

Buildings 776 and 777 Closeout Briefing Summary

Prepared by Rik Getty

Briefing Summary Revision Number

Rev 0 (12/05)

Approximate Location

Northing: 750,500 (approximate center of 776); 750,550 (approximate center of 777)

Easting: 2,083,775 (approximate center of 776); 2,084,050 (approximate center of 777)

Location Relationship to other Site areas: Buildings 776 and 777 were built on the flat pediment area to the south of the B771/774 hillslope. They were directly west of Building 779 and to the north of Building 707.

Historical Information

(For a detailed history on Buildings 776 and 777 -- 776/777, see References 1 and 2; the following section relies heavily on language used in References 1 and 2.)

For the first few years of the site's operations all plutonium (Pu) operations were conducted in Building 771 (then known as Building 71). Beginning in 1957 a new trigger or "pit" design resulted in an increase in the amount of Pu, relative to uranium, that needed to be processed at the site. In addition, different shapes of Pu with closer dimensional tolerances were required. This required more rolling, forming, and machining of Pu than in the earlier production years. As a result of the design changes and increasing workload, the 776/777 complex was constructed and operations began in 1957. The 776/777 facility was initially one building contained under one roof separated by a concrete wall. This wall was eventually removed resulting in one building. A photo (circa 1988) of the 700 area Pu operations buildings is shown in Figure 1 (page 5). Building 771/774 is in the foreground of the photo built into the hillslope while the 776/777 complex is located to the south of 771/774 towards the middle of the photo.

The initial Pu operations which began in 776/777 after transfer from 771 in 1957 were:

- casting;
- fabrication;
- assembly; and,
- quality control.

In 1969 a catastrophic fire inside 776/777 caused extensive damage to the operating equipment and building structure (see Figure 2, page 6, for example of typical glovebox fire damage). The fire started inside a glovebox when a Pu briquette spontaneously ignited. A Pu briquette was scrap Pu metal from machining operations that was collected and compressed into a "briquette". The fire breached the glovebox system and spread to surrounding areas resulting in extensive Pu contamination throughout 776/777. Small amounts of Pu were released to the surrounding environment around 776/777 as a result of the fire and fire-fighting actions. Initial decontamination clean-up activities in 776/777 were not completed until 1971. Due to the nature of the Pu contamination from the fire, the facility could never be decontaminated to Pu contamination levels that existed before the fire. As a result of the fire the site incorporated safety measures into future Pu operations and a new facility, Building 707, was brought on-line in 1972 for Pu fabrication operations with many Pu fire safety upgrades compared to 776/777.

After the 1969 fire 776/777 operations consisted mainly of:

- testing and inspection;
- disassembly of site returns (triggers or pits sent back to the site);
- special projects;
- Pu recovery;
- waste management; and,
- laboratory work.

(for further detailed information on these activities please see Reference 2.)

Pre-remediation Characterization Data

As stated in the historical information section of this briefing, the 1969 caused extensive Pu contamination to 776/777. As a result of this Pu contamination, the facility could not be decontaminated to pre-fire Pu contamination levels. Much of the internal surfaces of the facility had residual contamination that was simply covered up with a paint fixative after initial decontamination efforts failed. As a result, 776/777 was considered to be low-level radioactive waste for disposal purposes.

In addition to the extensive Pu contamination present in the facility there were many other contaminants of concern (COCs) resulting from the wide variety of operations that occurred in 776/777 over the years. These COCs included:

- radionuclides such as Am and U isotopes (in addition to the aforementioned Pu);
- metals such as Ag, As, Ba, Be, Cr, Cu, Mn, Ni, Pb, Sr, and Zn;
- VOCs such as chlorinated solvents, acetone, and toluene;
- SVOCs/PCBs such as pyrenes, phthalates and aroclor-type PCBs; and,
- asbestos-containing building materials found in many locations in 776/777.

Remedial Actions Taken

The site removed a large inventory of both hazardous and radioactive waste prior to the actual building demolition and remediation. Pu contamination was decontaminated to the extent practical as overseen and approved by the regulators, but not all contamination could be removed. After the decontamination effort reached a certain level, the regulators determined that the remaining contamination could stay in place resulting in the remaining building structure being declared low level radioactive waste (LLW). Areas with remaining contamination were protected by various fixatives and the building was carefully demolished using heavy equipment. Dispersal of airborne contamination was kept to a minimum using water-based fogs and sprays. Water from this airborne suppression effort was collected in holding ponds for subsequent analysis prior to any treatment or free-release. Debris waste from 776/777 was loaded onto specialized railcars for shipment to the LLW waste disposal site at Envirocare of Utah (see Figure 3, page 7, showing the last section of 776/777 being demolished).

The following is a summary of the waste volumes by categories generated during remediation:

- sanitary wastes disposed of at various Front Range landfills = 4,748 m³;
- LLW disposed of at Envirocare in Utah, Nevada Test Site, and Kingston, TN = 62,000 m³;
- LLMW (low-level mixed waste – both radioactive and hazardous) = 572 m³;
- TRU wastes disposed at the WIPP site in New Mexico = 645 m³; and,
- TRU mixed disposed at WIPP = 125 m³.

After demolition of the 776/777 building structure/slab and the subsequent loading of the wastes into railcars, the area was regraded for the final site land configuration and revegetated.

Post-remediation Remaining Contamination

(See Reference 3 for detailed information on remaining contamination.)

After final remediation there are areas of soils in the former 776/777 location that contain Pu activities that exceed the Wildlife Refuge Worker Action Levels (WRW ALs) of 50 pCi/g Pu. However these locations are deep enough (greater than 3 feet deep) and less than 1,000 pCi/g Pu that they do not require remediation per the Rocky Flats Cleanup Agreement requirements. In addition to the radionuclides there are also some soil areas that contain metal COCs above background levels but they do not exceed WRW ALs.

Potential Exposure Pathways to Remaining Contamination

(See Reference 3 for detailed analysis of potential exposure pathways to remaining contamination.)

The original 776/777 location was a flat area that was not prone to landslides or significant erosion. The final land configuration of the remediated site keeps the area with almost the same original topography. There is minimal soil erosion potential in the remediated area which could lead to exposure of Pu-contaminated soil which could mobilize into surface water.

Regarding groundwater contamination and movement, there are no building-specific groundwater monitoring for 776/777; however, the wells monitoring the large Industrial Area Plume includes any contribution from 776/777. However, the former Building 730, which supported 776/777, located just north of 776/777, was a significant source of carbon tetrachloride which contaminated groundwater. The site performed a source removal remedial action at B730 to remove the carbon tetrachloride source. Contaminated groundwater downgradient of B730 is being monitored for carbon tetrachloride levels as the groundwater plume degrades over time.

Long-term Stewardship Controls

(See Reference 3 for information on Long-term Stewardship controls.)

In Reference 3 the site proposed that no IHSS Group-specific, long-term stewardship activities are recommended beyond the generally applicable site requirements. The site went on to state that these requirements may be imposed on this area in the future. Institutional controls that will be used, as necessary, for the 776/777 area include the following:

- Prohibitions on construction of buildings in the former Industrial Area;
- Restrictions on excavation or other soil disturbance; and,
- Prohibitions on groundwater pumping in the area of 776/777.

Groundwater and surface water monitoring locations are designed to encompass the former 776/777 area in case of the exposure of residual contamination. In addition the post-closure site will perform periodic inspections of remediated areas as required in the Long-term Surveillance & Maintenance Plan based in part on the final CAD/ROD and post-closure cleanup agreement with the regulators (post-closure RFCA).

Notes

Photos of the final 776/777 slab/basement removal as well as the final re-grading of the area can be found at the end of Reference 3.

Document references

1. Decommissioning Closeout Report for the 776/777 Closure Project, Revision 1, November 2005 (document path, CERCLA AR# pending)
2. Historic American Engineering Record, Rocky Flats Plant (document path, DOE RFETS home page/historical information/HAER database). Use the following link:
<http://192.149.55.183/HAER/base/776.htm>
3. Closeout Report for IHSS Group 700-3, Volume II, UBC 776, UBC 777, UBC 778, and a Portion of IHSS 000-121, including Tank 18, October 2005 (document path, CERCLA AR# pending)

Figure 1. Photo, circa 1969, of 700 area Pu operations buildings. B771/774 are in foreground built into the hillside while B776/777 complex is located to the south towards the middle of photo.

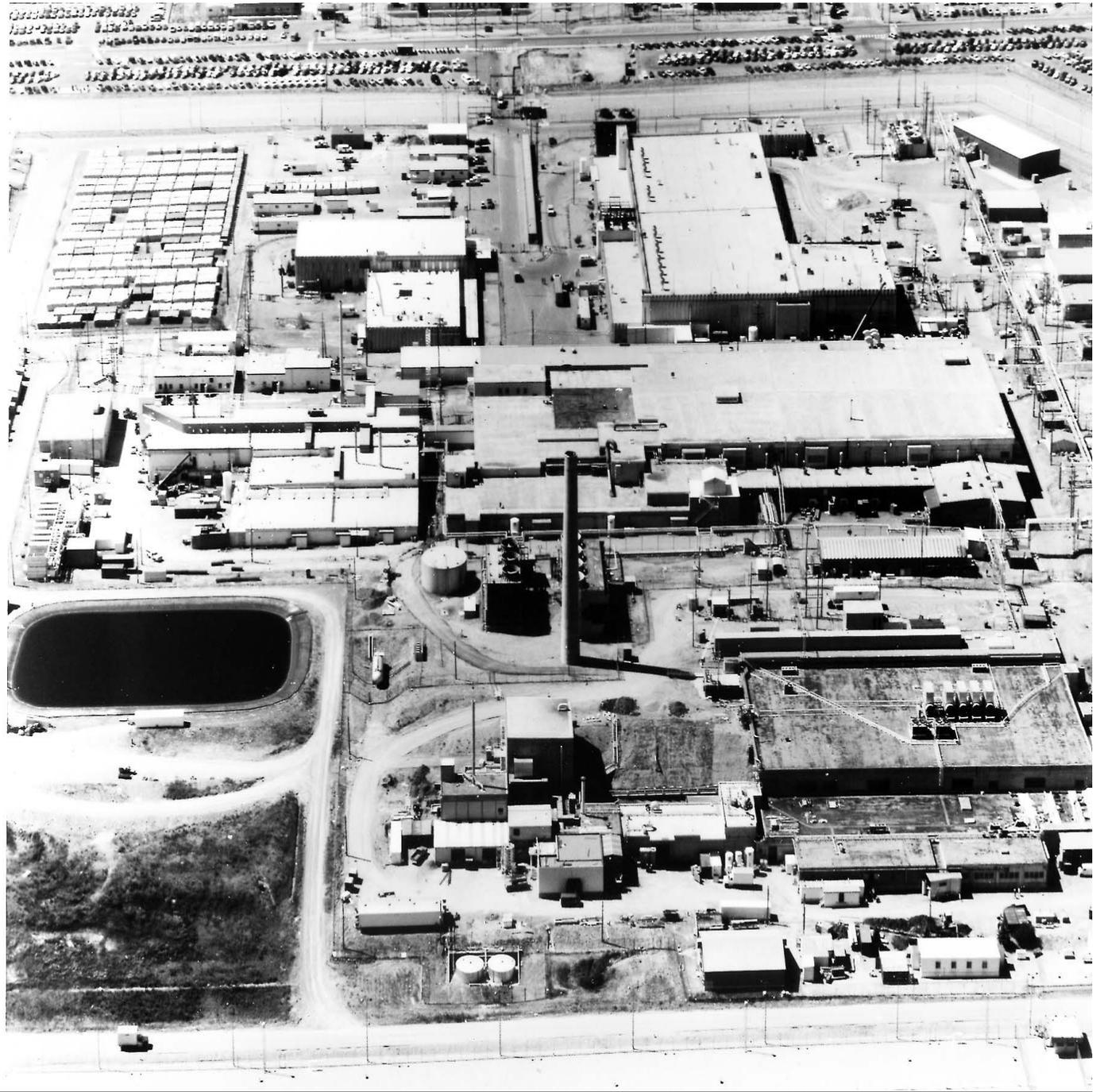


Figure 2. Photo showing damage to a glovebox after 1969 fire.



Figure 3. Photo (May 2005) of last section of 776/777 being demolished. Note use of dust suppression measures and railcars in background

