FINAL SAFETY ANALYSIS REPORT
FOR THE
HARDENED ENGINEERING TEST BUILDING
(HETB)

by
Byron N. Odell
Edward J. Hallinan

Lawrence Livermore National Laboratory
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evaluations and design are accomplished by the use of inelastic analysis methods combined with inelastic stress allowables. Primary concern is to ensure prevention of building collapse, thereby allowing the building occupants to exit safely following an earthquake.

For more detail on specific HETB structural criteria, see Appendix A.

4.1.2 Wind Design Requirement

LLNL Moderate Hazard facilities are designed for a wind speed of 177 km/h (110 mph) (Exposure C) using ANSI A58.1 and the Uniform Building Code.

4.1.3 Wind-Driven Missile Criteria

Seismic Category 1 structures, systems, and components are designed to withstand the following specified missile criteria. The missile is assumed to strike normal to the surface in question with the minimum cross-sectional area (on-end). The wind generated missile criteria for design consists of a timber plank weighing 9.1 kg (20 lb), having an impact speed of 113 km/h (70 mph) in the horizontal direction at a height up to 17 m (50 ft) above ground level. Vertical missile velocity criteria are not required since the low height to which the missile is capable of being carried is insufficient to generate any appreciable vertical velocities.

4.2 Facility Description

The following discussion provides a physical description of Building 334, including building layout, general area usage, construction materials and methods, utilities, ventilation systems, and integrated operations.

4.2.1 Building Layout and Construction

Building 334 was constructed at LLNL to provide a capability for the safe handling of weapons components (units and assemblies) containing Special Nuclear Material (SNM). These test items do not contain high explosive material. The Building 334 floor plans are presented in Figures 4-1, 4-2, and 4-3.

Building 334 is a windowless, reinforced concrete structure approximately 27 m wide, 21 m deep, and 9.1 m high. An additional 1.8 m concrete parapet obscures the elevator overhead clearance and various roof penetrations. Building 334 is an industrial type facility with an occupancy classification of B-2 based on the Uniform Building Code, and the structure conforms to the Uniform Building Code as well as to the codes, standards, and guides in DOE Order 6430.1. In addition, the exterior walls, the roof slabs, and the interior concrete wall are designed to conform to DOE security standards for "hardened facilities."

The first 3.8 m (12.5 ft) of the walls above the ground are 30 cm (12 in.) thick with two curtains of 5/8 in. steel bars each forming a lattice of 30 cm (12 in.) squares
staggered to form a 15 cm (6 in.) pattern. Both interior and exterior walls above 3.8 m (12.5 ft), as well as the roof slabs, are 20 cm (8 in.) thick concrete, reinforced with a single curtain of 5/8 in. rebar placed to form a single 15 cm (6 in.) grid pattern. All wall penetrations greater than 620 cm² (96 in²), such as air intakes and exhausts, are barricaded with 5/8-in. rebar in a 15 cm (6 in.) grid.

The interior of Building 334 is dominated by two high-bays, and all doors into these high-bays are vault-type, severe-service, security doors with "panic" hardware for quick exit. Windows looking into the bays from the control rooms are "bullet and attack resistant" glass.

Both high-bays are three stories high, while the portion of the building in front of the bays is divided into three stories. The first floor contains the controls for the Engineering Test Bay (ETB). The second floor houses the controls and instrumentation for the Intrinsic Radiation (INRAD) Bay, and the third floor provides 117 m² (1,260 ft²) for building support mechanical equipment such as heating, cooling, and ventilation components.

The HETB has utilities such as domestic water and compressed air. It also has low conductivity water, nitrogen gas, and liquid nitrogen piped into the building. (No natural gas is in the building.) In addition to the standard electrical supply, the facility has an emergency generator that will support the security, communication, and emergency lighting systems for short periods.

Other building features include a fire-resistive, sound-absorbing acoustical surface on the walls and ceiling of the Engineering Bay, a 3.8m (12.5 ft.) high aluminum platform in the Intrinsic Radiation (INRAD) Bay, and an extensive communication/alarm system throughout the facility. The communication/alarm system includes telephones and a paging system, radiation alarms, security/intrusion alarms, fire/smoke alarms, and a warning system outside the bay entrances.

4.2.2 Special Safety Related Features

Building 334 has a number of special features that enhance the safety of the operations by obviating or mitigating the potential for injuring people or the environment.

When the high-bays are engaged in activities that have a potential for the generation of airborne particulate toxic or radioactive material—as the result of some violent mechanical action—then the high-bay air is exhausted through a pre-filter and two stages of nuclear grade High Efficient Particulate Absolute (HEPA) filters. Each of the two bays has its own filtered exhaust system (two HEPA filters per bay), and the ventilation system is balanced so that the two bays are slightly negative with respect to the control rooms and outside.

The fire loading in the sprinklered bays is extremely low. Fusible link fire dampers protect the HEPA filters in the event of a fire. The filters are housed in a