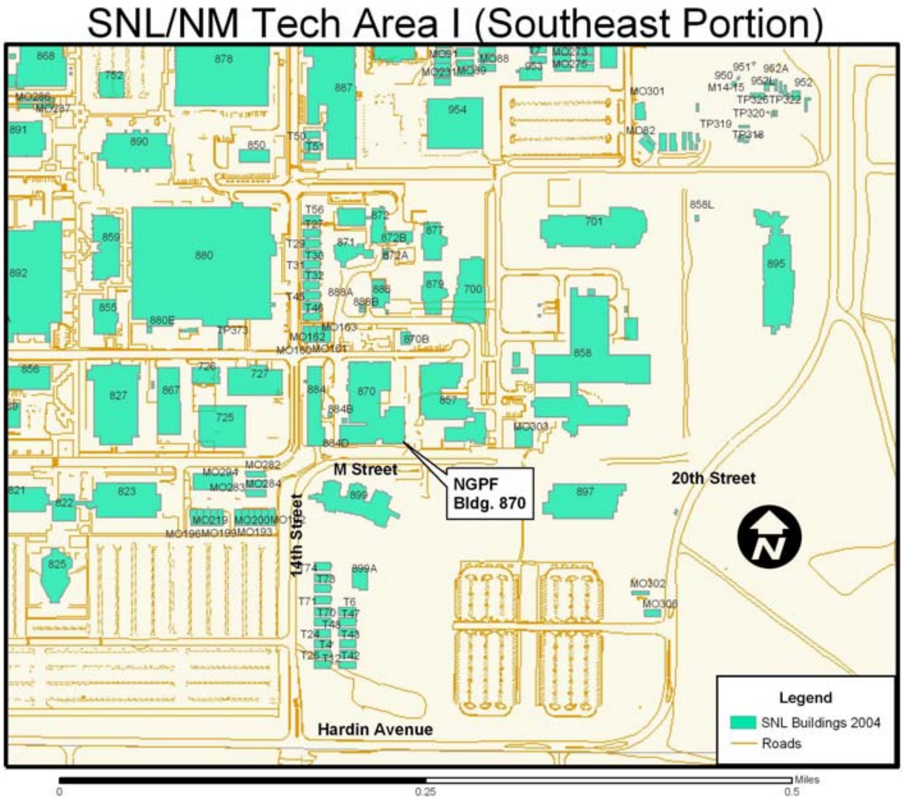


Figure 2-2. Location of Proposed Project Area, Sandia National Laboratories/New Mexico



2.1 No Action Alternative

Under the No Action Alternative, tritium target loading operations would continue at LANL as described in the Environmental Assessment of the Relocation of Neutron Tube Target Loading Operations (DOE 1995), which describes relocation of tritium target loading operations from LANL TA-21 to the Weapons Engineering Tritium Facility (WETF) in LANL TA-16 This relocation is in progress; target loading operations are conducted in TA-21 pending completion of loader installation and qualification at the WETF. Targets would continue to be manufactured at SNL/NM, shipped to LANL for tritium loading, and returned to SNL/NM for incorporation into neutron tubes, a subassembly of neutron generators.

The tritium capture system (TCS) is used to remove tritium from gases generated by tritium operations within the "tritium envelope," the part of Building 870 in which tritium is used, before exhausting to the atmosphere. The TCS is designed to collect gaseous effluent from the vacuum exhaust ports of equipment in Building 870, contain tritium gases, oxidize the tritium to water, and capture the water vapor onto molecular sieve beds. A vacuum manifold runs from various locations within the tritium envelope of Building 870 to transport the exhaust gases to the TCS. Once tritium has been removed, the exhaust is vented to the atmosphere via the facility's tritium exhaust stack, which is monitored to assure that the TCS is working. The TCS removes approximately 98 percent of the tritium from the exhaust.

This section describes the No Action Alternative's effect on facility modification (Section 2.1.1) and on operations. For the No Action Alternative, operations (Section 2.1.2), Air Emissions, Worker Health and Safety, and Waste Management are described.

2.1.1 No Action Alternative Facility Modification

No new construction or facility modification activities would be conducted under the No Action Alternative; however, it may be necessary to replace the TCS under either the No Action Alternative or the Proposed Action. Some tritium is being retained within the Building 870 TCS. SNL/NM is assessing the magnitude of the retention and the locations within the system where the retained tritium may be found.

There are seven locations within the TCS where tritiated compounds could be retained. The system design has six molecular sieve beds for the storage of water including tritiated water. It is also possible that tritiated compounds could be retained on the interior surfaces of the manifold and TCS. An analytical approach is being developed to assay the molecular sieves. After the procedure has been developed and approved procedures are established, each of the six sieves would be assayed before disposing of them as waste. The total amount of tritium found on the sieves would then be accounted for and subtracted from the holdup amount. The difference would be the amount residing on the interior surfaces of the manifold and TCS. At this point, SNL/NM would be able to quantify the magnitude of the plating issue.

If the amount of tritium plated out on the interior surfaces has saturated and does not continuously increase, no further action would be required. If the amount of tritium plated out on the interior surfaces continues to increase, the TCS would be replaced prior to the amount of tritium on the interior surfaces reaching 3,000 Ci. If the TCS is replaced, stand-alone units would be installed adjacent to the mass spectrometer used for analyses. This action would greatly decrease the length of manifold that transports effluent gases to the TCS, reducing the potential area on which tritium plating could occur.

If the TCS is replaced, the waste generated would be both low-level and mixed waste. While in operation the TCS does not generate mixed waste, but if this system would be replaced a small amount of mixed waste could be generated in this process. All efforts would be made to decontaminate keyboards, computers, monitors and circuit boards but in the event that this material could not be released by radiological personnel, then this material will be disposed of in an approved facility in Utah. The estimated amount of mixed waste that could be generated during this process would be less than 20 cubic feet (ft^3) (0.57 cubic meters (m^3)).

The low-level radioactive waste would consist of the tank, ovens, pumps, controls, and piping. The volume of this waste would be about 295 ft^3 (8.4 m^3) of low-level waste. Prior to initiating work, procedures would be developed to prevent workers from being exposed to tritium compounds. All work would take place within the existing tritium envelope; therefore, no increase in tritium emissions from the facility would result from replacement of the TCS.

2.1.2 No Action Alternative Operations

Operations at Building 870 under the No Action Alternative would continue as described in the SNL/NM Site-Wide Environmental Impact Statement (DOE 1999a) and the Rapid Reactivation Project EA (1999b). The mission of the NGPF, located in TA-I, is to support the U.S. nuclear weapons program by fabricating neutron tubes and generators. Building 870, which is part of the NGPF, is a low-hazard, nonnuclear facility. It is a two-story structure with a basement, where most processing and assembly operations take place. The facility includes a special air handling system that captures tritium from operations that have the potential to release this material. Building 870 is primarily an assembly facility that receives components, including the tritium-loaded target materials, from various sources (DOE 1999a).

A variety of techniques are used and highly specialized metal work is performed at Building 870 to accomplish the following categories of processes (DOE 1999a):

- Preparing and coating the surfaces of components
- Joining and welding
- Encapsulating
- Fabricating and assembling
- Inspecting and testing

Building 870 operations are allocated, but not limited, to the following programs and activities (DOE 1999a):

- Direct Stockpile Activities and Weapon Programs that involve development of neutron generators
- Technology Transfer that develops processes with part and process suppliers
- Production Support and Capability Assurance activities that involve production of neutron generators including components
- Other programs that include research and development, process development, and certification testing of neutron generators and components

The production of neutron generators at Building 870 involves fabricating and assembling major components, including a neutron tube (a miniature accelerator), power supply, and a timer.

Potential tritium emissions are associated with various aspects of equipment calibration, destructive testing, outgassing of components, prototype development, manufacturing, and material handling. These activities would continue at Building 870 under the No Action Alternative.

The following chemicals are used in many of these specific processes:

- Corrosives, solvents, organics, and inorganics
- Gases including hydrogen, methane and argon

Chemical emissions, including corrosives, alcohols, ketones, and other solvents, are associated with aspects of surface preparation, cleaning, material processing, manufacturing, testing, and quality control. Small sealed radioactive sources, nondestructive testing (x-rays), and lasers are used in the facility (DOE 1999a).

2.1.2.1 Air Emissions

Radiological and chemical air emissions currently generated by the neutron generator production project would continue under the No Action Alternative. The emissions include hazardous air pollutants (HAPs), volatile organic compounds (VOCs), and criteria pollutants that are regulated by Federal and local laws. The Albuquerque/Bernalillo County Air Quality Control Board regulates emissions from sources such as:

- Radiological exhaust
- Chemical exhaust and solvent cleaning machine
- Encapsulation and curing exhaust
- Diesel-fired standby generators

As required by the permits, SNL/NM-wide HAPs usage may not exceed 10 tons per year (TPY) (9.1 metric tonnes (MT)) for any single HAP or 25 TPY (22.7 MT) for any combination of HAPs. Based on chemical inventory and usage, a conservative estimate of approximately 3.6 TPY (3.3 MT) of HAP and 35.3 TPY (32.0 MT) emissions could be released under the No Action Alternative. This estimate assumes that the entire chemical inventory would be released. The current criteria pollutant emissions from the standby generators, which would not be altered by the No Action Alternative, are extremely low in comparison to permit limitations.

Under the No Action Alternative, the maximum estimated tritium inventory contained in Building 870 would be approximately 4,880 Ci. This inventory estimate is based on the maximum number of tritium-containing generator parts, gas cylinders (also known as “tritium standards”) that would be in the building at any given time, as well as up to 3,000 Ci of tritium retained within the TCS. It is estimated that the maximum potential release would be approximately 300 Ci of tritium per yr under the No Action Alternative. Tritium emissions from these facilities are due to production processing, analytical testing, and equipment calibration and maintenance. The dose to the Maximally Exposed Individual (MEI) resulting from operations under the No Action Alternative would be 2.3×10^{-2} millirem per year (mrem/yr).

2.1.2.2 Worker Health and Safety

Exposure to ionizing radiation at Building 870 could result from activities or processes associated with:

- Tritium-loaded occluder films
- Neutron tube and generator function testing
- Neutron tubes and generators
- Enclosed beam x-ray

- Incidental radiation-producing devices
- Calibration standards

Worker health and safety precautions and controls for current neutron generator production operations are implemented according to the facility's Primary Hazard Screening (PHS) (SNL 2005a) and the SNL/NM Environment, Safety, and Health (ES&H) Manual (SNL 2005b) and supplemental job-specific procedures. Each major piece of process equipment has an operating procedure. All production processes are performed using a work instruction. Radiological work is conducted using radiological work permits (RWPs) that establish protective measures, monitoring, and other work controls.

The following engineered barriers and administrative functions are used to control personnel exposure to tritium, and would be continued under the No Action Alternative.

- Hard plumbing of specific equipment for processing gaseous tritium (or equipment that has the potential to release gaseous tritium during processing) to the TCS
- Single-pass-through ventilation for rooms that have equipment for processing gaseous tritium
- Maintenance of the tritium envelope at negative pressure with respect to areas outside of the envelope, such as hallways
- Gloveboxes and fume hoods for processes that could potentially generate particulate tritium contamination
- Limitation on the quantity of tritium to less than the HC-3 threshold of DOE Standard (DOE-STD)-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.25, Nuclear Safety Analysis Reports (DOE 1992)
- Confinement of most operations likely to result in loose surface contamination or to generate gaseous tritium to the tritium envelope, which is subject to environmental, safety and health controls
- Systematic surface-wipe sampling in all tritium areas for contamination and personnel protection
- Continuous air monitoring in locations where airborne radioactivity is possible
- Smear surveys counted using liquid scintillation analysis to monitor and evaluate potential radiological exposures
- Designated radiological areas, as necessary, that are properly posted
- Appropriate personal protective equipment (PPE)
- Appropriately employed personnel dosimetry including bioassay
- Restricted access to tritium areas for all but authorized personnel
- Site-specific tritium safety training for personnel within NGPF, as appropriate

As necessary and appropriate, personnel participate in the SNL/NM internal dosimetry program. Exposure to tritium is measured using urine bioassay by liquid scintillation counting. As described in the SNL/NM Radiological Protection Procedures Manual (SNL 2005c), a system of administrative control levels (ACLs) have been implemented to control radiological worker doses at levels below the occupational exposure limits provided in the Occupational Radiation Protection Standard, 10 Code of Federal Regulations (CFR) 835.202. At SNL/NM each individual's total effective dose equivalent (TEDE) would be limited to 100 millirems (mrem) per calendar year. However, an individual's ACL can be increased to 500 mrem/yr with written approval from their manager and the signed ACL Approval Form placed in the worker's Health Hazard Case File. ACLs are reviewed and approved annually or when individual exposure levels require a change to an ACL. Measurable radiation exposure from neutron generator production activities is expected only for functional testing operations in Building 870. The maximum individual dose due to functional testing operations under the No Action Alternative is estimated at 50 mrem/yr. The number of potentially exposed individuals would be between three and six personnel.

Hydrogen is used as a cover gas during the thermal processing of neutron generator parts. The hydrogen system has a sensor, alarm, and control system. The system is calibrated to alarm at 20 percent of the hydrogen lower flammable limit (LFL), which also activates the emergency exhaust system. At 40 percent of the hydrogen LFL, a second differentiated alarm triggers a partial facility evacuation, isolation of the hydrogen supply tank, and inerting of the hydrogen piping in the facility with argon gas.

Hazards from chemicals in the facility are controlled through engineered barriers, such as fume hoods, local exhaust ventilation, and volume limits. The chemicals and solvents used in the fabrication process of neutron generators are common industrial materials. Accidental exposures to chemicals are handled in accordance with provisions in the SNL/NM ES&H Manual, Chapter 6, Industrial Hygiene (SNL 2005b).

Process and test equipment voltage ranges from 115 volts to 300 kilovolts. Personnel training and procedures are used for normal work and calibration of the equipment. When activities outside normal maintenance and calibration are encountered, an SNL/NM Safe Work Permit is generated to identify and mitigate hazards attendant to these activities. Only high-voltage trained and qualified engineers and technicians perform work on high-voltage equipment.

Building 870 is a low-hazard nonnuclear facility per the SNL/NM PHS system and does not require accident analysis per DOE-STD-1027-92, Hazard Categorization and Accident Analysis Techniques for Compliance with DOE Order 5480.25, Nuclear Safety Analysis Reports (DOE 1992). However, safety procedures and requirements have been developed in the case of accidents. Both natural and man-made external initiating events were considered in the design of Building 870 and procedures that establish the safety conditions for performing operations.

2.1.2.3 Waste Management

Neutron generator production operations generate nonhazardous, hazardous, low-level radioactive, and mixed wastes. The majority of the project wastes are generated in Building 870 and the Explosive Component Facility, Building 905. Nonhazardous waste consists of materials such as office paper, cardboard, plastic, glass, scrap metal, packaging materials, and wood. The majority of these waste materials are recycled through SNL/NM's Pollution Prevention program. Remaining nonhazardous waste, including industrial waste as defined by the State of New Mexico, approximately 624 cubic yards (477 m^3) per year, is removed and taken to the SNL/NM Solid Waste Transfer Facility where it is sorted, baled, and transported for disposal in local commercial and municipal landfills.

Hazardous waste is stored in satellite accumulation areas at or near the point of generation, in compliance with the Resource Conservation and Recovery Act, 40 CFR 262.34, prior to being transported to the Hazardous Waste Management Facility (HWMF). Hazardous wastes include acid solutions used in chemical cleaning operations, spent plating baths, off-specification chemicals, expired chemicals, spent solvents, spent alcohol solutions, spent acetone solutions, and wipes contaminated with alcohol and acetone. Approximately 8,096 pounds (lb) (3,680 kilograms (kg)) of hazardous waste per year would result from production of neutron generators under the No Action Alternative.

Low-level radioactive waste consists of PPE, scrap neutron generator parts, scrap equipment parts resulting from maintenance activities, and sludge removed from the tritiated process water holding tanks. Replacement of the mole sieve beds from the TCS could produce secondary low-level radioactive waste streams.

Approximately 987 ft^3 (27.9 m^3) of low-level radioactive waste would be generated per year from neutron generator production operations under the No Action Alternative. The waste would be transported to the Radioactive and Mixed Waste Management Facility (RMWMF) prior to final disposition at the Nevada Test Site (NTS).

Mixed waste resulting from neutron generator project operations, including destructive testing, consists of tritium-contaminated chromium thermocouples, cadmium-plated bolts, tin-and lead-solder circuit boards, high-efficiency particulate air (HEPA) filters with entrapped lead dust, and acid solutions. Approximately 660 lb (300 kg) of mixed waste per year would result from operations proposed under the No Action Alternative. The waste would be transported to the SNL/NM RMWMF for packaging and shipment to the NTS.

2.2 Proposed Action

Under the Proposed Action two production loaders would be relocated from TA-16 at LANL to Building 870, which is part of the NGPF at SNL/NM. One of these loaders would be placed in storage, and the other would be installed in Room 1208. Operations would commence using one loader and would continue in this manner until the need for a second loader is identified. An additional, smaller loader (development loader) would be constructed at SNL/NM for the purpose of conducting research and development to further refine the process of target loading. An existing loader (development loader) that is currently limited to deuterium-based experiments would be moved to Room 1209 and reassigned to tritium-related operations. Facility modifications would be required to accommodate the new operations in Building 870. Target loading and associated research and development activities would be conducted in Building 870.

This section describes the Proposed Action’s effect on facility modification (Section 2.2.1) and on operations (Section 2.2.2). For the Proposed Action facility modifications, Air Emissions (Section 2.2.1.1), Worker Health and Safety (Section 2.2.1.2), and Waste Management (Section 2.2.1.3) are described. For the Proposed Action operations, Air Emissions (Section 2.2.2.1), Worker Health And Safety (Section 2.2.2.2), and Waste Management (Section 2.2.2.3) are also described.

2.2.1 Proposed Action Facility Modification

Initially, one production loader would be installed in Room 1208. The second production loader would be placed in storage. Preliminary studies indicate that one production loader operating three times a week in a 6-day week may be sufficient to meet production and development demands at least until 2008 when peak production would be reached. A single loader currently meets War Reserve production and development needs. If necessary, the second production loader would be installed in Room 1209 in Building 870. The two development loaders would also be installed in Room 1209 and would be connected to the existing TCS manifold in Room 1209. The TCS manifold would be extended to Room 1208 to facilitate operation of the first production loader in that room. If the second production loader is required, it would be connected to the TCS manifold in Room 1209.

The 18-inch (46-centimeter) raised floors in Rooms 1208 and 1209 are supported on six pedestals, separating the floor and sub-floor. The resulting space would accommodate plumbing for supplied gases and exhaust systems. Utilities would run within the floor space or connect to the loader through the basement below the loader room. These utilities would include process chilled water, supplied gases, electricity, and exhaust conveyance. Supplied gases would be stored in a bottle storage area adjacent to the loader room. The lines connecting the gases to the loader systems would run within the elevated floor space.

There is a possibility that the TCS would be replaced in the event that tritium retention continues to increase. Activities associated with replacing the TCS would be identical to those conducted under the No Action Alternative as discussed in Section 2.1.1.

2.2.1.1 Air Emissions

No increase in air emissions is anticipated to result from facility modification under the Proposed Action. All modifications would be performed within the existing tritium envelope. Radioactive material and items would be removed from the rooms before construction begins. Surfaces contaminated to levels requiring radiological controls would be decontaminated before construction begins. Thus, there would be no planned release of airborne radioactive material due to construction activities. No heavy equipment or construction vehicles would be used during facility modifications; therefore, no associated carbon monoxide (CO) emissions would result.

2.2.1.2 Worker Health and Safety

Facility modifications associated with the Proposed Action would incorporate all applicable health and safety standards common to each of the construction disciplines employed in the project and would follow all Occupational Safety and Health Administration (OSHA) standards for health and safety practices.

The primary means of preventing exposure to tritium during construction would be the removal of tritium sources and decontamination of surfaces before work begins. Facility modifications and process equipment moves would occur under the Proposed Action. Personnel exposure to tritium compounds through inhalation, ingestion, or skin contact with tritium-contaminated objects or surfaces would be prevented during the construction process.

2.2.1.3 Waste Management

It is anticipated that facility modification activities would generate minor quantities of nonhazardous wastes (primarily construction debris and sanitary wastewater), and possibly low-level radioactive waste and emissions related to reconfiguration of the TCS manifold. Construction debris would consist of packaging materials and scrap material such as electrical wire, floor tile, scrap metal, and empty adhesive and paint containers. Construction waste would be recycled as appropriate. Low-level radioactive waste consisting of PPE, paper wipes, plastic bags, plastic sheeting, and metal piping and fittings would also be generated from modification activities. It is estimated that less than 10 ft^3 (0.3 m^3) of low-level radioactive waste would be generated during facility modification activities.

2.2.2 Proposed Action Operations

Under the Proposed Action, existing operations would continue and the operation of the two production and two development loaders would be added to activities conducted within the tritium envelope in SNL/NM Building 870. The major component of the production loaders is a double-sided stainless-steel glovebox with measurements of approximately 10 feet (ft) (3 meters (m)) long by 4 ft (1.2 m) deep. Each glovebox contains a loader vacuum chamber, a video microscope, a HEPA filter/fan module and a tritium manifold. Less than 2,000 Ci are in use for production loaders and less than 1,000 Ci are in use for development loaders during a loading run. The bulk of unused tritium would be returned to the hydride bed and reused during future loading operations, with minor quantities discharged to the TCS.

Operations within the gloveboxes are conducted in an inert nitrogen atmosphere. This is achieved by circulating the nitrogen through a commercial purifier that strips oxygen and water vapor from the inert atmosphere of the glovebox. The gloveboxes normally operate with a slight positive pressure and contain a bubbler. This bubbler would be connected to the facility exhaust to prevent damage to the glovebox in the event of either an over pressure or under pressure condition. The glovebox atmosphere is monitored by a tritium monitor, an oxygen monitor, and a water vapor analyzer.

The purifier service connections would be cooling water, nitrogen, 94 percent argon/6 percent hydrogen regeneration gas, regeneration gas exhaust, vacuum pump exhaust, and 208 volts alternating current single-phase and three-phase electrical power. The purifier cooling water would be supplied by a chiller located underneath the glovebox. The chiller would require water and electrical power service.

Materials such as the target disks pass into the glovebox through one of two airlocks. These airlocks are loaded, isolated, evacuated, and backfilled with nitrogen so that room air is not introduced into the glovebox atmosphere. The end product is the hydrided (with tritium) metal disk. Product quality would be monitored by gas analysis instrumentation, microscopic inspection of the disk and surface analysis of the metal to tritium ratio. Quality evaluations would include the destructive testing of a limited number of hydrided disks. Disks would be destructively tested by heating them to measure the amount of tritium released from the occluder film on the disk. Materials leaving the facility would either be disposed of as radioactive waste or surveyed for tritium contamination before being released. Items not meeting DOE free-release criteria would be decontaminated or disposed of as radioactive waste.

The effluent stream that potentially contains tritium contamination is the glovebox and loader vacuum system exhaust. Building 870 has a tritium capture system that removes tritium from this waste stream before the exhaust is discharged to the stack.

There are two existing mass spectrometers in Building 870, Room 1206. One of the mass spectrometers is connected to the TCS and performs all analyses that involve tritium gas; for example, target analysis. The second mass spectrometer is used only for analyses that do not contain tritium. Drops already exist to connect the second mass spectrometer to the TCS. These drops were established when the facility was constructed, in preparation for the second mass spectrometer analyzing gases containing tritium. If the Proposed Action with its commensurate analyses of tritium beds exceeded the capacity of the mass spectrometer that performs tritium analyses, then the second mass spectrometer might be used to analyze samples containing tritium. Use of the second mass spectrometer would require no major modifications to the TCS.

Under the Proposed Action, it is anticipated that the total tritium inventory, including all sources, for Building 870 would be less than 12,000 Ci at any given time. Building 870 is a low-hazard facility that maintains its radioactive material inventory below HC-3 nuclear facility limits. The existing material balance accounting for Building 870 would be broadened to include the tritium for target loading, and would be used to evaluate and manage inventory levels at the facility.

During times when there are multiple sets of tritium gas standards in Building 870, the total tritium inventory may reach 12,000 Ci, but will not reach 16,000 Ci. For the purpose of this EA, a maximum inventory of 15,999 Ci has been used for accident analysis and other associated calculations.

2.2.2.1 Air Emissions

It is anticipated that actual tritium emissions from Building 870, operating with the TCS, would increase by less than 3 Ci/yr under the Proposed Action. For analysis under the Proposed Action, emissions calculations do not account for the capture of tritium by the TCS, and tritium emissions of 785 Ci/yr are analyzed for normal operations. Assumptions for the emissions calculations for the Proposed Action include the following.

- The use of the second mass spectrometer, if needed, would double the current estimated release of tritium to the TCS from mass spectrometer operations from 240 Ci/yr to 480 Ci/yr.
- The release of tritium to the TCS from each of the four loaders is twice the anticipated release (10 Ci/yr vs. 5 Ci/yr). The release of tritium to the TCS from all the loading operation is 50 Ci/yr.
- Approximately 150 Ci/yr of tritium would be released to the TCS as a result of product testing activities.
- Total emissions for normal operations are approximately 680 Ci, to which a 15 percent contingency has been added for bounding purposes.
- Air emissions impacts for this analysis result in a dose to the MEI of 0.0664 mrem/yr representing emissions of 785 Ci/yr.
- The assay of material surfaces occurs within Building 870 as part of its standard monitoring program causing an incremental increase in the number of surveys, and no increase in emissions to the air.
- Tritium loading operations do not involve the use of hazardous chemicals, causing no change in other emissions.

2.2.2.2 Worker Health and Safety

Under the Proposed Action, the operators who complete the loading process would work in the room that contains the loaders. They would insert their hands into gloves for the loading and unloading of targets into the reaction chamber. During normal operations, there is limited potential exposure to tritium when inserting hands into the glovebox gloves. Gloves are chosen to minimize tritiated water permeation, and would be replaced when they are degraded by age or have tritium permeation that results in tritium contamination above DOE surface-contamination guidelines.

Personnel could also be exposed to tritiated water vapor and to tritium-contaminated wastes during routine loading activities, as discussed in the EA of the Relocation of Neutron Tube Target Loading Operations (DOE 1995). Tritium monitors and routine contamination surveys of laboratory surfaces would be used to warn of potential tritium hazards to workers, as is currently done in the gas mass spectrometric laboratory. All other conditions associated with worker health and safety would be identical to those associated with the No Action Alternative described in Section 2.1.2.2.

During maintenance activities, the sides of the glovebox are sometimes removed. During these maintenance activities, personnel might be exposed to tritiated water vapor or tritium-contaminated wastes. RWPs address the potential hazards and ensure personnel are protected.

2.2.2.3 Waste Management

Operations under the Proposed Action would result in an increase in tritium-contaminated waste materials from approximately 250 ft^3 (7.1 m^3) to approximately 300 ft^3 (8.5 m^3) per year. As with the No Action Alternative, tritium waste would be transported to the RMWMF for packaging and shipment to NTS. No increase in generation of hazardous, mixed, or nonhazardous solid wastes are anticipated to result from operations conducted under the Proposed Action.

3.0 AFFECTED ENVIRONMENT

This chapter discusses the local environment currently and potentially affected by tritium target loading operations. The building and facilities utilized for the tritium target loading operations are located in an industrially developed area of TA-I at SNL/NM. Surrounding areas have been disturbed as a result of development of the area. There are minimal biological resources and no threatened or endangered species present at the site, and the possibility of encountering previously unidentified cultural resources is low. No exterior construction is planned for this project; the entire project would be installed and operated within the existing building footprint. For these reasons, the project would not affect archaeological or cultural resources. Therefore, those aspects of the environment are not addressed in this EA.

The following sections describe the affected environment under the Proposed Consolidation of Neutron Generator Tritium Target Loading Production:

- 3.1 Regional Setting and Air Quality
- 3.2 Water Resources
- 3.3 Population and Employment
- 3.4 Site Services

3.1 Regional Setting and Air Quality

The mountains, canyons, and Rio Grande Valley significantly influence wind patterns in the Albuquerque Basin and interact to form a complex condition. The 13-mile (21 km) escarpment, which forms the west face of the Sandia Mountains, greatly influences flow, creating diurnal up-slope and down-slope wind patterns. Mountain vegetation and elevations also create differences in ambient temperature and rainfall compared to the valley region. Tijeras Canyon, slightly northeast of SNL/NM, is the largest canyon pass in the area, dividing the Sandia and Manzanita Mountains. This canyon tends to create strong channeled or funneled winds.

Dense, cold air creates temperature inversions during the winter months. These inversions, combined with low wind speed and basin geography, restrict the dispersion and dilution of air pollutants by trapping the pollution near the surface. Thus, the entire basin can be considered a single airshed when evaluating the emission, accumulation, and transportation of air pollutants (SNL 2004a).

Meteorological monitoring commenced at SNL/NM in January 1994. The eight-tower meteorological monitoring network consists of six 33-ft (10-m) towers, one 200-ft (60-m) tower, and one 165-ft (50-m) tower. All towers are instrumented at the 10-ft (3-m) and 33-ft (10-m) levels. Instrumentation is also installed at the top of the tall towers. Meteorological variables measured at all tower levels include wind speed, wind direction, temperature and relative humidity. There are also three rain gauges and two atmospheric sensors in the meteorological network (SNL 2004a).

SNL/NM is located in the Albuquerque Middle Rio Grande Intrastate Air Quality Control Region. Under the national ambient air quality standards (NAAQS), Bernalillo County is currently in maintenance status for the CO NAAQS. Depending on emission levels, modification to existing sources or construction of new sources emitting CO may require a general or transportation conformity analysis as well as additional levels of controls to comply with the NAAQS. In addition, modification to existing sources or construction of new sources emitting the other criteria pollutants for which a preconstruction permit must be obtained are required to comply with the NAAQS (SNL 2004a).

National Emission Standards for Hazardous Air Pollutants Program (NESHAP) compliance support is provided to all SNL/NM source owners subject to radionuclide air emissions regulations. The U.S. Environmental Protection Agency (EPA) regulates radionuclide air emissions in accordance with 40 CFR 61, Subpart H. Dose is calculated using the CAP88 computer code. NESHAP regulation stipulates that direct stack or diffuse monitoring is only required if a facility has the potential to produce an effective dose equivalent (EDE) to the MEI of greater than 0.1 mrem per year. There are no facilities with this potential and no stack monitoring is required at SNL/NM. While not required by regulation, stack monitoring and calculations based on measured parameters are performed as a best management practice at several SNL/NM facilities. All emissions based on continuous monitoring, periodic monitoring, and calculations based on measured parameters are used to calculate the doses.

In 2003, there were 18 SNL/NM facilities reporting NESHAP-regulated emissions. Of these 18 sources, 17 were point sources and one was a diffuse source (SNL 2004b). Two of the facilities associated with the Neutron Generator Production Program are among the 18 sources; Building 870, where this project would be located, and the other is Building 905. The NESHAP sources estimate their potential radionuclide air emissions. The EPA has set a maximum individual public dose limit of 10 mrem per year resulting from the combined radiological emissions produced from any DOE facility. Historically, radioactive releases from SNL/NM have been, and continue to be, several orders of magnitude below this maximum allowable standard.

3.2 Water Resources

The groundwater at SNL/NM is the source of drinking water for SNL/NM, KAFB, and adjacent portions of the City of Albuquerque and Pueblo of Isleta. Groundwater characteristics within KAFB area vary among and within three hydrogeologic regions. These characteristics include aquifer type, hydraulic properties, horizontal groundwater-flow directions, vertical hydraulic gradients, trends in water-level decline resulting from water supply pumping, and groundwater geochemistry. Many of these characteristics are directly related to the geologic media that provide the local framework for the regional aquifer (SNL 2004a).

Groundwater withdrawal by water supply wells for the City of Albuquerque and KAFB has resulted in significant changes to groundwater flow in the Santa Fe Group aquifer system over the past 30 yr, as discharge exceeds recharge for this region of the Albuquerque Basin. Groundwater flow beneath KAFB has been altered from a principally westward direction to northwestward and northward flow directions along the western and northern portions of KAFB. Basin-wide declines from steady-state conditions have been estimated to range from 20 to 160 ft (6 to 48 m). The greatest declines are near the eastern limit of fluvial deposits of the ancestral Rio Grande (SNL 2004a).

The surface water system within KAFB consists primarily of ephemeral drainages, including Tijeras Arroyo, Arroyo del Coyote, and an unnamed drainage south of Arroyo del Coyote. In TA-I, storm water is conveyed through a system of storm sewers and open channels that direct water south to Tijeras Arroyo or west to KAFB. Storm water collected in the northwest corner of TA-I flows west to KAFB in storm sewers beneath E Street and south of K Street. The remainder of TA-I is drained by storm water lines running south along 9^{th}, 11^{th}, and 14^{th} Streets. These sewers flow into open ditches south of TA-I. Flow from open ditches south of TA-I is combined south of Ordnance Road into a single ditch that empties into Tijeras Arroyo. Floods and runoff occur most commonly during the summer thunderstorm season (July through September), when approximately 50 percent of the average annual rainfall occurs (SNL 2004a).

3.3 Population and Employment

SNL/NM is located in the Albuquerque metropolitan statistical area (MSA) in central New Mexico. Based on estimates/projections from the 2000 census, the estimated population of the Albuquerque MSA is 758,527 (AED 2005). The MSA includes Bernalillo County (City of Albuquerque), Sandoval County (City of Rio Rancho), and Valencia County (Cities of Belen and Las Lunas). Sandia employed about 8,500 full-time-equivalent employees as of February 2005. Most work at or report to the Albuquerque, NM facility, and about 900 employees work at the Livermore, CA laboratory. Some employees reporting to Albuquerque work elsewhere.

SNL/NM is the fifth largest major public facility/institution in New Mexico. Approximately $603 million in direct salaries and wages were paid during fiscal year 2003 to 8,162 employees at SNL/NM. Approximately $63.5 million is paid annually to New Mexico health providers for treating SNL/NM employees, retirees, and their families. The spending of wages, salaries, and benefits by SNL/NM families creates jobs and income for others in the region who provide goods and services. Procurement spending by SNL/NM also generates economic activity in the form of jobs and income for others in the area (SNL 2004a).

3.4 Site Services

The facility and infrastructure that would be utilized for tritium target loading operations are located in a secured portion of TA-I of SNL/NM. It is the most developed and populated of the TAs at SNL/NM (SNL 2004b). Security is provided by the SNL/NM Protective Force Department that consists of dispatchers, an offensive force, and a defensive force. In addition, the SNL/NM Emergency Management Department (EMD) provides planning for emergency preparedness and response, including the analysis of potential impacts of unmitigated and mitigated releases of chemicals and radioactive materials from accidents that could affect SNL/NM personnel and operations, natural phenomenon events, and security-related events. Fire protection is provided by the U.S. Air Force, which operates five fire stations located throughout KAFB (SNL 2004a). The Health Services Department provides medical assistance and treatment of sick or injured personnel (SNL 2004a).

The proposed consolidation of neutron generator tritium target loading production would be located in TA-I, within Building 870. In addition, the main administrative center and a close grouping of laboratories and offices are located within TA-I (SNL 2004b). Site services are available to operations and facilities located within TA-I.

SNL/NM currently generates over 15,000 different waste streams. SNL/NM has three waste processing facilities onsite: the HWMF, the RMWMF, and the Solid Waste Transfer Facility (SNL 2004b). Any wastes generated through operations at facilities within TA-I are managed onsite, at the appropriate waste management facility.

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes and compares the environmental consequences of the No Action Alternative and the Proposed Action. Descriptions of the No Action and Proposed Action Alternatives are provided in Chapter 2 of this EA, and affected aspects of the environment are discussed in Chapter 3. The following sections compare potential environmental consequences of the two alternatives (Sections 4.1 and 4.2) and describe the cumulative impacts of the Proposed Action in Section 4.3. Section 4.4 describes abnormal events. Other aspects of the environment were considered in the scoping of the analysis; however, only those potentially affected by the proposed project are discussed in this chapter.

The Proposed Action and No Action Alternatives would both result in air emissions, waste generation, process and facility water use, and discharge of liquid effluents into the Albuquerque sanitary sewer system. Table 4-1 compares air emissions and other waste volumes related to operations under the No Action Alternative and the Proposed Action. The issues summarized in Table 4-1 are addressed in Sections 4.1 and 4.2. Cumulative impacts and abnormal events for the Proposed Consolidation Neutron Generator Tritium Target Loading Production are presented in Sections 4.3 and 4.4.

Table 4-1. Comparison of Estimated Annual Emissions and Wastes for the No Action and Proposed Action Alternatives

Emissions and Wastes	No Action Alternative	Proposed Action[1]
Air Emissions (tritium)	300 Ci per year	785 Ci per year
Low-Level Radioactive Waste	250 ft^3 (7.1 m^3) per year	300 ft^3 (8.5 m^3) per year

[1] Does not include facility modification wastes

4.1 No Action Alternative

Under the No Action Alternative, SNL/NM would continue to fabricate targets and ship them to LANL for tritium loading. Once loaded, targets would continue to be shipped to SNL/NM for incorporation into neutron generators. Facilities, infrastructure, equipment, and staffing level would be maintained, and any environmental consequences associated with current operations would continue to exist. A description of the environmental consequences of the No Action Alternative on facility modification and operations follows.

4.1.1 No Action Alternative Facility Modification

No facility modification activities are associated with the No Action Alternative; therefore, no effects on air quality, human health, or waste management resulting from modification activities would be attributed to the No Action Alternative. No facility modification-related waste would be generated.

Under the No Action Alternative, removal of the TCS could be required if retention of tritium within the system reaches 3,000 Ci. Should removal of the TCS be required, up to 20 ft^3 (0.57 m^3) of mixed waste and 295 (ft^3) (8.4m^3) of low-level waste would be generated as discussed in Section 2.1.1. This is a relatively small quantity and would not adversely affect the current waste management systems and processes at SNL/NM.

4.1.2 No Action Alternative Operations

Description of the projected environmental effects of the No Action Alternative is based on information available from monitoring and tracking of current project operations in comparison to total SNL/NM operations. The following sections present the environmental issues of air emissions, worker health and safety, and waste management. Discussion of each issue is inclusive of effects or potential effects of all neutron generator production operations and emissions, and is not facility- or process-specific.

4.1.2.1 Air Emissions

SNL/NM manages air quality through the EMD. Compliance programs are divided between the Air Quality Compliance Program, the Radiological NESHAP Program, and the Clean Air Network Program, all of which are monitored by the EMD. Meteorological data and ambient air monitoring data assist the EMD in assessing the impact of emissions.

Air emissions regulated by Federal and local laws include HAPs, VOCs, and criteria pollutants. Emission sources include radiological exhaust, chemical exhaust and solvent cleaning machine, encapsulation and curing exhaust, and diesel-fired standby generators. As required for minor source designation, SNL/NM-wide HAP usage may not exceed 10 TPY (9.1 MT) for any single HAP or 25 TPY (22.7 MT) for any combination of HAPs. Based on chemical inventory and usage, a conservative estimate of approximately 3.6 TPY (3.3 MT) of HAP and 35.3 TPY (32.0 MT) of VOC emissions could be released under the No Action Alternative. These emission estimates are based on the assumption that the annual chemical inventory within Building 870 would be released. This estimate does not take into account engineered controls such as pollution control equipment, which would result in lower emissions. Under the No Action Alternative, no change in HAP, VOCs, or criteria pollutants would result from continued operations in Building 870.

The National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities regulation (40 CFR 61, Subpart H) requires all DOE installations that potentially emit radionuclides into the air to evaluate the resulting dose to the public. This regulation requires that radionuclides released to the ambient air not exceed those amounts that would cause any member of the public to receive an EDE of 10 mrem per year. Compliance procedures for DOE facilities require the use of CAP88-PC or other approved computer models to calculate EDE to the maximally exposed member of the public. The CAP88-PC computer model estimates dose and risk from point sources of radionuclide air emissions and calculates exposure to radionuclide releases.

Using the CAP88-PC computer program, an annual release of 300 Ci of tritium was modeled as an upper bounding release condition. The calculated EDE to the MEI was determined to be 2.3×10^{-2} mrem per year. The lifetime fatal cancer risk that could occur under the No Action Alternative was estimated at 1.15×10^{-6}. Therefore, no fatal cancers are anticipated to result from operations conducted under the No Action Alternative.

Actual tritium emissions from the facility have been estimated at less than 15 Ci per/yr. For consistency with regulatory guidelines for calculating radionuclide emissions found in Appendix D to 40 CFR Part 61. DOE does not account for pollution control equipment such as the TCS in calculating emissions for this EA. Much of the air that could potentially contain tritium is passed through the Building 870 TCS, which uses a molecular sieve method to remove tritium from the air prior to its release into the environment.

4.1.2.2 Worker Health and Safety

No measurable effects on worker health and safety are anticipated to result from chemical or radionuclide exposure under the No Action Alternative, as analyzed in the Rapid Reactivation Project Environmental Assessment (DOE 1999b). Engineering and administrative controls are enforced at the NGPF to ensure that no worker is exposed to chemicals beyond the permissible exposure limits established by OSHA and other industrial standards. Engineering and administrative controls, including the use of volume control, closed containers, closed loop systems, and fume hoods would further ensure that worker exposures to all chemicals would be kept As-Low-As-Reasonably-Achievable (ALARA). Potential scenarios for exposure to chemicals would continue to be handled in accordance with provisions in the SNL/NM ES&H Manual, Chapter 6, Industrial Hygiene (SNL/NM 2005b).

Neutron tubes and neutron generators are functionally tested at various steps in the production process. The functional test produces fast-moving neutron radiation. Equipment operators and personnel in adjacent rooms would be exposed to minor amounts of radiation under the No Action Alternative, due to the penetrating ability of fast-moving neutrons. The location of functional test equipment is a critical parameter in determining the exposure to personnel from these operations. Exposure to operating personnel and members of the public would be maintained ALARA, through a combination of facility design, equipment location, shielding, and administrative controls. Engineering controls under the No Action Alternative would minimize ionizing radiation exposure; however, personnel would continue to participate in the SNL/NM internal dosimetry program when monitoring results indicate a need. Administrative controls would include adherence to worker health and safety precautions and controls according to the SNL/NM ES&H Manual, supplements, and additional job-specific procedures. Therefore, no impact to worker health and safety is anticipated under the No Action Alternative.

4.1.2.3 Waste Management

No impacts to existing waste storage, transportation, or other related processes are anticipated under the No Action Alternative. Waste volumes that would be generated under the No Action Alternative, including nonhazardous, hazardous, low-level radioactive, and mixed waste are described in Section 2.1.2.3 and summarized in Table 4-1. All wastes would continue to be managed by SNL/NM's waste management program.

4.2 Proposed Action

Under the Proposed Action up to four loaders (two development loaders and two production loaders) would be installed and operated in Building 870, Rooms 1208 and 1209. Modifications to the manifolds of the TCS would be required to connect the loaders' exhaust systems to the TCS. Any corrective measures required to address retention of tritium within the TCS, including replacement of the TCS, would be identical to those associated with the No Action Alternative. (See Section 4.1.1 for a discussion of the corrective measures under the No Action Alternative.)

4.2.1 Proposed Action Facility Modification

Under the Proposed Action minor modifications to Rooms 1208 and 1209 would be performed. Modifications would include running process gas and electric lines and connecting the loaders to the TCS.

4.2.1.1 Air Quality

All facility modification activities would be conducted within the existing tritium envelope. No release of tritium or other contaminants into the ambient air within the tritium envelope is anticipated. No impacts to air quality are anticipated to result from facility modification activities under the Proposed Action.

4.2.1.2 Worker Health and Safety

Minimal impact on worker health and safety is anticipated as a result of modification activities associated with the Proposed Action. Workers may have limited exposure to chemical or radiological hazards during construction. Hazards would be analyzed and controls established prior to performing the work. Personnel exposure to tritium through inhalation, ingestion, or skin contact with tritium-contaminated objects or surfaces could occur during facility modification activities. Worker protection measures, including hazard training, work procedures, and the use of PPE, would be enforced. Therefore, no adverse health effects due to radiation exposure during facility modification activities are anticipated.

4.2.1.3 Waste Management

Under the Proposed Action, minor quantities of nonhazardous solid waste and potentially radioactive waste would be generated by facility modification activities. Up to 10 ft^3 (0.3 m^3) of radioactive waste could be generated by room modifications and activities. No major reconfiguration activities are proposed, and modifications would primarily involve installation of gas and water lines in addition to connecting new equipment to the TCS. These quantities would be incidental to existing waste management capabilities; therefore, no impacts to waste management systems or processes are anticipated.

4.2.2 Proposed Action Operations

The Proposed Action involves transfer of two production loaders from LANL to SNL for installation and operation, installation and operation of two development loaders, conversion of one mass spectrometer to use with tritium, and associated facility modification. For the Proposed Action operations, Air Emissions (Section 4.2.2.1), Worker Health And Safety (Section 4.2.2.2), and Waste Management (Section 4.2.2.3) are described.

4.2.2.1 Air Emissions

Under the Proposed Action, no change in emissions of HAPs, VOCs, or criteria pollutants would result. As discussed in Section 2.2.2.1, radiological air emissions (tritium) would increase by less than 3 Ci per year as a result of implementation of the Proposed Action. However, emissions-related calculations do not take emissions control equipment into account. Therefore, it is estimated that the maximum potential release would be approximately 785 Ci per year under the Proposed Action. This estimate was modeled as an upper bounding release condition using the CAP88-PC computer program. The calculated EDE to the MEI was determined to be 0.0664 mrem per year. The lifetime fatal cancer risk that could occur under the Proposed Action is estimated at 3.32×10^{-6}.

4.2.2.2 Worker Health and Safety

Exposure to tritium from the inside of the glovebox is not anticipated to occur to workers during normal operations conducted under the Proposed Action. Tritium monitors and routine contamination surveys of laboratory surfaces would be used to warn of potential tritium hazards to workers, as is currently done in the gas mass spectrometric laboratory. All other conditions associated with worker health and safety would be identical to those associated with the No Action Alternative.

During maintenance activities, the sides of the glovebox are sometimes removed. During these maintenance activities, personnel might be exposed to tritiated water vapor or tritium-contaminated wastes. RWPs address the potential hazards and ensure personnel are protected.

No radiation from external penetrating sources (e.g. gamma or neutron radiation) would result from the Proposed Action. Therefore, no additional exposures to internal or external radiation hazards would be received by workers conducting Proposed Action operations.

4.2.2.3 Waste Management

Under the Proposed Action no increase in tritiated process water is anticipated. Tritium waste generation would increase from 250 ft^3 (7.1 m^3) per year to 300 ft^3 (8.5 m^3) per year. These quantities are considered incidental to existing waste management capabilities and do not represent a substantial increase in waste generation for Building 870. No change in generation of hazardous, mixed, or nonhazardous waste is anticipated to result from Proposed Action operations. Therefore, no impact on existing waste management systems or processes is anticipated.

4.3 Cumulative Effects

DOE considered the cumulative effects of the Proposed Action with other activities at SNL/NM. Projected air emissions, water use, liquid effluents, and waste generation rates were compared to data previously compiled for the SNL/NM SWEIS, SNL/NM site-wide permits, and information provided by project personnel as documented in the administrative record (DOE 1999a). These projected amounts would be small and would not add substantially to existing levels. Other operations at SNL/NM do not contribute substantially to the total tritium inventory for SNL/NM, and the effects of the increase in tritium emissions resulting from the Proposed Action are anticipated to be negligible. Therefore, the effects of the Proposed Action when combined with those effects of other actions defined in the scope of this section do not result in substantial cumulative impacts.

4.4 Abnormal Events

Abnormal occurrences include operational, external, or natural phenomena events postulated to affect SNL/NM activities. These could include radiological and toxicological releases, explosions, and airplane crashes. The worst case abnormal occurrence considered for this EA is an aircraft crash into Building 870 and the resulting facility fire.

The assumed inventory is based on the total amount of tritium that would be contained in the maximum number of neutron generator parts, gas standards, loaders, and the TCS contained within the building at any given time. This inventory is assumed to be 4,880 Ci for the No Action Alternative and 15,999 Ci for the Proposed Action.

The results indicate that the consequences of a radiological accident associated with Building 870 are very low. For the No Action Alternative, the highest consequence dose to the MEI is estimated at 9.6×10^{-3} mrem, with an increased probability of a Latent Cancer Fatality (LCF) of 4.65×10^{-7}. The highest consequence dose to the MEI resulting from the release of 15,999 Ci was estimated at 3.32×10^{-2} mrem. The increased probability of an LCF to the MEI from the release of 4,880 Ci based on the consequence dose was estimated at 1.66×10^{-6}. Because these

LCF estimates are less than 1, it is not likely that fatal cancers attributable to exposures estimated from this accident scenario would occur. The major source of effects from the airplane crash is considered to be death of the facility occupants resulting from the crash itself.

The operational event analyzed for this EA is the rupture of a single steel vessel used to refill the tritium loaders and contain approximately 1,000 curies of tritium. Dropping the vessel during handling or a human error during its connection to the loader could cause a release. The air in this room is replaced every 10 minutes. Assuming the entire 1,000 curies is released into the room, the alarms sound, and the worker is exposed for five minutes, the resulting dose to the worker is 3 mrem, which is less than 0.1% of the DOE exposure limit for the worker. Doses were calculated using the derived air concentration for elemental tritium from 10 CFR 835. The 1,000 curies of tritium, if released to the atmosphere, is much less than the 16,000 curies analyzed in the discussion above for the airplane crash into Building 870.

5.0 REFERENCES

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