4.0 ACCIDENT ANALYSIS

The purpose of an accident analysis under NEPA is to provide the decision makers and stake-holders with an estimate of impacts that would not necessarily occur, but which are reasonably foreseeable. "Reasonably foreseeable" includes impacts that may have very large or catastrophic consequences, even if their frequency of occurrence is low, provided that the impact analysis is supported by credible scientific evidence, is not based on pure conjecture, and is reasonable.

Under NEPA a review is performed of existing documentation covering the same or similar activities as the Proposed Action to identify primarily nonstandard industrial accidents that might present threats to the safety and health of workers or the general public. Although the proposed construction activities, including demolition, are performed on a routine basis in standard industry, the consequences of a construction-type accident can be serious; therefore, under NEPA, in addition to nonstandard industrial accidents, the potential effects of high-consequence standard industrial accidents such as construction accidents are routinely analyzed.

Hazards for the Proposed Action can be grouped into operational hazards, construction hazards, and transportation hazards. Potential accidents associated with the Proposed Action are most likely to occur during construction (including demolition) activities. No fatalities are likely to result from any likely accident scenario. The operational hazards of the Proposed Action have been previously assessed in the LANL SWEIS (DOE 1999a) at the current locations of those operations. Most of the operations proposed for consolidation at the Two-Mile Mesa Complex were eliminated from further analysis in the SWEIS on the basis of hazard categorization; i.e., no hazards existed beyond those routinely encountered in an office or standard industrial laboratory environment. As there would be no substantial changes (such as in quantities of hazardous materials at risk, etc.) in operations from implementing the Proposed Action, the potential outcomes of accidents involving operations-related hazards are bounded by the operational hazard analyses in the SWEIS. This EA tiers from the broader scope of analyses in the SWEIS.

4.1 Operations Hazards

Of the current operations under the Proposed Action, only operations at TA-9 Building 21 (Analytical Chemistry Building) were the subject of further review in the SWEIS on the basis of hazard categorization. A small inventory (3 lbs [1.3 kg]) of phosgene in this building constitutes a potential hazard to workers only. Therefore, an accident involving this hazard was selected for further analysis. The potential release of phosgene, a toxic gas, was assessed in a qualitative and quantitative consequence analysis in site-wide accident scenarios. The initiator of an accident causing a phosgene release of this sort was an earthquake with a frequency of occurrence range from about once in 1,000 to once in 100,000 years depending on the magnitude of earthquake assumed. If the entire inventory of phosgene were released in such an accident, one to two persons could be affected, depending on weather conditions. They would probably experience irreversible health effects (ERPG-2) or life threatening health effects (ERPG-3) at distances from the facility of 0.76 mi (ERPG-2) and 0.32 mi (ERPG-3) (1.22 km and 0.52 km, respectively) under worst-case weather. Under average weather conditions, they would experience these effects at distances of 0.23 mi (ERPG-2) and 0.10 mi (ERPG-3) (0.37 km and 0.16 km, respectively). The number of people that could be affected from this accident at the Two-Mile Mesa Complex could be greater than at the TA-9 site because of a relatively larger workforce in the immediate area of the Two-Mile Mesa Complex. The actual number of workers that could be involved in such an accident at the Two-Mile Mesa Complex, and the actual toxicological

effects that could occur depends on the final complex configuration, operations, and surrounding workforce population.

The Contained Firing Capability buildings would provide containment vessels or concrete "bombproofs" in which HE tests may be performed. As many as five containment vessels, including the vessel currently located at TA-40 Building 8, may be located at the Two-Mile Mesa Complex. A bombproof, an earth-covered concrete or metal chamber, may be substituted for one or more of these vessels. DU may be used in some of these tests. DU is uranium having a smaller percentage of uranium-235 than found in natural uranium in the earth's crust. DU is radioactive. The anticipated inventories of DU for this new operation would be well below the threshold of nuclear facilities.

In the SWEIS, operations at TA-40 Building 8 were not selected for accident screening since only higher risk scenarios were analyzed in detail. Furthermore, the operations at TA-40 Building 8 do not currently involve DU, therefore SWEIS accident analyses at the TA-40 facility would not apply to the Proposed Action. The Dual-Axis Radiographic Hydrodynamic Test (DARHT) Facility conducts operations similar to the contained firing operations that could be conducted at the Two-Mile Mesa Complex under the Proposed Action, with some important differences. Potential accidents for the DARHT operations were extensively analyzed in the DARHT Facility EIS (DOE 1995). The inventories of explosives and DU used at DARHT are substantially higher than proposed at the Two-Mile Mesa Complex, thus potential accident dose consequences and effects from DARHT are large enough to assume that an accident at Two-Mile Mesa Complex would have much lower consequences. A DARHT accident that applies to, and bounds, potential accidents involving contained firing and DU under the Proposed Action at the Two-Mile Mesa Complex is described below.

The DARHT EIS considered both vessel and building containment accidents involving DU. Containment breach releases have potentially greater effects than uncontained releases because the radiological material released into the atmosphere is more concentrated. A DARHT accident in which an explosion causes catastrophic failure of the vessel containment bounded the contained firing test accidents. Similar to many other industrial-type accidents involving overpressure, the most serious consequence from these type of accidents is fatalities to involved workers from the force of the blast and the physical impacts from container fragments that become projectiles. The actual number of workers that could be involved in such an accident at the Two-Mile Mesa Complex depends on the final configuration of the new buildings and their operations. In any event, consequences to workers are expected to be substantially less than those projected for a similar accident at DARHT.

The DARHT bounding accident results in the release of all of the test assembly materials, including DU, to the environment, resulting in chemical and radiological doses to noninvolved workers and the public. The DARHT accident involves both radiological (carcinogenic) hazard and its chemical (toxicological) hazards from the DU. For the DARHT accident, a noninvolved worker could receive up to 0.7 percent of the uranium inhalation level that is considered immediately dangerous to life or health (IDLH). The maximally exposed individual (MEI) member of the public could receive up to 0.2 percent of the IDLH for uranium toxicity for inhalation. The maximum total radiological dose from the bounding accident at DARHT was estimated at 0.05 rem effective dose equivalent (EDE) for the noninvolved worker and 0.01 rem EDE for the MEI. The maximum estimated population dose was 17 person-rem but only a

portion of this dose was associated with DU. The population dose associated only with DU would produce no latent cancer fatalities (less than 0.0085).

The final configuration of the Two-Mile Mesa Complex, its operations, and the surrounding populations of workers and members of the public would determine the actual consequences of a DU containment failure at that site. In any event, the toxicological and radiological consequences, including cancer fatalities, to workers and the public are expected to be substantially less than those projected for a similar accident at DARHT.

In summary, the operational hazards of the Proposed Action are primarily either hazards that are routinely encountered in standard industry or hazards that pose only small risks to workers and the public. The risks to workers are easily mitigated using controls and technology that currently apply at operating facilities at LANL.

4.2 Construction and Demolition Hazards

An estimate of the potential number of fatalities that might occur from construction-related activities of the Proposed Action was derived from recent risk rates of occupational fatalities for all industries. The average fatality rate in the U.S. is 3.9 deaths per 100,000 workers per year (Saltzman 2001). If the peak construction period is assumed to last for one year, no deaths (0.0031) would be expected for the estimated 80 onsite construction workers from construction- or demolition-related activities that include falls, exposure to harmful substances, fires and explosions, transportation incidents, and being struck by objects, equipment, or projectiles. Even assuming the peak number of workers for the duration of the project (about 10 years) and adding three NNSA and 20 UC site inspectors, no deaths (less than 1.0) would be expected from implementing the Proposed Action.

4.3 Transportation Hazards

Transportation hazards can be associated with construction, operations, or demolition activities. Construction activities would involve the transport of building materials to the Two-Mile Mesa Complex, of construction waste from the Two-Mile Mesa Complex, and of demolition waste from various DX technical areas, primarily TA-9. Of the different types of transportation occupations nationwide, truck drivers, including all types of trucks, experience the highest fatality rate (26 deaths per 100,000 full-time workers per year) (Saltzman 2001). The estimated number of fatalities associated with the Proposed Action as discussed in Section 4.2 included transportation incidents in general. Consolidating DX facilities and operations would generally result in a reduction in transport of materials, hazardous and otherwise, because the required processing capabilities would be consolidated. Ignoring any special training or mitigation of accidents that might occur at LANL, the chance of a fatality occurring to a driver of a medium or heavy truck hauling hazardous waste is about three in one million (2.7×10^{-6}) based on 1993 nationwide statistics (NSC 1994). Considering all these factors, no transportation fatalities are expected under the Proposed Action.