

## Site Summary – Building 4654

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### Site Identification:

Building 4654  
Interim Storage Facility

### Operational Use/History:

- Constructed in 1958.
- Originally constructed to store dummy and spent fuel elements, shipping/storage casks and radiological waste generated at the SRE, the Organic Moderated Reactor (OMR), and SNAP programs.<sup>1</sup>
- Demolished and decommissioned in 1985.<sup>1</sup>

### Site Description:

- Building 4654 was a below-ground concrete structure on which eight storage tubes were anchored. The tubes extended into holes in the bedrock and were embedded with drilling mud. A paved fenced-in pad adjacent to the storage tubes served as a storage area.<sup>2</sup>

### Relevant Site Information:

- During excavation, a hydraulic hammer mounted on a backhoe punctured one of the storage tubes. The storage tube and surrounding area were surveyed and found to be free of contamination.<sup>1</sup>
- Several incidents are recorded for this facility that could have involved releases of radioactivity to the environment:
  - On January 23, 1962, contamination from equipment stored outside spread from inside the fenced area to asphalt outside the fence. Samples indicated contamination levels ranged from 2 mrad/hr to 17 mrad/hr. No decontamination was conducted (A0014).
  - On July 5, 1979, contaminated shipping casks stored in the area were found to be emitting high levels of radiation (up to 35 mR/hr) (A0079).

### Radiological Surveys:

- Building 4654 was decommissioned and demolished in 1985.<sup>1</sup>
  - Activities included: removal of surface and imbedded contamination, excavation and removal of fuel storage tubes and restoration of site to natural grade. Waste was packaged and shipped to DOE-Hanford for burial.
- Rocketdyne performed a Phase I Radiation Survey during and after the D&D effort in 1984-85.<sup>1</sup>

## Group G

- The survey found that all surface contamination had been removed in the D&D effort and all radiation levels were within acceptable limits.
- Samples (soil samples, radioactive analysis and in situ gamma radiation surveys) were taken and no measurable contamination was found in any of the logical paths of contaminant migration.
- Soil samples were taken during excavation and at maximum depth during D&D. While some were found to be contaminated with Cs-137 (the only non-naturally occurring isotope encountered) all contamination was found to be below 2.0 pCi/g or 36 pCi/g maximum beta activity (release criterion 100 pCi/g gross detectable beta activity).
- After D&D was completed, a statistical survey of the surface was done. The instrumentation was susceptible to sky shine and the adjusted mean exposure rate found was 12  $\mu$ R/hr compared to a background level of 10  $\mu$ R/hr (NRC guideline is 5  $\mu$ R/hr above background).
- In 1988, Rocketdyne collected and analyzed six soil samples just to the north of Building 4654.<sup>3</sup> The samples were analyzed for gross alpha and gross beta. All measurements were below soil release limits, however some appeared to be higher than background.
  - Values were 7.4 to 37 pCi/g (gross alpha) and 33 to 52 pCi/g (gross beta).
- ORISE performed a document review in 1996.
  - Initial review of documentation in 1996 found that the documents available did not provide all of the information necessary for a reviewer to independently assess the status of the buildings or outside areas, relative to DOE guidelines for release for unrestricted use.<sup>4</sup>
  - Effectiveness of the gamma exposure rate survey was compromised by sky shine from the Radioactive Materials Disposal Facility (RMDF). ORISE recommended a 100% direct qualitative scan for gamma exposure rate followed by surface soil sampling.<sup>5</sup>
  - At the time of the Independent Verification Survey (IVS) review, the subsurface soil was not accessible for sampling. ORISE recommended sampling of subsurface soil throughout the depth of excavation.<sup>5</sup>
- ORISE performed an IVS in 1997.<sup>6</sup>
  - In surface scans of the site and beta-gamma scans of the extracted sample cores, no elevated direct radiation resulting from residual contamination was found.
  - Exposure rates at the Interim Storage Facility were 15  $\mu$ R/hr compared with background rates between 12 and 16  $\mu$ R/hr with an average of 14  $\mu$ R/hr. NRC limit is 5  $\mu$ R/hr above background.
  - Radionuclide concentrations from 4 surface samples and 12 surfaces subsurface borehole samples:
    - Ra-226: less than 0.61 to 1.254 pCi/g (background: 0.20 to 1.19 pCi/g).
    - Th-232: 0.67 to 1.94 pCi/g (background: 0.56 to 1.72 pCi/g).
    - U-235: less than 0.84 pCi/g (background: less than 0.13 pCi/g).

- U-238: less than 2.35 pCi/g (background: less than 2.15 to 2.54 pCi/g).
  - Activation and fission products: less than the minimum detectable concentration (MDC) of 1.50 pCi/g for Cr-51 (background: all less than respective MDC).
  - Cs-137 detected above MDC: less than 0.22 to 0.43 pCi/g.
  - Borehole composite samples: all less than MDC for Sr-90: 0.39 to 0.55 pCi/g.
- ORISE concluded that the site could be released for unrestricted use.
- Rocketdyne performed a Supplemental Final Status Survey in 1997 and finalized the report in 1999.<sup>5</sup>
  - Ninety-three surface soil samples were taken. Cs-137 ranges from 0.02 to 6.99 pCi/g, less than the DCGL of 9.2 pCi/g. The maximum Sr-90 sample was 1.3 pCi/g, less than the DCGL of 36 pCi/g.
  - The survey concluded that the site was suitable for release for unrestricted use.
- DHS performed verification sampling in 1997.
- In August 2002, twenty soil samples were collected in Grid Blocks S-19 and T-19, neighboring Building 4654.<sup>7</sup> Sampling was conducted as a follow up to the 1988 survey results and the Area IV survey results. It was suspected that this area was used for storage of materials from SRE operations.
  - Sixteen of the samples had values greater than background; the highest value was 4.9 pCi/g of Cs-137
- In June 2003, twenty-two soil samples were collected in Grid Blocks S-19 and T-19, neighboring Building 4654.<sup>8,9</sup> Sampling was conducted as a follow up to the 1988 survey results. It was suspected that this area was used for storage of materials from SRE operations.
  - In twenty-one samples Cs-137 ranged from non-detect to 4 pCi/g. The value of one sample was 15.1 pCi/g, which exceeded the DCGL of 9.2 pCi/g. Coincident surveys using a GPS radiation survey cart confirmed that the elevated Cs-137 was localized to approximately 15 ft x 15 ft.. This area was excavated per ALARA policy. Post remedial samples confirmed contamination had been removed.
  - Other radionuclides analyzed were Am-241 (all non-detect), Co-60 (21 non-detect, 1 sample 0.5 pCi/g), Pu-238 (all non-detect), Pu-239 (21 non-detect, one sample 0.04 pCi/g), and Sr-90 (two samples were 1.2 and 0.9 pCi/g, the rest were non-detect). Uranium and thorium were at background levels.

**Status:**

- Building 4654 was demolished in 1985.<sup>1</sup>
- A certification docket has been submitted to DOE.<sup>2</sup>
- On February 1, 2005 DOE provided a letter to Boeing declaring that Boeing and ORISE surveys had confirmed that DOE and DHS approved soil cleanup limits had been met, and that the 4654 site was suitable for release for unrestricted use.<sup>10</sup>

## Group G

### References:

- 1- Boeing Document, EID-04364, "Final Report Decontamination and Decommissioning of Interim Storage Facility 4654," May 27, 1999.
- 2- DOE Document, DOE/CD-EETEC-654, "Draft Docket for the Release of Building 4654 at the Energy Technology Engineering Center," May 1999.
- 3- Rocketdyne Document, A4CM-AN-0003, "Radiological Characterization Plan, Area IV, SSFL," March 30, 1994.
- 4- ORISE, Letter, "Comments on the Final Status Survey Documentation for the Interim Storage Facility; Buildings T013, T019, T024, T030, and T641; the Storage Yard West of Buildings T626 and T038; and the NW Area; Santa Susana Field Laboratory, Ventura County, California," from Timothy Vitkus (ORISE) to Don Williams, January 11, 1996.
- 5- ETEC Document, RS-00004, "Building T654 Supplemental Final Radiological Survey Report," January 30, 1999.
- 6- ORISE Document, ORISE 97-1900, "Verification Survey of the Interim Storage Facility (T654), Santa Susana Field Laboratory, Rockwell International, Ventura County, California," November 1997.
- 7- Boeing Document, RD02-148-01, "Site Environmental Report for Calendar Year 2002 DOE Operations at The Boeing Company, Rocketdyne Propulsion & Power," September 2003.
- 8- Boeing Document, RD04-170, "Site Environmental Report for Calendar Year 2003 DOE Operations at The Boeing Company, Rocketdyne Propulsion & Power," September 2004.
- 9- Boeing Internal Letter, "Grid S19/T19 Interim Soil Remediation," from E.R McGinnis to B. D. Sujata, November 19, 2003.
- 10- DOE Letter, "Release of Building 4654," from M. Lopez (DOE) to M. Lee (Boeing), February 1, 2005.
- 11- Historical Site Photographs from Boeing Database.
- 12- SSFL Area IV, ETEC Industrial Planning Maps, 1962-1992.

Photograph – Building 4654 (Note: Structure is subgrade)

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