

## Site Summary – Building 4028

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### Site Identification:

Building 4028  
Shield Test Irradiation Reactor (STIR) Facility  
Shield Test Reactor  
Liquid Metal Fast Breeder Reactor (LMFBR) Fuel Safety Building  
Includes Site 4811, Electrical and Mechanical Equipment Pad

### Operational Use/History:

- Constructed in 1960.
- Building 4028 was constructed to perform tests on space reactor shields.<sup>1</sup>
- The original reactor was the Shield Test Reactor, a 50 kW swimming pool type reactor that operated from 1961 to 1964.<sup>1</sup>
- The reactor was modified in 1964 to become the STIR; a 1 MW reactor that operated from 1964 to 1972.<sup>1</sup>
- Site 4811, which was located adjacent to Building 4028, became part of Building 4028 between 1962 and 1967. Site 4811 was a mechanical and electrical pad that held equipment directly supporting the STIR facility reactor.
- In March of 1976, STIR was decommissioned and removed from Building 4028.<sup>1</sup>
- From 1977 to 1981, Building 4028 was used to conduct research on the behavior of molten UO<sub>2</sub>, causing the building to again become contaminated.<sup>1</sup>
- Operations were terminated in 1984, and the building remained inactive until 1988 when cleanout and decontamination began.<sup>1</sup>
- Decommissioning and demolition (D&D) was conducted in 1988. Activities included the removal of surplus uranium oxide, decontamination and removal of equipment and electrical components, removal of the radioactive ducting system, decontamination of the building surfaces, miscellaneous cleanup operations and the final radiological survey of the facility.<sup>1</sup>
- The above-ground structures were removed in 1989 and the below-ground structures were removed in 1998.<sup>1,2</sup>

### Site Description:

- Building 4028 was a 14-foot tall steel-framed structure covered with steel siding and roofing built on top of a concrete test vault. The test vault was 60 square meters with a 6 foot ceiling.<sup>1,3</sup>
- Site 4811 was a concrete electrical and mechanical pad. It housed a cooling tower, heat exchanger, ventilation equipment and an air-cooled condenser, which supported the STIR facility.<sup>1,3</sup>
- Building 4028 had a high-efficiency particulate air (HEPA) exhaust system and stack.<sup>1,3</sup>

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- Records do not indicate there was a radiological waste holdup tank associated with Building 4028. Given the building's location, it is likely that waste water was discharged to the 4614 Drainage Sump.<sup>2</sup>
- Serviced by Site 4811, Electrical and Mechanical Equipment Pad.

### Relevant Site Information:

- There have been five incidents associated with Building 4028 that could have resulted in a release to the environment:
  - On July 17, 1963, an unmarked irradiated fission foil was moved in a private car to a clean office (A0447).
  - On June 17, 1965, an employee received an extremity beta exposure resulting from the handling of a plastic bag sealed with green tape containing chemical samples which were irradiated for 1000 seconds at 1 Mw (A0279).
  - On January 10, 1978, there was a small Uranium fire in the arc-melting furnace (A0065).
  - On January 30, 1979, increased radioactivity was found in runoff water from Radioactive Materials Disposal Facility. The estimated total activity released to the pond was approximately 0.36 mCi of gross beta activity (A0232).
  - On July 24, 1981, a contaminated crucible stored outside was exposed to elements (A0087).

### Radiological Surveys:

- On September 15, 1988, a site water runoff analysis was conducted as part of the D&D effort. It determined that there was no detectable activity.<sup>4</sup>
- In 1988, a final survey of the total facility was conducted after the completion of D&D to verify that the radiation levels of the facility had been reduced to <0.1 mrad/hr. The survey consisted of an ambient contamination detection scan inside the building and throughout the fenced in area (based on Industrial Planning Maps and the survey map the fenced in area includes Building 4504 – Classified Scrap and S.S. Materials Storage).<sup>3,5</sup>
  - The survey concluded that the facility beta-gamma surface contamination levels were all <0.1 mrad/hr.
  - Measured beta-gamma surface contamination ranged from 0.02 to 0.07 mrad/hr (limit is 1.0 mrad/hr).
- Rockwell International conducted a D&D survey in 1989. The survey covered the interior (above and below grade portions) and the surrounding area of Building 4028 through direct radiation sampling, exposure rates and surface sampling.<sup>1</sup>
  - Indication surveys for contamination conducted in the non-radiological controlled areas of the building found no detectable activity.
  - Alpha and beta measurements were made in the radiological controlled areas.
    - Total alpha: 12.3 dpm/100cm<sup>2</sup> average.
    - Maximum alpha: 72.8 dpm/100cm<sup>2</sup>.

- Alpha acceptable limit: 5,000 dpm/100cm<sup>2</sup>).
    - Total beta: 523 dpm/100cm<sup>2</sup> average and 1,303 dpm/100cm<sup>2</sup> maximum.
    - Beta acceptable limit: 5,000 dpm/100cm<sup>2</sup>.
    - Removable alpha: 5.1 dpm/100cm<sup>2</sup> average and 109 dpm/100cm<sup>2</sup> maximum.
    - Removable alpha acceptable limit: 1,000 dpm/100cm<sup>2</sup>.
    - Removable beta: 14.7 dpm/100cm<sup>2</sup> average and 307 dpm/100cm<sup>2</sup> maximum.
    - Removable beta acceptable limit: 1,000 dpm/100cm<sup>2</sup>.
  - Ambient gamma in the above grade levels: 0.2 µR/hr average and 1.0 µR/hr maximum (adjusted for background).
  - Ambient gamma in the below grade levels: -0.7 µR/hr average and 2.3 µR/hr maximum (adjusted for background).
  - Acceptable limit: 5 µR/hr above background.
  - The survey concluded that the facility met the release criteria for unrestricted use.
- Oak Ridge Institute for Science and Education conducted a survey to verify the results of the final radiation survey performed by Rockwell in 1989. The survey covered the Old Conservation Yard, Building 4064 and Building 4028. Surface scans and surface activity levels were measured for Building 4028.<sup>6</sup>
    - The survey concluded that Building 4028 met the release criteria for unrestricted use.
    - Surface scans for alpha, beta and gamma activity of the above-ground concrete slab, below-grade vault, and the stairway did not identify any areas of elevated direct radiation.
    - Surface activity measurements for alpha contamination in a grid block were <83 dpm/100cm<sup>2</sup> average and individual direct measurements ranged from <83 to 89 dpm/100cm<sup>2</sup> (limit is 5,000 dpm/100cm<sup>2</sup> average and 15,000 dpm/100cm<sup>2</sup>). Beta contamination measurements in a grid block were between <860 and 1,200 dpm/100cm<sup>2</sup> average and individual direct measurements ranged from <860 to 1,400 dpm/100cm<sup>2</sup> (limit is 5,000 dpm/100cm<sup>2</sup> average and 15,000 dpm/100cm<sup>2</sup>).
    - Removable gross alpha contamination was <12 dpm/100cm<sup>2</sup> (limit is 1,000 dpm/100cm<sup>2</sup>). Removable gross beta contamination ranged from <15 to 25 dpm/100cm<sup>2</sup> (limit is 1,000 dpm/100cm<sup>2</sup>).
  - DHS performed verification sampling in 1992.

**Status:**

- The California Department of Health Services (DHS) concurred with release of Building 4028 for unrestricted use in December 1995.<sup>7</sup>
- The Department of Energy (DOE) released Building 4028 without radiological restrictions in April 1997.<sup>8</sup>

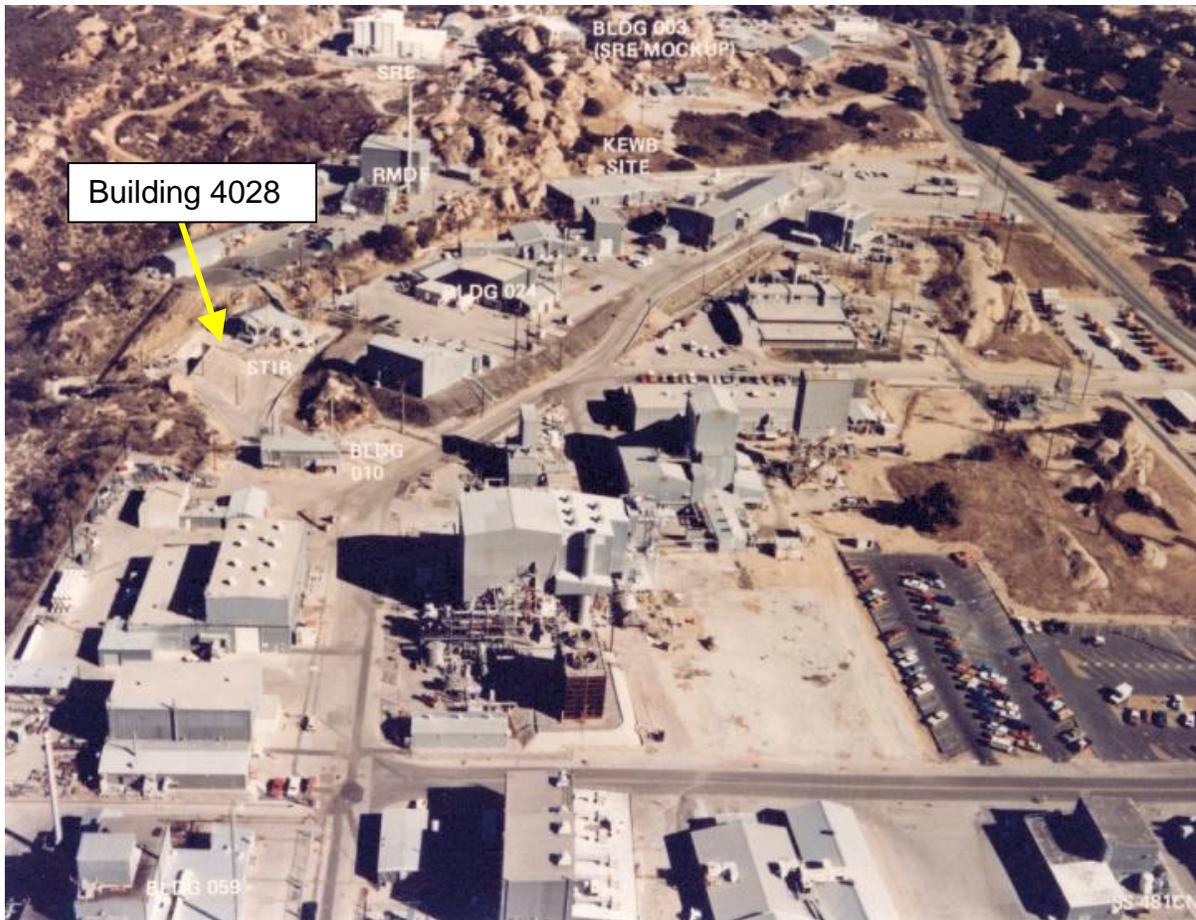
## Group K

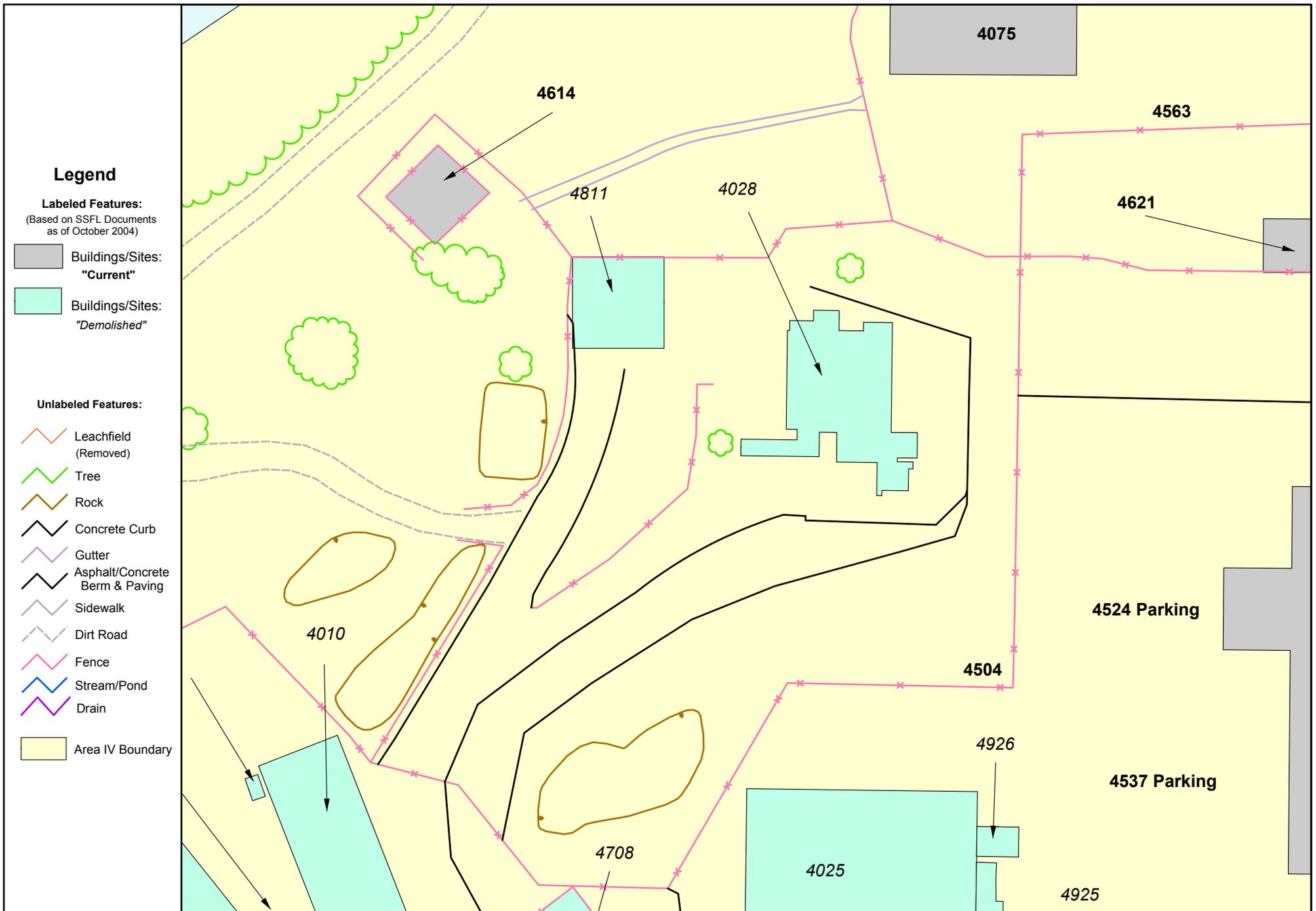
- The above grade portion of the building was demolished in 1989, and the concrete slab floor, test vault and stairway were demolished in 1998.<sup>2</sup>

### References:

- 1- Rockwell International Report, N704SRR990033, "Final Decontamination and Radiological Survey of Building T028," February 27, 1991.
- 2- Personnel Interview, Rod Meyer, September 25, 2003.
- 3- Rockwell International Report, AI-ERDA-13168, "STIR Facility Decontamination and Disposition Final Report," August 26, 1976.
- 4- Rockwell International Report, N001TI000322, "Building T028 Decontamination and Demolition Final Report," June 6, 1990.
- 5- SSFL Area IV, ETEC Industrial Planning Maps, 1962-1992.
- 6- ORISE Report, 93/J-107, "Verification Survey of the Old Conservation Yard, Building T064 Side Yard, and Building T028, Santa Susana Field Laboratory, Rockwell International, Ventura County, California," October, 1993.
- 7- DHS/RHB, Letter, "Rocketdyne's letter dated July 6, 1995 with attachments concerning the release of Buildings T029, T028 and OCY," from Gerard Wong (DHS/RHB) to Phil Rutherford, December 21, 1995.
- 8- DOE-ER, Letter, "Release of Decontaminated Building 028 without Radiological Restrictions at ETEC," from Sally Robinson (DOE-ER) to Roger Liddle, April 2, 1997.
- 9- Historical Site Photographs from Boeing Database.

Photograph – Building 4028





**Legend**

**Labeled Features:**  
(Based on SSFL Documents as of October 2004)

- Buildings/Sites: "Current"
- Buildings/Sites: "Demolished"

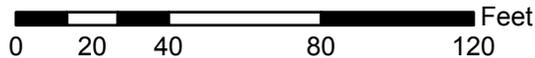
**Unlabeled Features:**

- Leachfield (Removed)
- Tree
- Rock
- Concrete Curb
- Gutter
- Asphalt/Concrete Berm & Paving
- Sidewalk
- Dirt Road
- Fence
- Stream/Pond
- Drain
- Area IV Boundary

DRAWN BY:



1 inch equals 50 feet



DATE:

May 2005

Site Summary Group K  
AREA IV  
Santa Susana Field Laboratory, CA