ENERGY TECHNOLOGY ENGINEERING CENTER

OPERATED FOR THE U.S. DEPARTMENT OF ENERGY
ROCKETDYNE DIVISION, Boeing North American, Inc.

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FINAL REPORT

Dm 26084

TITLE: DECONTAMINATION & DECOMMISSIONING OF BUILDING T030

- APPROVALS -

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1. INTRODUCTION

Boeing North American's Rocketdyne Division operates the Santa Susana Field Laboratory (SSFL). The Energy Technology Engineering Center (ETEC), is that portion of the SSFL operated for the Department of Energy (DOE), which performed testing of equipment, materials, and components for nuclear and energy related programs. Contract work for the Atomic Energy Commission (AEC) and the Energy Research and Development Administration (ERDA), predecessor agencies to the DOE, began in the early 1950's. Specific programs conducted for AEC/ERDA/DOE involved the engineering, development, testing, and manufacturing operations of nuclear reactor systems and components. Other SSFL activities have also been conducted for the National Aeronautics and Space Administration, the Department of Defense, and other government related or affiliated organizations and agencies. Some activities were under license by the Nuclear Regulatory Commission (NRC) and the State of California Radiological Health Branch of the Department of Health Services.

Several buildings and land areas, became radiologically contaminated as a result of the various operations which included ten developmental reactors, seven criticality test facilities, fuel fabrication, reactor and fuel disassembly, laboratory work, and on-site storage of nuclear material. Potential radioactive contaminants identified at the site are, uranium (in normal, depleted, and enriched isotopic abundance's), plutonium, Am-241, fission products (primarily Cs-137, and Sr-90 present as a mixed fission product that has not been separated), activation products (tritium [H-31], Co-60, Eu-152, Eu-154, Ni-63, Pm-147, and Ta-182).

Decontamination and decommissioning (D&D) of contaminated facilities began in the late 1960's and continue as the remaining DOE nuclear program operations have been terminated. As part of this D&D program, Rocketdyne performed decommissioning and final status surveys of a number of facilities that supported the various nuclear-related operations during the latter part of the 1950's and have continued through to the present. Environmental management of DOE contaminated properties continues under the termination clause of the existing Management and Operation (M&O) contract.

2. BACKGROUND

2.1 LOCATION

Building T030 is located within Rocketdyne's Santa Susana Field Laboratory (SSFL) 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. The SSFL location relative to the Los Angeles area and surrounding vicinity is shown in Figure 1. An enlarged map of the neighboring SSFL communities is presented in Figure 2. The Santa Susana Field Laboratory which includes Area IV, shown in Figure 3. The layout of Building T030, Figure 4 . Photograph of Building T030 looking west at the east wall , Figure 5. Photograph of Building T030 northern concrete shielding wall is shown in Figure 6.

2.2 BUILDING CHARACTERISTICS AND SITE TOPOGRAPHY

Building T030 was constructed in 1958 as a "Particle Accelerator Facility". The building has a total enclosed area of 2,311 ft^2. The facility consists of two connecting sections, both with steel framing, siding, and roofs. The rear open (west) section was constructed at a right angle to the front office (east) section. The rear section was configured to accommodate a low-voltage particle accelerator used as a proton on tritium (P-T) neutron source. An outside concrete wall, north of the west section, provided shielding for the accelerator beam. Men's and women's restrooms were built into the facility so that the facility provided a complete self-contained accelerator test installation. A fenced-in (asphalt area) between Building T030 and Building T641 was previously used as a palletized material holding area. To the north of Building T030, south of Building T641, and west of both buildings are outcroppings of Chatsworth sandstone formation. This formation is only about 50 ft from the north and west sides of Building T030.

2.3 OPERATING HISTORY

After construction in 1958, a Van de Graaf accelerator was moved into the facility in 1960. The accelerator could provide a proton beam of up to tens of microamperes in current, with continuously adjustable energies from a few hundred KeV up to a maximum of about 1 MeV. The particle beam was well focused, with a diameter of a few millimeters. Neutrons were generated using a tritium target via the $^3H(p,n)^3He$ reaction. Five -gallon cans of borated water were used for neutron shielding around the machine.

2.3 OPERATING HISTORY (cont.)

The accelerator was operated from 1960 through 1964, at which time the facility was decommissioned. Even though the facility was not in use, the accelerator remained in the facility after 1964. In 1966, a smear survey of the accelerator (Ref. 4) showed significant tritium contamination. It was believed that the tritium contamination had not spread to surrounding areas. Following removal of the accelerator in 1966, the building was surveyed and no residual contamination was found. The building was released for other uses, and had subsequently been used as an office building for purchasing and on-site traffic. In 1988 a second radiological survey was performed (Ref 1) confirming the 1966 survey results. The Building was utilized as an office area until 1995.

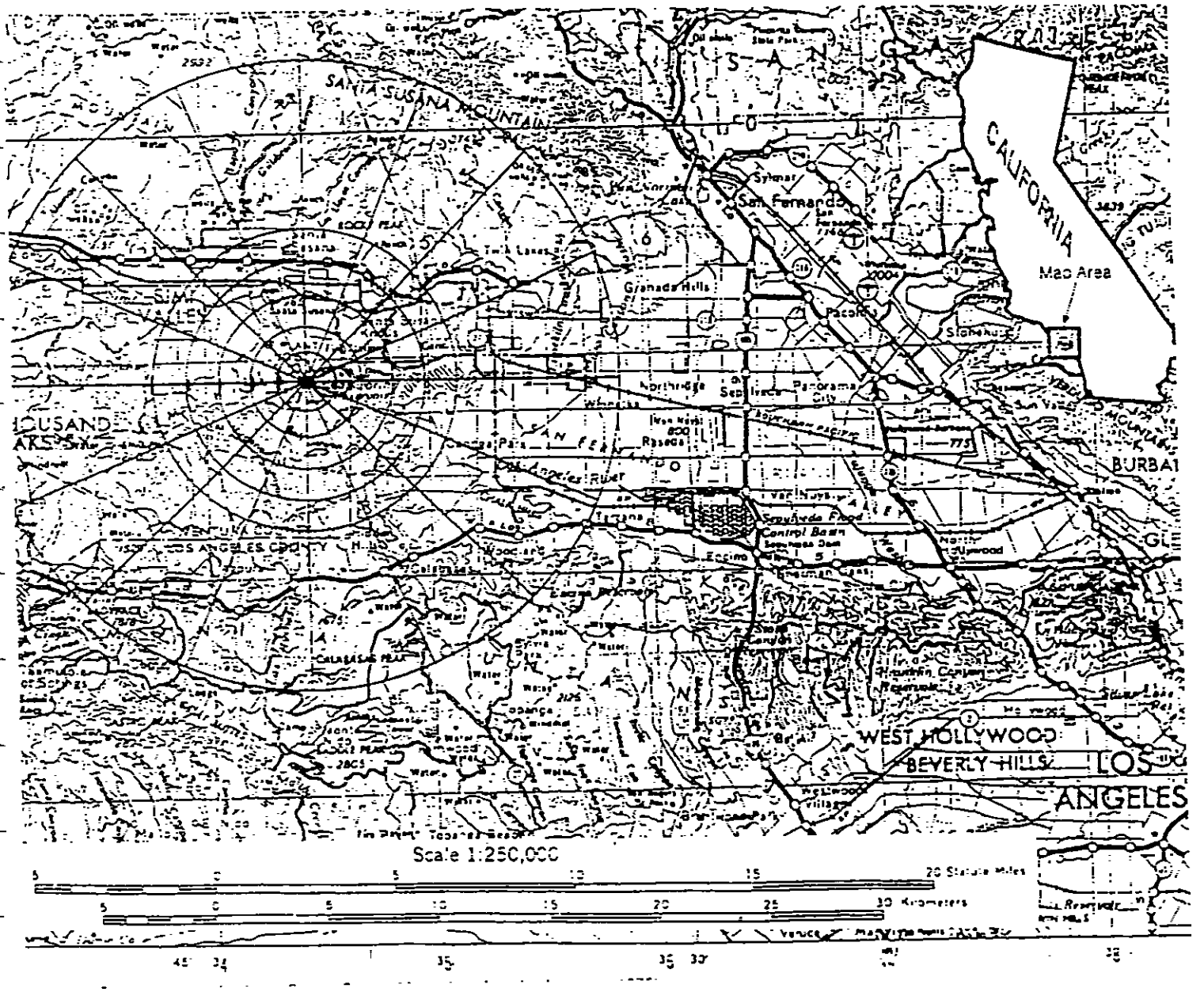

Figure 1 Location of SSFL Relative to Los Angeles Area

Figure 2 Neighboring SSFL Communities

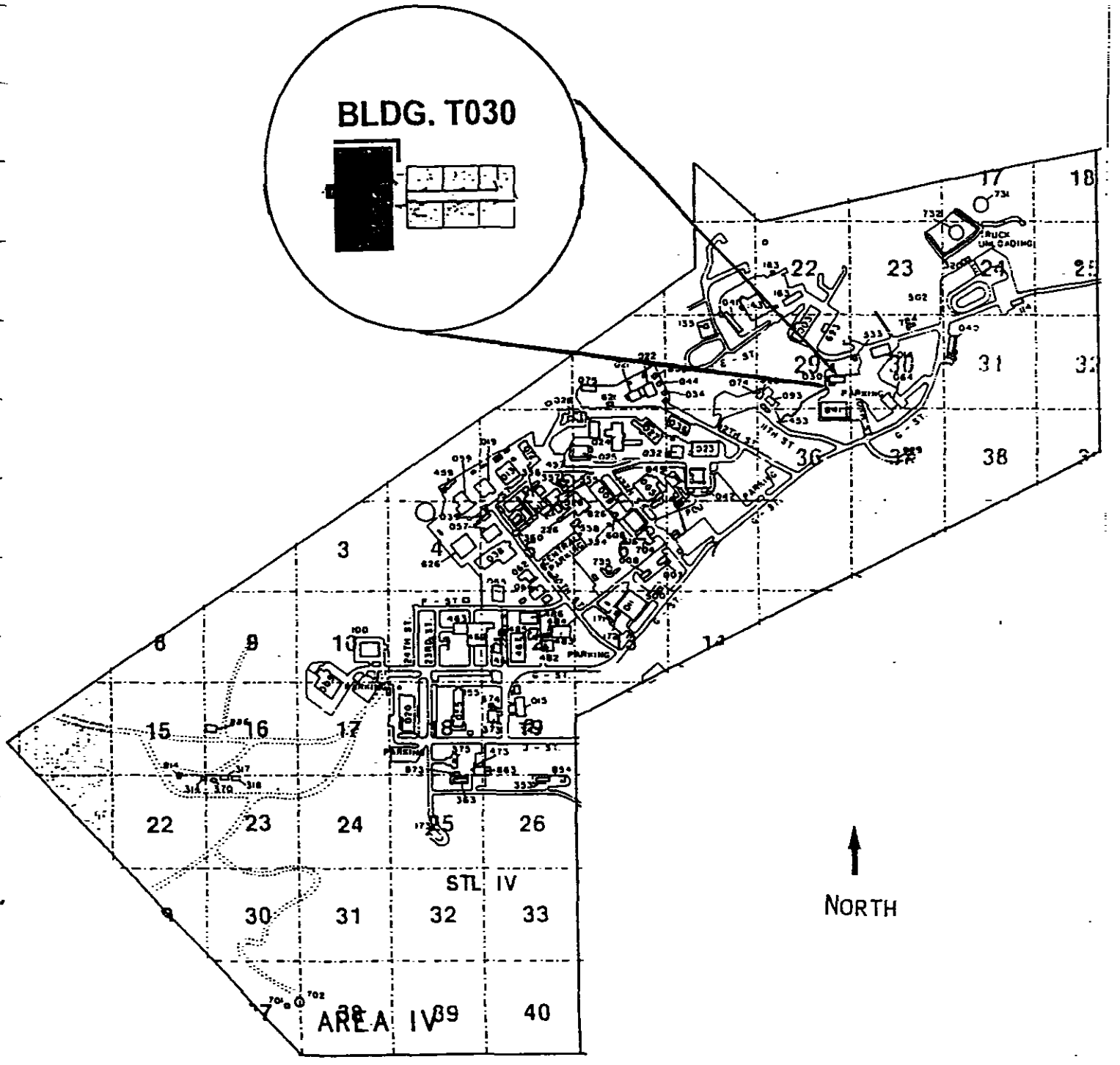

Figure 3 Santa Susana Field Laboratory (Area IV)

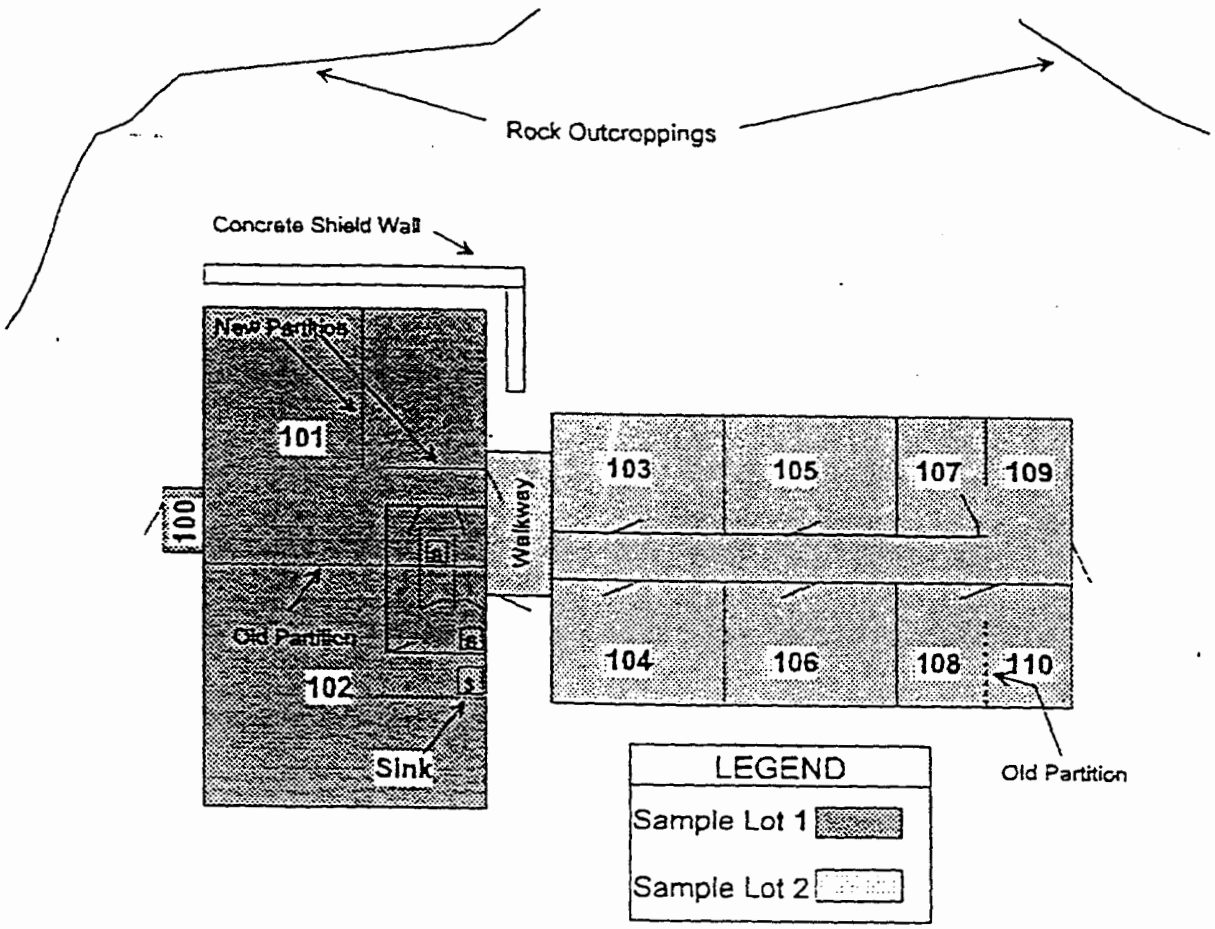

Figure 4 Layout of Building T030

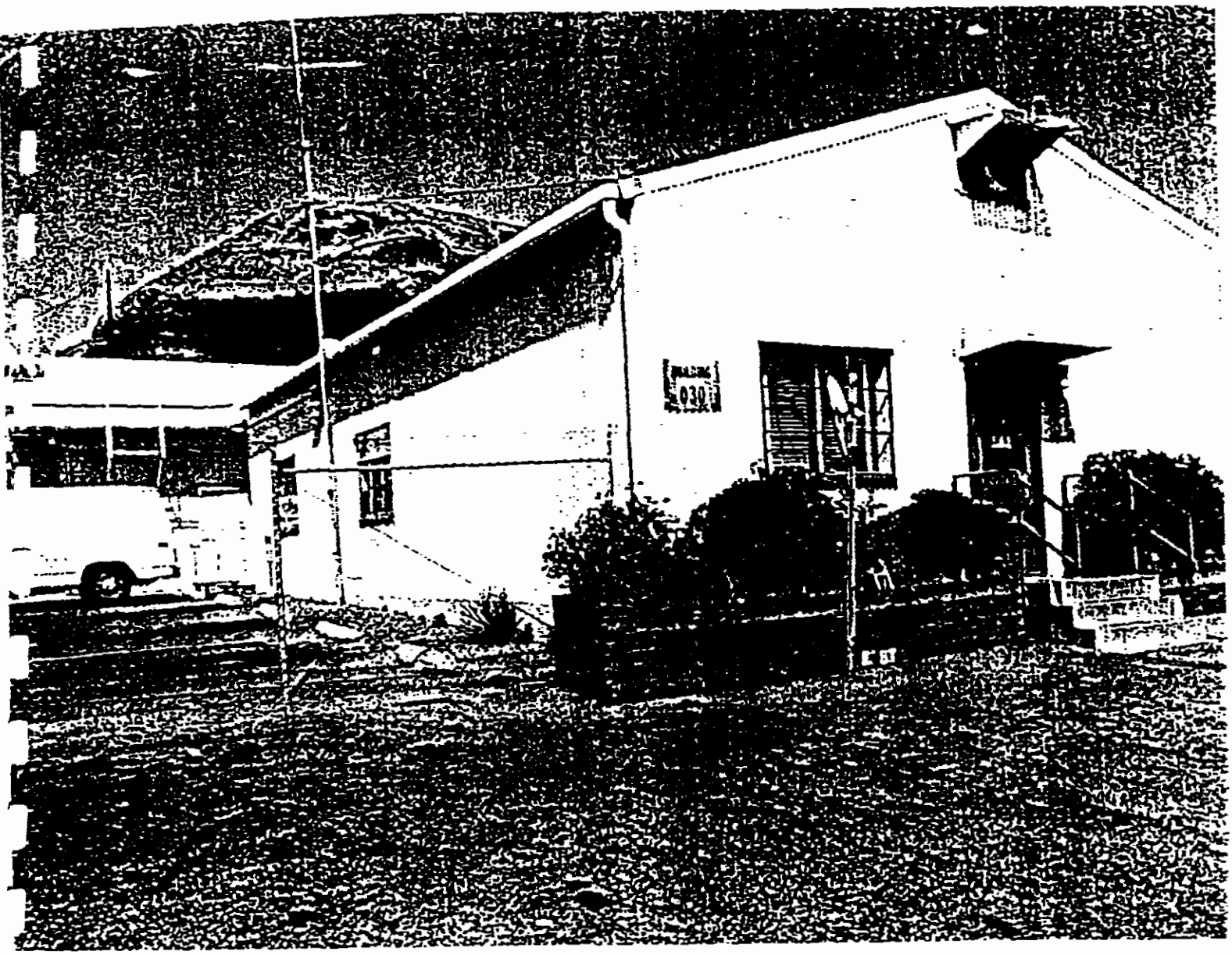

Figure 5 Photograph of Building T030 Looking West at East Wall

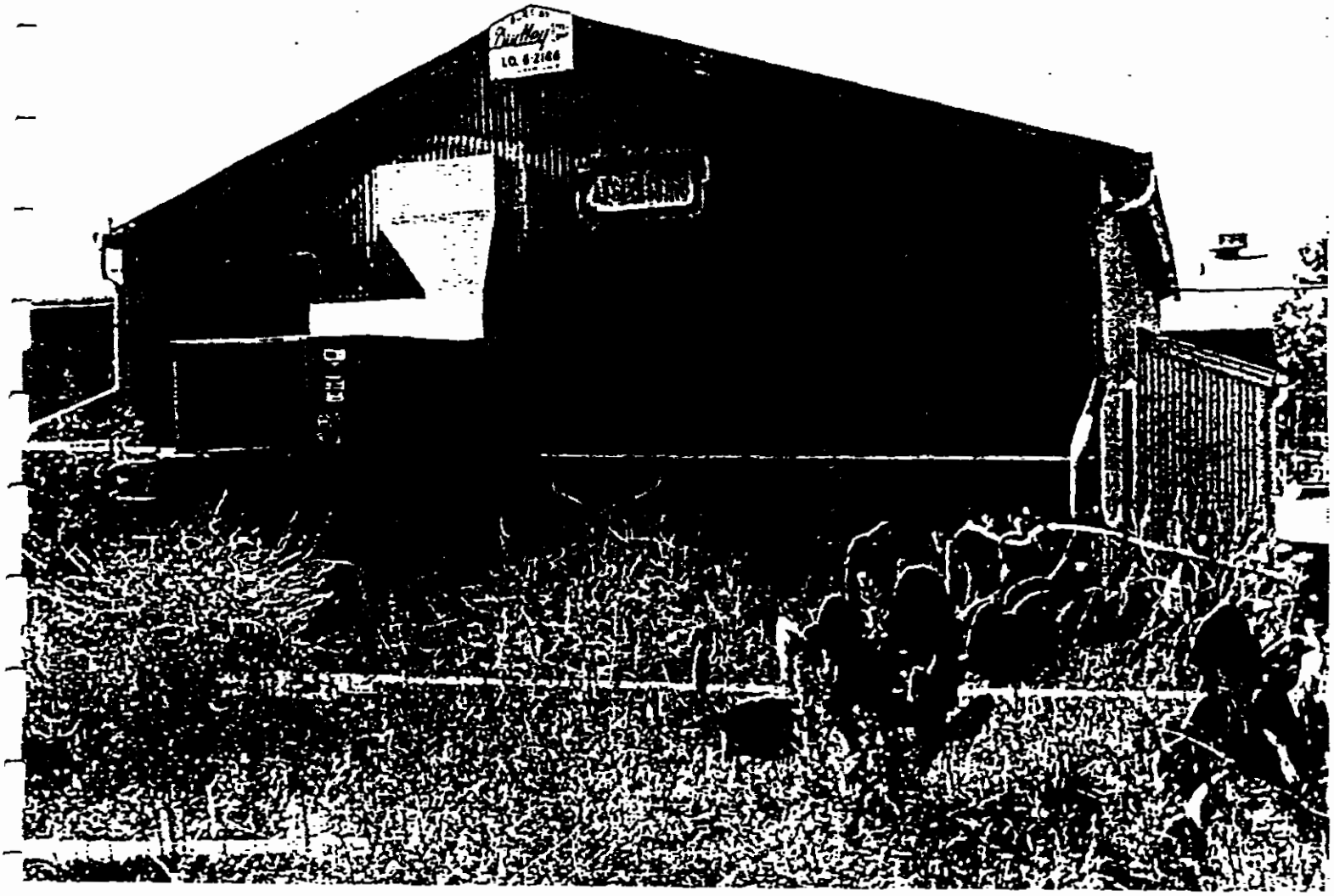

Figure 6 Photograph of Building T030 Looking at Northern Concrete Wall

3. SUMMARY

Building T030, located at Rocketdyne's SSFL, was used for testing, utilizing the Van de Graaf accelerator, between the years of 1960 and 1964.

In the latter part of 1965 through the early part of 1966, Building T030 was decommissioned including the removal of the accelerator.

In 1996 a Final Radiological Survey (REF. 6) was performed and demonstrates that Building T030 meets the requirements of DOE, NRC, and the State of California for release without radiological restrictions.

4. PRIOR DECONTAMINATION

In 1988, a general radiological survey was conducted to clarify and identify areas at the Rocketdyne SSFL requiring further radiological inspection or remediation (Reference 1). Building T030 was included in this survey. The scope of the Building T030 survey included ambient gamma exposure rate measurements, "indication" beta surveys of the accelerator room and outside paved area used for storing palletized containers, and exterior soil samples for tritium content. The result of that survey showed no detectable contamination in the facility. Tritium analyses on ten soil samples, and the beta survey, showed no detectable activity. Background-corrected gamma measurements were all less than the acceptance limit of 5 μR/hr.

In September 1995, the Oak Ridge Institute for Science and Education (ORISE) conducted a confirmatory survey of several facilities at the SSFL, including Building T030 (Ref. 2). With the exception of a single finding for removable tritium contamination of 6,600 dpm/100 cm^2 (below the acceptance limit of 10,000 dpm/100 cm^2) found on the north wall of the accelerator room, no unusual findings were noted. However, ORISE did question the completeness of the 1988 survey. Specifically, ORISE recommended complete measurements of total and removable surface activity, and additional sampling for tritium activity in the accelerator area. In view of ORISE's advice, a comprehensive final survey of Building T030 was conducted in 1996. (Ref. 2)

3. 5. PROJECT ACTIVITIES

3.1

3.2 PHASE I (1988)

Buildings T030 and T641 and the surrounding area were inspected for radioactive contaminants. Gamma exposure rate measurements indicated that no residual radioactive contamination existed in T030's accelerator room; Building T030's palletized container storage area; Building T641's shipping dock; or in the nearby area. Gaussian probability plots of these data and of "background" areas show the great difficulty in assessing the radiological condition of a clean facility based on an acceptance requirement relative to "background". Variability of gamma exposure rates is quite large and depends on whether the measurement was made indoors, outdoors, or near a large sandstone outcropping. Accounting for these variations and deviations, and subtracting a value that represents "natural" background gamma radiation at SSFL, it was concluded through inspection by variables that the area is clean of any residual radioactive contamination, with a consumer's risk of acceptance of 0.1 at an LTPD of 10%. Ten surface soil samples collected randomly in locations near Building T030 all show tritium (^3H) concentrations less than the overall error reported by the analytical laboratory. No statistically significant tritium activity was found. Further radiological investigation of the T030 accelerator room and palletized-container storage area using a beta probe showed in all cases no detectable activity. Within the limits prescribed by the Site Survey Plan, this area was judged to be clean of radioactive contaminants. Further radiological investigation and remedial action was not indicated.

3.3 PHASE II (1996)

Survey measurements were made for alpha, beta-gamma, and tritium surface contamination on the interior walls, floors, and ceilings in Building T030, and for ambient gamma exposure rate at 1 meter above the interior floors. For the radiological survey, interior rooms in Building T030 were divided into two areas, Affected Areas and Unaffected Area. Affected Areas were defined as those areas which have known or suspected contamination based on either past measurements or site history. Unaffected Areas included all areas of a facility not classified as Affected, and were those areas which were not expected to contain any contamination based on previous measurements or site history. Statistical interpretation of the survey data was separated between Affected (Lot 1) and Unaffected Areas (Lot 2). Lot 1 included Rooms 100, 101, 102, and adjacent restrooms. Lot 2 included all other areas in the eastern section of the facility, including the walkway, Rooms 103 through 108, and the connecting aisles. All measurements were tested statistically for compliance with acceptable contamination limits for activation products and mixed fission products and for ambient exposure rate. The results of these tests showed that the facility is suitable for release without radiological restrictions.

4. 6. WASTE

4.1 PHASE I (1966)

The Van de Graaf Accelerator was removed from Building T030. *Disposition of the* accelerator could not be determined.

4.2 PHASE II (1996)

Approximately 2,311 ft^2 of asbestos floor tile was removed and disposed of as non-radioactive hazardous waste.

7. PERSONNEL EXPOSURE

No files or documents could be located to *determine* personnel radiation or chemical exposure. Radioactivity in this facility was so low that radiation doses would have been negligible.

8. PROJECT COST

The radiological survey was the only cost associated with Building T030. This cost cannot be isolated from total radiological facility survey's. Costs associated with the removal of the asbestos floor tile was approximately $9,200.

9. REFERENCES

1. Rockwell Document GEN-ZR-0007, "Radiological Survey of Shipping/Receiving and Old Accelerator Area - Buildings T641 and T030," August 19, 1988.

2. T. J. Vitkus and T. L. Bright, "Verification Survey of the Interim Storage Facility; Buildings T030, T641, and T013; An Area Northwest of Buildings T019, T012, and T059; and a Storage Yard West of Buildings T626 and T038; Santa Susana Field Laboratory, Rockwell International, Ventura County, California," Oak Ridge Institute for Science and Education (ORISE) Final Report, February 1996.

3. Rockwell Document SSWA-AR-0007, "Building T030 Final Radiological Survey Plan," June 25, 1996.

4. Rockwell Internal Letter, "Tritium Smear Survey, Building T030 Van de Graaf Accelerator," A. R. Mooers to W. F. Heine, March 29, 1966.

5. Rockwell Document 030-SP-0004, "Building T030 Final Survey Procedure," June 16, 1995.

6. "Final Radiological Survey" of Building T030, 030-AR-0001, January 22, 1997.