ENERGY TECHNOLOGY ENGINEERING CENTER

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Rocketdyne Division, Boeing North American Inc.

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FINAL REPORT

DRR 26039

TITLE: DECONTAMINATION AND DECOMMISSIONING OF BUILDING T012

- APPROVALS -

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1. INTRODUCTION AND BACKGROUND

1.1 FACILITY LOCATION

The Energy Technology Engineering Center (ETEC), Santa Susana Field Lab (SSFL), is located in the Simi Hills of southeastern Ventura County, California, adjacent to the Los Angeles County line and approximately 29 miles northwest of downtown Los Angeles, directly south of the City of Simi Valley. Location of the SSFL relative to Los Angeles and vicinities is shown in Figure 1. An enlarged map of neighboring SSFL communities is shown in Figure 2. Figure 3 is a plot plan of the western portion of SSFL known as Area IV, where Building T012 is located. Building T012 is located on government-optioned land.

1.2 TOPOGRAPHY AND BUILDING CHARACTERISTICS

Building T012, located on B Street, had 120 square meters of floor space. In 1986 the passageway and metal portion containing the operations and control rooms of Building T012 (Figure 4) were demolished in order to build the Energy Technology Engineering Center (ETEC) Sodium Component Test Installation (SCTI) Power Pak section of the Cogeneration Project. The concrete vault portion of the facility remains and is used as a structural support foundation for the Cogeneration unit.

The remaining concrete vault consists of two rooms, Room 109 (fuel storage/equipment room) and Room 110 (critical cell), Figure 5. The critical assembly machine was removed when the facility was deactivated and the cell (Room 110) was used for industrial radiography for a short period of time. Room 109 is divided by a 20-in.-thick borated concrete wall in which fuel storage tubes were embedded. An air conditioning duct ran the length of the room over the fuel storage area. The critical cell (Room 110) consisted of a steel lined, 4-ft-thick concrete walled chamber that was secured by a heavy shield (vault type) door. Currently, there are no sources of water, equipment, or active lighting provided in the building. Building T012 is inside a fenced area and the only entrance is through a door which leads directly into Room 109.

1.3 FACILITY OPERATING HISTORY

Operations in Building T012 began with systems for Nuclear Auxiliary Power (SNAP) critical assemblies in 1962. These experiments used three different critical assembly machines, SCA-4A and -4B, and SCA-5. Most tests were directed at determining criticality of various configurations and conditions, such as water immersion, and were performed well below the allowed high power limit of about 100 W. No significant amounts of induced activity were produced by these operations.

Clad reactor fuel elements (U-ZrH) were stored as shipped in containers and in the fuel storage tubes located in Room 109. The SNAP critical experiments continued intermittently through 1968, when the fuel was shipped to the SSN Storage Vault (Building T064), and the facility was placed in a stand-by mode.

In 1969-1970, the SCA-4A critical assembly machine was modified for use in the NASA-sponsored Heavy Metal Reflected Fast Spectrum Reactor (HMRFSR) project, and critical experiments began in 1970. These experiments used various fabrications of highly enriched uranium rods and foil to simulate reactor fuel elements. These fuel materials were stored in the fuel storage tubes, and assembled in the critical cell (Room 110). Some extended tests, at reactor powers of up to 200 W for several hours at a time, were used for reactivity coefficient measurements. The fuel materials were returned to the original supplier in 1972, and the facility was deactivated.

In 1979, the concrete portion of the facility was modified for use by ETEC Quality Assurance in performance of X-ray machine and source radiography under Rocketdyne Use Authorization No. 18 (Reference 6). In preparation for this modification, a radiation survey found some areas that showed alpha activity approaching the allowable surface contamination limit. These areas were idendified for future work. The major modification consisted of enclosure of the fuel storage room to serve as a photographic darkroom. This modification also involved removal of four of the fuel storage tubes. This use was terminated in 1992, with all radioactive sources transferred to the Radioactive Material Handling Facility (RMHF) for storage.

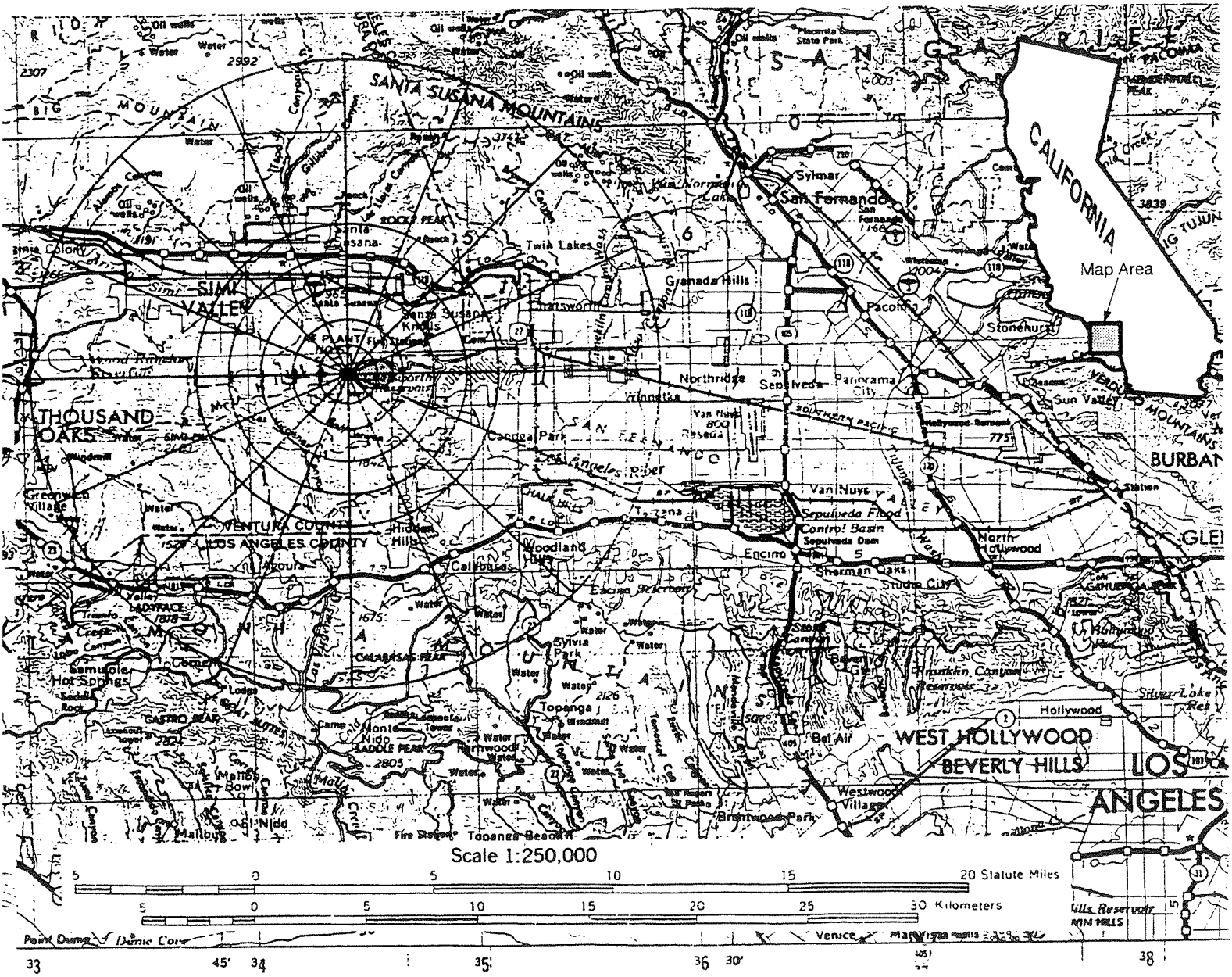

Figure 1. Location of SSFL Relative to Los Angeles and Vicinities

Figure 2. Neighboring SSFL Communities

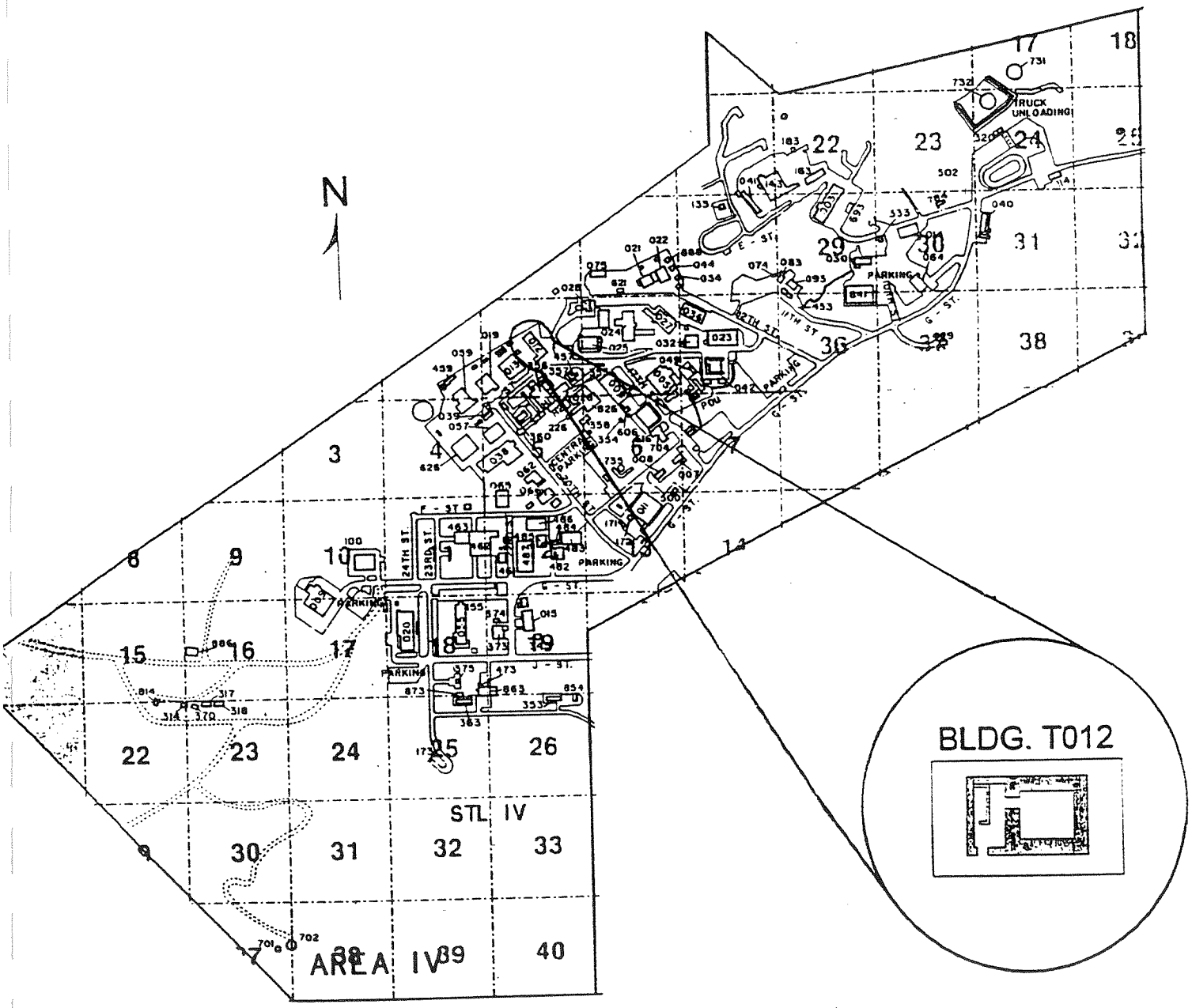

Figure 3. Santa Susana Field Laboratory (SSFL) Area IV

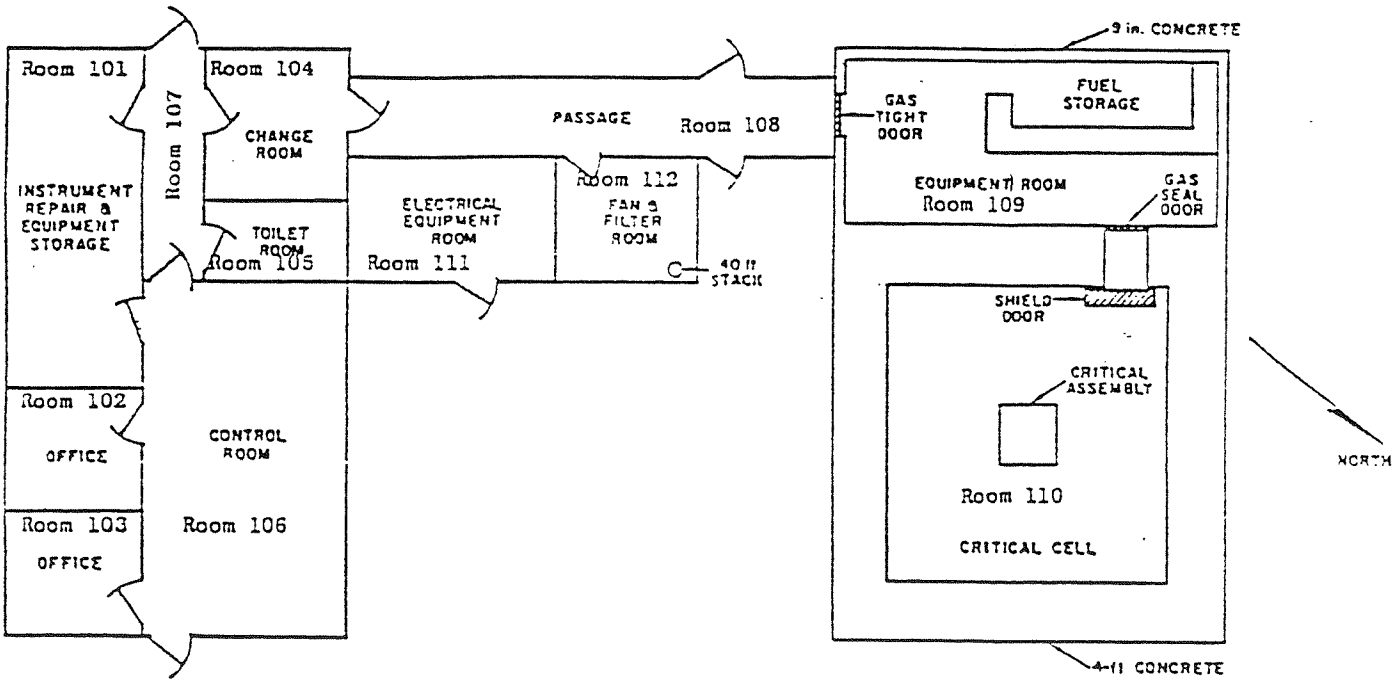

Figure 4. Original Floor Plan of Building T012

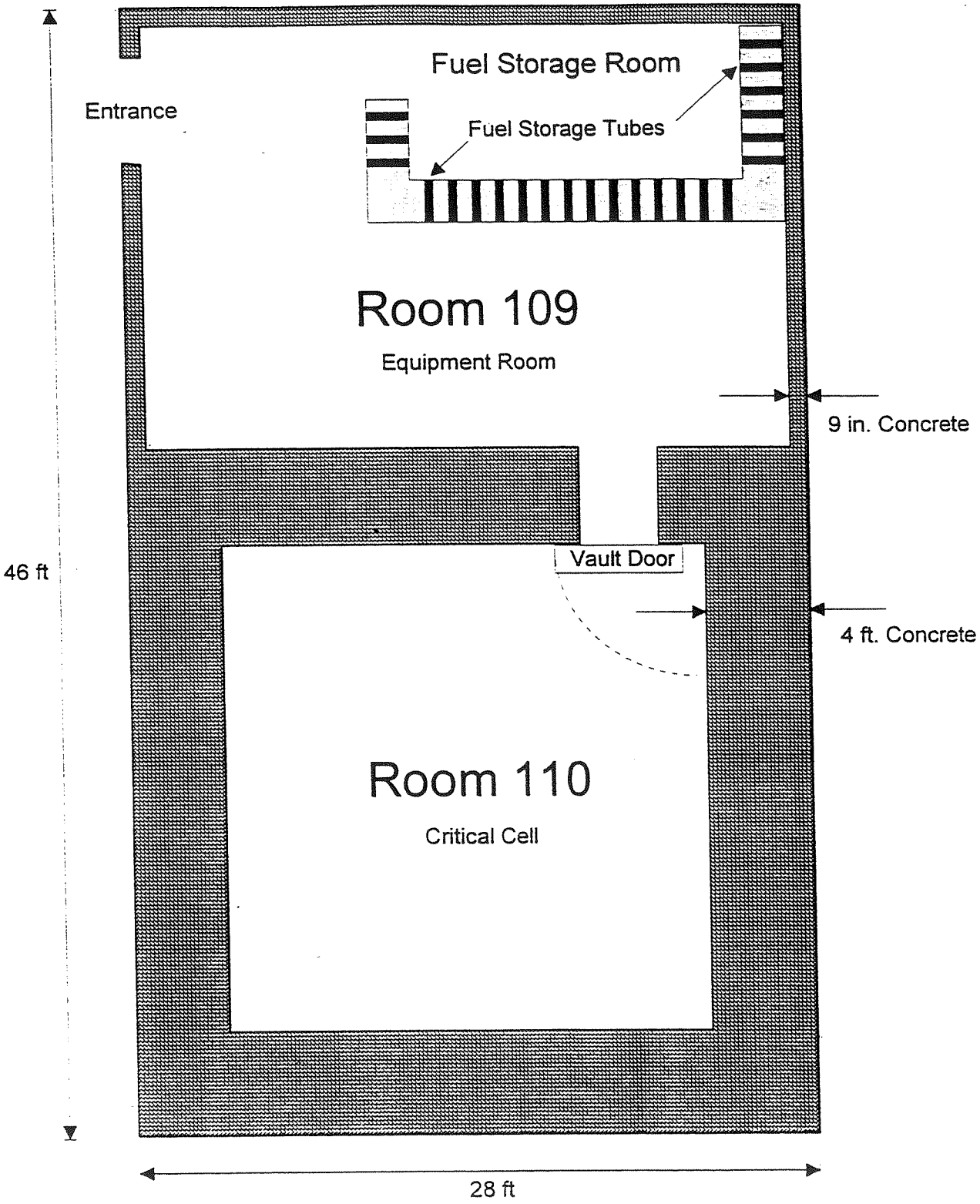

Figure 5. Existing Layout of Building T012 Critical Cell and Equipment Room

2. PRIOR DECONTAMINATION EFFORTS AND RADIOLOGICAL RESULTS

Review of previous Health and Safety Analysis Records indicates Building T012 was decontaminated and surveyed during the period of March through May 1973 (Ref. 3). Fixed contamination was painted over with an eggshell-colored paint and stenciled "Caution Fixed Alpha Radioactive Material." The holdup tank was also removed in 1973.

In 1979 a follow-up radiation survey was performed (Ref. 3). Areas with total alpha activity at or below the limit for uranium were noted and identified. The concrete portion of the facility was modified for use by ETEC Quality Assurance in performance of X-ray machine and source radiography. The major modification consisted of enclosure of the fuel storage room (Room 109) to serve as a radiographic darkroom, and the removal of four of the fuel storage tubes.

A radiological survey of the Building T012 concrete vault was conducted in 1985 preparatory to construction of the ETEC/SCTI Cogeneration plant. The results of the survey (Ref. 3) indicated the presence of alpha contamination in both Rooms 109 and 110 of the concrete vault.

The equipment area of Room 109 exhibited alpha contamination at the entrance door (840-1400 dpm alpha/100 cm^2), overhead light fixtures (2800 dpm alpha/100 cm^2), air conditioning duct (840-2800 dpm alpha/100 cm^2), radioactive exhaust duct (4200 dpm alpha/100 cm^2), and steel door frame between Rooms 109 and 110 (1960 dpm alpha/100 cm^2). Spot checks of the concrete floor surface under the floor tile revealed contamination levels of 1400-2800 dpm alpha/100 cm^2, all of these are below the allowable limit for surface contamination (5000 dpm/100 cm^2).

Survey of the fuel storage area of Room 109 revealed contamination of the concrete floor (up to 6500 dpm alpha/100 cm^2). Survey of the fuel storage tubes indicated contamination levels up to 6000 dpm alpha / 100 cm^2 at the entrance of the tubes. The tubes were surveyed internally by use of a standard alpha scintillator probe modified to provide a cylindrical sensitive surface close to the internal surface of the tubes, most tubes showed acceptably low levels of contamination, however eight contaminated fuel storage tubes were identified and removed.

The walls, ceiling, and floor of the critical cell (Room 110) were covered with paint which prevented meaningful alpha surveying. However, the walls were stencil painted "CAUTION, FIXED ALPHA RADIOACTIVE MATERIAL," but no level of contamination was indicated. Contamination was indicated on the light fixtures (2800 dpm alpha/100 cm^2) and electrical boxes (280-840 dpm alpha/100 cm^2).

3. SUMMARY

To allow the release of Building T012 for use without radiological restrictions, radioactive rials and hazardous waste were removed from the facility.

Initial decontamination and decommissioning efforts began in 1973 with the removal of the d-up tank." In 1986 the removal of the operations control room and the enclosed passageway ecting those structures to the Equipment Room (Room 109) and the Critical Cell (Room was completed.

Final decontamination and decommissioning of the remaining portion of Building T012 (as ssed in section 4) was performed from February through June 1995. After completion of D&D efforts a comprehensive "Final Radiological Survey" (Ref. 5) was completed to nstrate regulatory compliance for the release of Building T012 without radiological ctions.

4. PROJECT ACTIVITIES AND RESULTS

4.1 PHASE I (1986)

Initial decontamination and demolition efforts of Building T012 were completed in 1986 (Ref. 7). This operation involved the removal of the ventilation exhaust stack (above roof level), the demolition of the operations and control rooms and passageway connecting these structures to the concrete portion of the facility (Rooms 109 and 110).

The above tasks were performed to accommodate the construction of the ETEC/SCTI Power Pak section of the Cogeneration project of the ETEC/SCTI.

The concrete portion (Rooms 109 and 110) of Building T012 was retained and is used as a support structure for the Power Pak facility.

4.2 PHASE II (FEBRUARY THROUGH JUNE 1995)

The objective of Phase II was to decontaminate and decommission (D&D) the remaining concrete vault structure of Building T012 sufficiently to permit its use without radiological or chemical contamination restrictions.

The accomplishment of this objective included removal of asbestos containing floor tiles and pipe insulation; removal of eight contaminated fuel storage tubes; removal of light fixtures, conduit, and ventilation systems; paint sampling and removal; and scabbling of the floor, wall, and ceiling surfaces and completion of the "Final Radiological and Chemical Contamination Assessment Survey" (Ref. 5).

5. WASTE VOLUMES GENERATED AND DISPOSAL

5.1 PHASE I (1986)

The operations and control rooms and the passageway connecting these structures to the concrete portion of the facility were completely demolished and disposed of as nonradioactive waste.

In addition to the structures, equipment from all the rooms, air conditioning and exhaust ducts, and floor tile were also removed.

During this period the radioactive exhaust system removal was completed (Ref. 7). The exhaust stack (down to the roof level) was also removed and disposed of.

5.2 PHASE II (1995)

The categories of waste generated from the remaining concrete structure of Building T012 were:

I. Low Level Radioactive Waste (LLW): The LLW included fuel storage tube cores, light fixtures, conduit, piping, ventilation ducting, air conditioning unit, concrete rubble, and soft trash. 9390 lb (280 ft^3) were sent to Hanford Washington for disposal.

II. Hazardous Waste: Hazardous waste (approximately 250 ft^3) included floor tiles, mastic and pipe insulation containing asbestos, paint containing lead, light ballasts containing PCB, freon from the air conditioner, and a small volume of hydraulic oil from the critical cell door actuator.

III. Mixed (LLW): Mixed waste items consisted of radioactively contaminated paint containing lead and contaminated floor tiles and insulation containing asbestos. 165 gallons of mixed waste were generated and are presently being stored at the RMHF facility.

6. PERSONNEL RADIATION EXPOSURE

None of the Engineering, Health & Safety Radiation Services, or Contractor personnel assigned to the Building T012 decontamination & decommissioning project received any measurable exposure to ionizing radiation .

7. PROJECT COST SUMMARY

The decontamination and decommissioning of Building T012 cost was..... $263,636.

Waste disposal costs for Building T012 was..... $125,996.

The total D&D cost for Building T012 was..... $389,632.

8. REFERENCES

1. SSWA-AN-0004, D&D Plan for Building 012 2/22/95
2. 012-AT-0001, Radiological Assessment Plan for Building T012 2/2/93
3. 355-ZR-0012, Radiation Survey of T012, SCTI Cogeneration Project 6/26/85
4. 012-SP-0003, D&D Procedure for Building T012 3/28/95
5. 012-AR-0002, Final Radiological Survey for Building T012 6/14/96
6. Authorization No. 28, ETEC Radiography at SSFL, terminated 3-10-93
7. N001DWP000011, Building T012 Modification 5/9/86
8. 012-SP-0001, Removal of Fuel Storage Tubes, Building T012 2/17/95