

## 4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes and compares the environmental consequences of the No Action Alternative and the Proposed Action for the TCR Project. 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. 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 Alternative 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 summarizes and compares air emissions and other waste volumes related to operations under the No Action Alternative and the Proposed Action. The issues summarized in the table are addressed in the following sections.

**Table 4.1 – Comparison of Estimated Annual Emissions, Water Use, and Wastes for the No Action Alternative and the Proposed Action**

Emissions and Wastes	No Action Alternative	Proposed Action
<b><i>Construction and Demolition</i></b>		
Air Emissions/Conformity	Not applicable (NA)	Less than 2 tons
Asbestos	NA	117 yd <sup>3</sup> or 47,385 lb (89 m <sup>3</sup> or 21,539 kg)
Non-hazardous Waste	NA	8,108 tons (7.4 million kg)
<b><i>Operations</i></b>		
Air Emissions	Passes screen (see Section 4.1.1)	Passes screen (see Section 4.4.1)
Hazardous Waste	4,715 lb/yr (2,143 kg/yr)	9,914 lb/yr (4,506 kg/yr)
Radioactive Waste	NA	1,000 lb/yr (455 kg)
Mixed Waste	NA	2,100 lb/yr (955 kg/yr)
Water Use	1,339,000 gal/yr (5,068,666 ℓ/yr)	2,130,000 gal/yr (8,063,684 ℓ/yr)
Wastewater Discharge	539,300 gal/yr (2,041,473 ℓ/yr)	870,500 gal/yr (3,295,201 ℓ/yr)
Non-hazardous Waste <sup>1</sup>	851,504 lb/yr (387,047 kg/yr)	857,684 lb/yr (389,856 kg/yr)

<sup>1</sup> Includes recycled materials discussed in Section 2.3.3.

### 4.1 No Action Alternative

Description of the projected environmental effects of the No Action Alternative is based on information available from the SNL/NM SWEIS (DOE 1999), the SWEIS Annual Report (SNL 2001), and the CDR for TCR (SNL 2002). The environmental effects of the Proposed Action would be the same as those discussed for the Expanded Operations Alternative in the SWEIS.

Because some of the TCR-related facilities were not discussed in detail in the SWEIS, additional information was gathered and calculations performed to more closely examine the facilities specific to this EA. The following sections are organized according to environmental issues. Discussion of each issue is inclusive of effects or potential effects of all associated operations and emissions and is not facility- or process-specific.

#### *4.1.1 Air Emissions*

The SWEIS examined approximately 465 chemicals used at SNL/NM as potential components of routine emissions (Section 5.3.8 of the SWEIS). Occupational Exposure Limits (OELs; a time-weighted average concentration for a conventional 8-hour workday and a 40-hour workweek, to which it is believed that nearly all workers may be repeatedly exposed, day after day, without adverse effect) were identified for each of these chemicals, and a “screening” value of the OEL divided by 100 (for conservatism) was established for determining whether emissions factors for each chemical should be developed. This “screening” value is called the Threshold Emission Value (TEV). The initial screening was based on total inventory; in essence, this screening assumed that the entire quantity of a given chemical would be emitted. A chemical passed the screen if a theoretical release of the entire inventory did not cause the TEV to be exceeded. Facility-specific emissions factors were developed for those chemicals that did not pass the initial screening. After applying facility-specific emissions factors, chemicals were screened again to determine whether the TEV was exceeded. Chemicals also passed this screen if the TEV was not exceeded. The SWEIS concluded that normal operations at SNL/NM, including the No Action Alternative for this Environmental Assessment (EA), would not likely result in degradation of air quality.

In the SWEIS, the radiological dose to the MEI due to the radiological air emission from routine SNL/NM facility operations were evaluated. The radiological dose from normal operations of the Expanded Operations Alternative was determined to be 0.51mrem/yr to the MEI.

#### *4.1.2 Water Use and Liquid Effluents*

Water use and wastewater generation would continue at 894,000 gal/yr (3.34 million ℓ/yr) and 651,600 gal (2.47 million ℓ), respectively, under the No Action Alternative. Sanitary wastewater would continue to be discharged either to the City of Albuquerque sewer system or to septic systems (for remote facilities) or removed from portable toilets and disposed of appropriately. Process wastewater discharged by the facilities would continue to be analyzed to ensure compliance with City of Albuquerque discharge standards for discharges to the sanitary sewer system or NMED water quality standards for discharges onto the ground.

The No Action Alternative would not result in a change in water use or wastewater generation above that analyzed in the SWEIS.

#### *4.1.3 Waste Management*

The No Action Alternative would continue to generate 851,504 lb/yr (387,047 kg/yr) of non-hazardous solid waste and 4,715 lb/yr (2,143 kg/yr) of hazardous wastes. No change in waste generation would result from the No Action Alternative. All wastes would continue to be managed by SNL/NM’s waste management program as described in the SWEIS.

#### *4.1.4 Human Health and Safety*

Current operations utilize hazardous chemicals and other substances that may affect human health and safety.

Air is the primary pathway for possible worker or public exposure; however, no adverse human health effects would be expected to occur from HAP exposure resulting from the No Action Alternative. The chemicals and solvents used in the current processes are common industrial materials. The SWEIS estimated the overall cancer risk to the MEI from radiation would be less than 1 chance in 4 million.

Engineering and administrative controls are enforced at the facilities associated with the TCR Project to ensure that workers are not exposed to chemicals beyond the permissible exposure limits (PELs) established by the OSHA. Hazards from chemicals in the facility are controlled through engineered barriers, such as fume hoods, local exhaust ventilation, closed containers, closed loop systems, and volume limits. Potential scenarios for accidental exposure to chemicals would continue to be handled in accordance with provisions outlined in the SNL/NM ES&H Manual, Chapter 6, Industrial Hygiene (SNL 2000).

According to the SNL/NM SWEIS (DOE 1999), impacts for the entire SNL/NM workforce are projected to be zero fatalities per year and 1 or 2 confirmed chemical exposures annually. No measurable effects on worker health and safety are anticipated to result from chemical exposure under the No Action Alternative.

## **4.2 Proposed Action**

Under the Proposed Action, renovation and upgrades would be performed at the existing facilities listed in Chapter 2, and the new TTC (including the Radiant Heat Test Cell, FLAME II, and XTF), ESC, and CTF would be constructed. Several existing facilities would also be demolished. The following sections summarize potential environmental consequences associated with the Proposed Action.

## **4.3 Proposed Action Construction and Demolition Activities**

Modifications, renovation, and construction of facilities necessary for implementation of the Proposed Action would result in short-term environmental effects, including noise generated by construction, fugitive dust, and safety and security issues associated with construction personnel on the site. However, these effects would be minimal and confined to relatively small areas for short periods of time.

### *4.3.1 Construction/Demolition Air Conformity*

No discernible changes in air quality are anticipated as a result of Proposed Action construction activities. CO emissions from equipment used for construction would affect air emissions under the Proposed Action. However, the total construction-related CO emissions are projected to be less than 2 tons, which would result in emissions less than the 100 TPY threshold requiring a conformity analysis; therefore, a conformity analysis is not required. Water would be used for dust suppression as appropriate.

#### 4.3.2 *Water Use and Liquid Effluents*

Water use during construction for installation of equipment and dust suppression would occur during the construction process. The short-term increase in water use due to construction activities is anticipated to be negligible in comparison to SNL/NM's site-wide water use.

#### 4.3.3 *Waste Management*

Generation and proper management of construction wastes related to the Proposed Action would not exceed the capacity of existing waste management systems. Typical construction debris, as identified in Section 2.4.5, would be generated from demolition and building renovations and modifications under the Proposed Action. Construction, renovation, and demolition activities would result in the generation of approximately 1608 tons (1.47 million kg) of solid waste.

Construction projects are common at SNL/NM; wastes associated with construction are considered routine and are managed according to prescribed procedure. Waste generated during construction of the Proposed Action would be stored in dumpsters prior to disposition. Current plans call for disposal of standard construction waste in the KAFB construction waste landfill.

As much as 117 yd<sup>3</sup> or 47,385 lb (89 m<sup>3</sup> or 21,539 kg) of asbestos-containing materials may be present in the facilities associated with the Proposed Action. Any asbestos encountered during the demolition activities would be removed according to SNL/NM asbestos management procedures. Current procedures involve disposal of asbestos at the Kerrs Environmental Mountainair Monofill Facility.

#### 4.3.4 *Health and Safety*

Little effect on worker health and safety is anticipated as a result of construction and demolition activities associated with the Proposed Action. Workers would likely have limited if any exposure to chemical hazards during renovation and new facility construction. Hazards would be limited to those commonly associated with construction activities and would be analyzed prior to performing the work. Worker protection measures, including hazard training, work procedures, and the use of personal protective equipment (PPE) would be enforced.

#### 4.3.5 *Cultural Resources*

Potential impacts to historic properties are assessed by applying the Criteria of Adverse Effect as defined in 36 CFR 800.5a. An adverse effect is found when an action may alter the characteristics of a historic property that qualify it for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, workmanship, feeling, or association. Adverse effects may include reasonably foreseeable effects caused by the action that may occur later in time, be farther removed in distance, or be cumulative.

Of the facility locations proposed for TCR activities, the 10,000-ft Rocket Sled Track, Centrifuge Complex, Mechanical (Dynamic) Shock Facility, Vibration and Acoustics Facility, and the Aerial Cable Test Facility each include buildings or structures that SNL/NM has recommended as NRHP-eligible as historic districts or individual historic properties. A historic building inventory was completed of TA-I in 1998 and 1999; no historic properties were identified in the area. Consultation between DOE and the New Mexico SHPO on properties in the area affected by the proposed ESC and TCR activities has concluded that no historic properties will be affected. Similarly, no historic properties are present that would be affected by proposed TCR activities at the TTC or the new CTF.

Proposed TCR activities include a variety of site infrastructure and utility improvements, equipment upgrades, building and structural renovations, construction of new facilities, and removal of buildings and structures. As such, the proposed action is an undertaking, which has the potential to cause effects on historic properties. These proposed changes may alter the characteristics of the properties that qualify them for NRHP listing.

The historic properties present are associated with the contributions that environmental testing conducted at SNL/NM made to weapons design during the Cold War. In addition to this association, some properties are of unique design or size or house unique test equipment because of the nature of the weapons work. The proposed improvements to the test capabilities of these facilities would allow the continued use of these buildings in a mission compatible with their historic role. If other aspects of integrity can be maintained, continued use would have a positive impact on the integrity of the historic properties present. Prior to approving the undertaking, the DOE would complete consultations with the SHPO and other parties regarding the application of the criteria of adverse effect and the development of appropriate mitigation measures to avoid or reduce any impacts in accordance with 36 CFR 800.

The treatment plan(s) to resolve any adverse effects would be negotiated between the SHPO and NNSA. The treatment plan(s) for the affected buildings could include a combination of the following elements: archival medium-format photographs; existing architectural blueprints; preparation of detailed reports on buildings' histories; and interviews with past and present workers. Not all elements would necessarily be applied to all of the eligible buildings.

A Memorandum of Agreement between NNSA and the New Mexico SHPO for resolution of adverse effects would be prepared following SHPO concurrence on the NRHP eligibility assessment and treatment plan. SNL/NM would implement the treatment plan. The Advisory Council on Historic Preservation would be notified of the Memorandum of Agreement and would have an opportunity to comment.

Ground-disturbing activities associated with site improvements, new utility infrastructure, and facility construction could impact undiscovered buried archaeological resources. Although no archaeological resources are known or significant resources anticipated, procedures for addressing the discovery of cultural resources, including human remains and Native American cultural items would be made part of construction plans and specifications. At a minimum, work would stop at the location of the discovery and a qualified archaeologist contacted to assess the find and determine further appropriate actions in coordination with the SHPO.

#### **4.4 Proposed Action Operations**

Implementation of the Proposed Action would involve the continuation of current operations at the facilities identified in Section 2.1 and new operations at the TTC, ESC, and CTF. With the exception of the CTF and the TTC, environmental effects of operations would remain the same as those evaluated in the SWEIS because operations at existing facilities would not be expanded and those at the ESC would consist of existing operations relocated to a new facility located essentially adjacent to those currently in use. The following sections describe the environmental consequences of increased production that could result from implementation of the Proposed Action.

4.4.1 Air Emissions

Chemical emissions identified under the No Action Alternative would also be generated under the Proposed Action. This would include all HAP chemicals used by the Proposed Action.

Anticipated air emissions and the resulting consequences were analyzed using the same methodology used for the analyses supporting the SNL/NM SWEIS (DOE 1999). With the completion of the CDR for TCR (SNL 2002), more precise projections of chemical inventories and the resulting air emissions are possible. A list of chemicals projected to be present at the TTC and the CTF was evaluated to determine whether release of the entire inventory of each chemical would exceed the TEV. The initial screening identified 16 chemicals at the CTF and 3 chemicals at the TTC for which process knowledge would be needed to determine whether additional air emissions modeling would be required. For each of these chemicals, an emission rate was calculated based on process knowledge, equipment specifications, and other specific information. In all cases, these refined emission estimates were below the threshold emission values; therefore, additional dispersion modeling was not required, and no degradation of air quality is anticipated. The emissions from facilities at which chemicals are used in large quantities as well as the TEV for each chemical are provided in Table 4.2 and Table 4.3.

**Table 4.2 – Dispersion Modeling Results (Hazardous Pollutants)  
 at the Cask Testing Facility**

<b>Compound</b>	<b>OEL/100 (ug/m<sup>3</sup>)</b>	<b>Maximum Impact (ug/m<sup>3</sup>)</b>
Benzene	31.9	2.47
Benzyl Chloride	50.0	0.0333
1,3-Butadiene	22.1	0.296
p-Dichlorobenzene	4500	0.506
Napthalene	500	1.48
Styrene	4260	0.358
1,1,2-Trichloroethane	450	0.0728
1,2,4-Trichlorobenzene	400	2.47
Vinyl Chloride	25.6	0.0272
Arsenic	5.00	0.136
Cadmium	0.05	0.0121
Chromium	5.0	0.132
Lead	0.5	0.127
Nickel	15.0	0.0120
Selenium	2.00	0.0132

**Table 4.3 – Dispersion Modeling Results (Hazardous Pollutants)  
 at the Thermal Test Complex**

<b>Compound</b>	<b>OEL/100 (ug/m<sup>3</sup>)</b>	<b>Maximum Impact (ug/m<sup>3</sup>)</b>
Beryllium	0.0200	0.000252
Depleted Uranium	2.50	0.000327
Lithium	0.250	0.00395

The radiological dose to the MEI resulting from the proposed action alternative was modeled and determined to be a maximum of 0.00018 mrem/yr. This is below the SWEIS Expanded Operation Alternative radiological dose of 0.51 mrem/yr and well below the 10 mrem/yr regulatory limit.

#### 4.4.2 *Water Use and Liquid Effluents*

Potable and process water use under the Proposed Action would be approximately as follows:

- Potable water use – 620,000 gal/yr (2,347,712 ℓ/yr)
- Process water use – 1,510,000 gal/yr (5,715,972 ℓ/yr)
- Total water use – 2,130,000 gal/yr (8,063,684 ℓ/yr)

This represents an increase of approximately 791,200 gal/yr (2,649,788 ℓ/yr) as compared to the No Action Alternative. Water use at existing facilities would not increase substantially as a result of operations under the Proposed Action. Much of the increase would be the result of new process water use at the TTC and the CTF. Water use under the Proposed Action would represent an increase in SNL/NM's total water use in FY 2000 (SNL 2001) from approximately 416 MGY (1.57 billion ℓ/yr) under the SWEIS Expanded Operations Alternative, by approximately 0.002%.

The Proposed Action includes operation of a well for potable water supply at the Aerial Cable Site Central Services Building. Because this well would be pumped intermittently, with a maximum projected annual withdrawal of approximately 28,8000 gal, it appears unlikely that use of this well would affect groundwater movement in the area.

Wastewater generation under the Proposed Action would be approximately as follows:

- Potable wastewater – 620,200 gal/yr (2,347,712 ℓ/yr)
- Process wastewater – 250,300 gal/yr (947,489 ℓ/yr)
- Total wastewater – 870,500 gal/yr (3,295,201 ℓ/yr)

Sanitary wastewater would be discharged either to the City of Albuquerque sewer system or to septic systems (for remote facilities) or removed from portable toilets and disposed of appropriately. Process wastewater discharged by the facilities would be examined to ensure compliance with City of Albuquerque discharge standards for discharges to the sanitary sewer system or NMED water quality standards for discharges onto the ground.

Liquid effluent generated by the Proposed Action would be approximately 870,500 gal/yr (3,295,201 ℓ/yr), an increase of approximately 331,200 gal/yr (1.3 million ℓ/yr). Sanitary wastewater would be discharged either to the City of Albuquerque sewer system or to septic systems (for remote facilities) or removed from portable toilets and disposed of appropriately. Process wastewater discharged by the facilities would be examined to ensure compliance with City of Albuquerque discharge standards for discharges to the sanitary sewer system or NMED water quality standards for discharges onto the ground.

The increase in water use would not substantially affect current or projected water supply to SNL/NM, and increase in liquid effluent generation would not affect SNL/NM's ability to discharge wastewater. No modifications to either system, other than routine connections

between the systems and the facilities, would be required. The increase in both water use and wastewater generation would be minor.

#### *4.4.3 Waste Management*

Non-hazardous solid waste volumes would increase to 857,684 lb/yr (389,856 kg/yr). This represents an increase of approximately 6,180 lb/yr (2,809 kg/yr), or approximately a 0.73 % increase in waste volume compared to waste generation under the No Action Alternative. Collection and disposal of these wastes would remain within the capacity of existing facilities and operations.

Hazardous waste volumes would be approximately 9,914 lb/yr (4,506 kg/yr) of hazardous waste, an increase of approximately 6,482 lb/yr (2,946 kg/yr) over the amount that would be produced under the No Action Alternative. However, this represents only a 0.01 % increase in the total quantity of hazardous waste estimated for the SWEIS Expanded Operations Alternative. Management of this quantity of waste remains within the capacity of existing hazardous waste management systems at SNL/NM.

Low-level radioactive waste at TCR-associated facilities could increase from none to 1,000 lb/yr (455 kg) as a result of Proposed Action operations, specifically those associated with decontamination of the XTF between tests. Using the 500 kg/m<sup>3</sup> conversion for low-level radioactive waste used in the SWEIS (DOE 1999), this amounts to approximately 0.91 m<sup>3</sup> of radioactive waste. The SWEIS reports that approximately 9,897 ft<sup>3</sup> of low-level radioactive waste is generated annually by SNL/NM under the Expanded Operations Alternative, which equates to approximately 280 m<sup>3</sup>; therefore, the Proposed Action would result in an increase in SNL/NM's total low-level radioactive waste of approximately 0.33 % as opposed to the No Action Alternative. Mixed radioactive waste could increase from none to 2,100 lb/yr (955 kg/yr). The additional mixed waste represents an increase of approximately 19 % above the current 10,899 lb (4,954 kg) currently produced at SNL/NM (DOE 1999, Appendix H), and would be readily accommodated by SNL's waste management system.

#### *4.4.4 Human Health and Safety*

The Proposed Action would not result in substantially increased risks to workers and the public. Analysis of human health impacts in the SNL/NM SWEIS supports the conclusion that any increase in human health risk would be a result of a larger employee population, rather than introduction of new or unique hazards. Impacts expected would be zero fatalities per year, approximately 326 nonfatal injuries/illnesses per year, and 1 or 2 confirmed chemical exposures per year (DOE 1999). The overall cancer risk to the maximally exposed individual from radiation due to the proposed action would not change the SWEIS determination of less than 1 chance in 4 million.

However, the increase in employee population (an additional 10 employees) resulting from the Proposed Action would be relatively minor. Modernization would include engineered controls to enhance worker safety; therefore, hazards to workers and the resulting impacts including injuries and exposure-related illness would likely decrease slightly under the Proposed Action.

#### **4.5 Cumulative Effects**

Cumulative effects of SNL/NM operations, including most of those associated with Proposed Action, were evaluated as part of the cumulative impact analysis in the SNL/NM SWEIS, Chapter 6 (DOE 1999). This analysis, which evaluated SNL/NM operations in the context of other DOE, DoD, Federal, state, and local activities, is incorporated by reference in this EA. Many of the operations in TA-III were also evaluated in the Environmental Assessment of the Sandia National Laboratories Design, Evaluation, and Test Technology Center at Technical Area III, Kirtland Air Force Base, New Mexico (DOE 1997). The Environmental Assessment of the Microelectronics Engineering Sciences and Applications Complex at Sandia National Laboratories (DOE 2000) evaluated the construction and operation of that facility in SNL/NM's TA-I. The area affected by the Proposed Action would be the same as that discussed in these three National Environmental Policy Act documents. The Proposed Action involves the renovation of several facilities; however, in most cases, little change would result in the nature and extent of the operations. The new ESC would be used to consolidate existing operations currently located in close proximity to the proposed location of the new facility, and the effects of operations at the ESC would be essentially the same as those currently being conducted. Two new facilities, the TTC and the CTF, would result in new impacts; however, the analyses conducted in support of this assessment revealed no evidence that the consequences of the Proposed Action would add substantially to the cumulative impacts evaluated in the SWEIS. Therefore, the effects of the Proposed Action, when combined with the effects resulting from common issues of actions taken by DOE, DoD, Federal, state, and local entities, would not result in cumulatively significant effects.

#### **4.6 Abnormal Occurrences**

An accident consequence analysis was performed to determine the worst-case impact of an unplanned explosive event as part of a safety analysis to support a weapon surveillance test at the Aerial Cable Test Facility involving test articles that contain potentially hazardous materials. This accident analysis found that for a low-probability hypothetical blast that includes both air releases and the subsequent deposition of the release onto soils would pose no human health risk.