DECOMMISSIONING OF HEPA FILTER PLENUMS

J. K. Fretthold
K-H Engineering Programs

Rocky Flats Environmental Technology Site
Golden, Colorado 80403-8200

Abstract

Rocky Flats Environmental Technology Site (RFETS) has approximately 90 exhaust filter plenums. These plenums are located both in the buildings they service and in adjacent buildings. There are both 2 & 4 stage walk-in type plenums with an average of 30 HEPA filters per stage. The RFETS mission is the closure of the site; part of the closure process is the demolition of facilities. The first major building and associated mechanical buildings were demolished in 1999/2000. Seven exhaust plenums were demolished in place. The method used for the successful demolition is recorded in Photos of Building 782 that contained one supply and three exhaust plenums.

Background

The 779 Cluster Closure Project was located in the north central section of the RFETS protected area. Main structures in the 779 Cluster were the R&D facility, Building 779; a filter plenum and emergency generator facility, Building 729 and a filter plenum Building 782. (Figure 1)

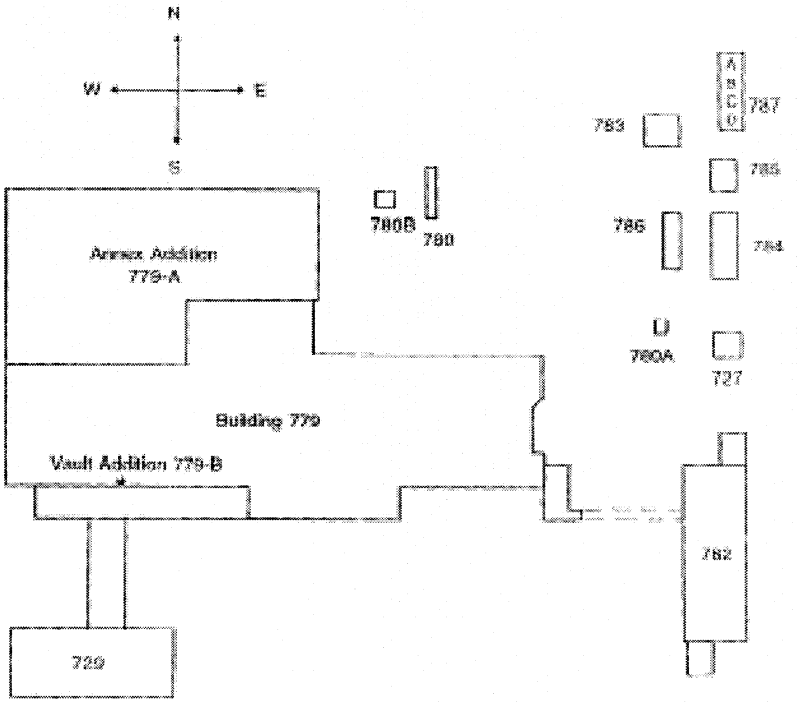

Figure 1 – Building 779 Cluster Layout

Building 779 D&D effort, as defined in the 779 Decommissioning Operations Plan, removed interior equipment, decontaminated the remaining structures, and dismantled the facilities, leaving facility foundations, basements, and underground utilities in place.

The 779 Closure Project was completed in accordance with project's Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) decision document, the Decommissioning Operations Plan for the 779 Cluster Interim Measure/Interim Remedial Action,, approved February 1998.

Building 782, Plenum Building Description

Building 782 (Photo 1) was a single-story building approximately 100ft. long x 62ft. wide by 16ft. high. Reinforced concrete caissons, varying from 2 ft. to 2½ft. in diameter and from 6ft. to 24ft. deep, supported reinforced concrete grade beams that are 10in. thick by 5ft. deep. Building 782 houses three exhaust plenums and one supply plenum (Figure 2) along with the fans, duct work, electrical equipment and supporting utilities. (Photos 2, 3, 4 and 5)

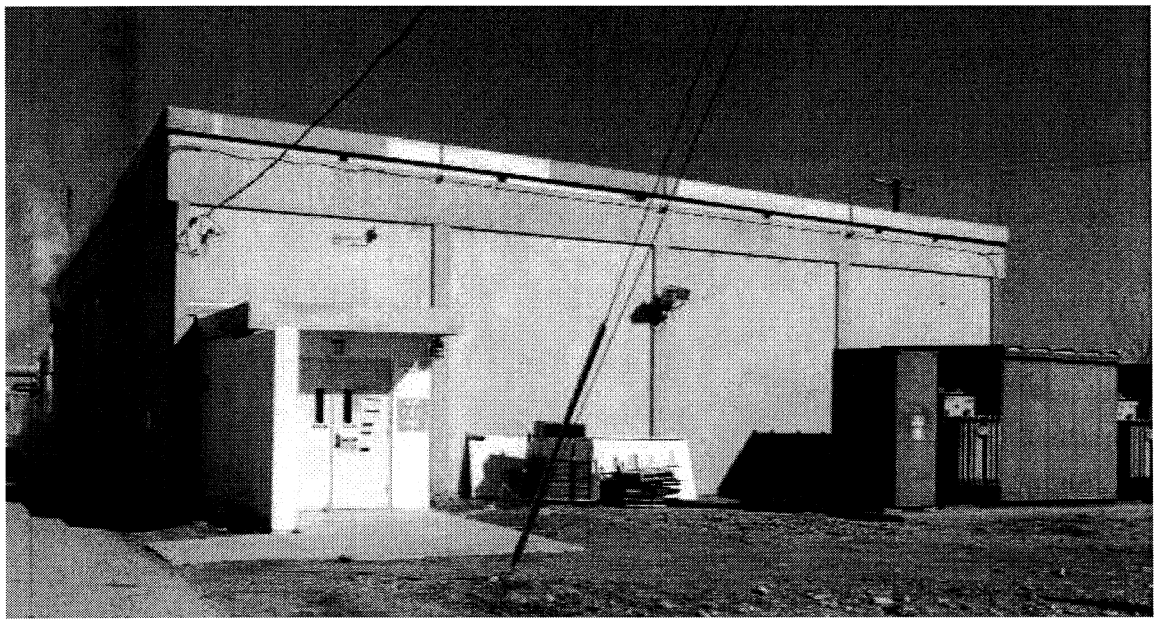

Photo 1 – Building 782

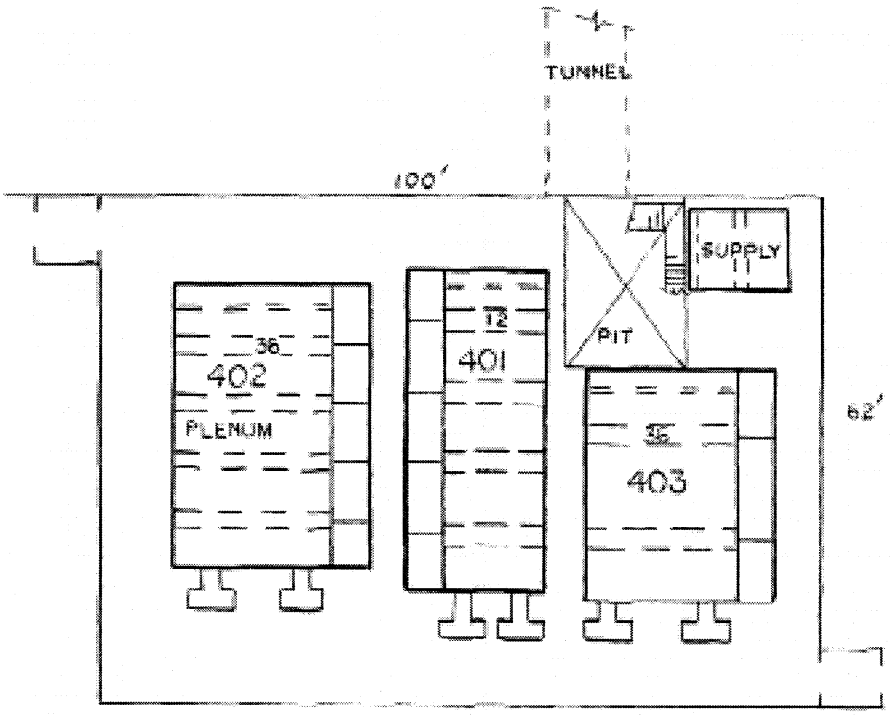

Figure 2 – Building 782 Layout

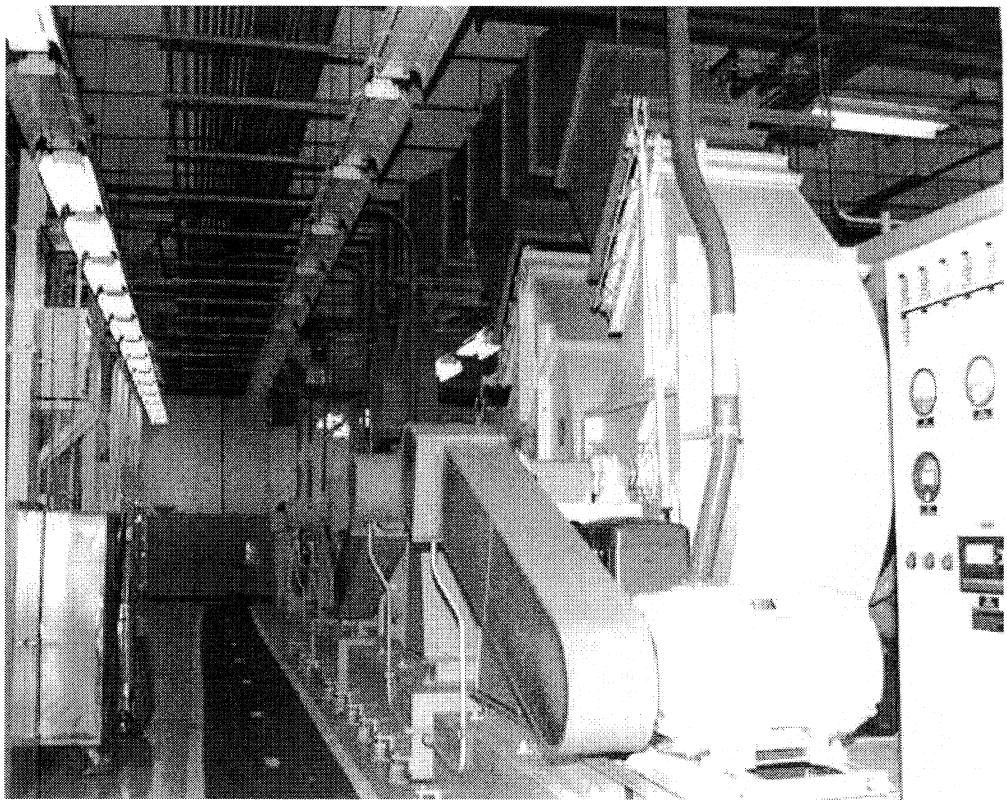

Photo 2 – Plenum Exhaust Systems

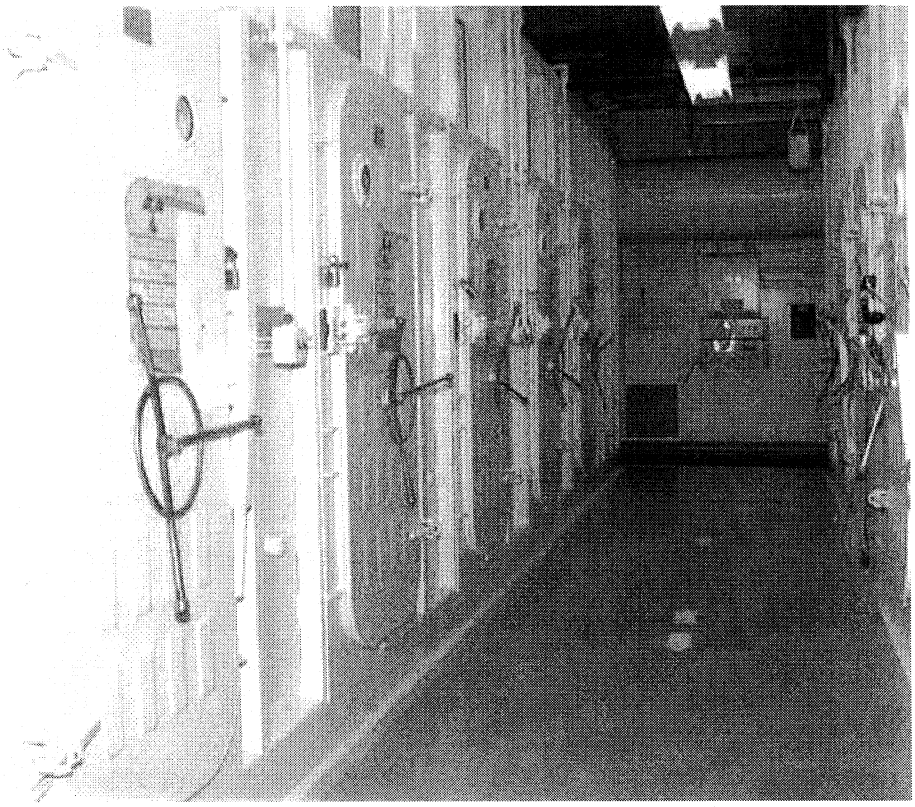

Photo 3 – Plenum 401 And 402

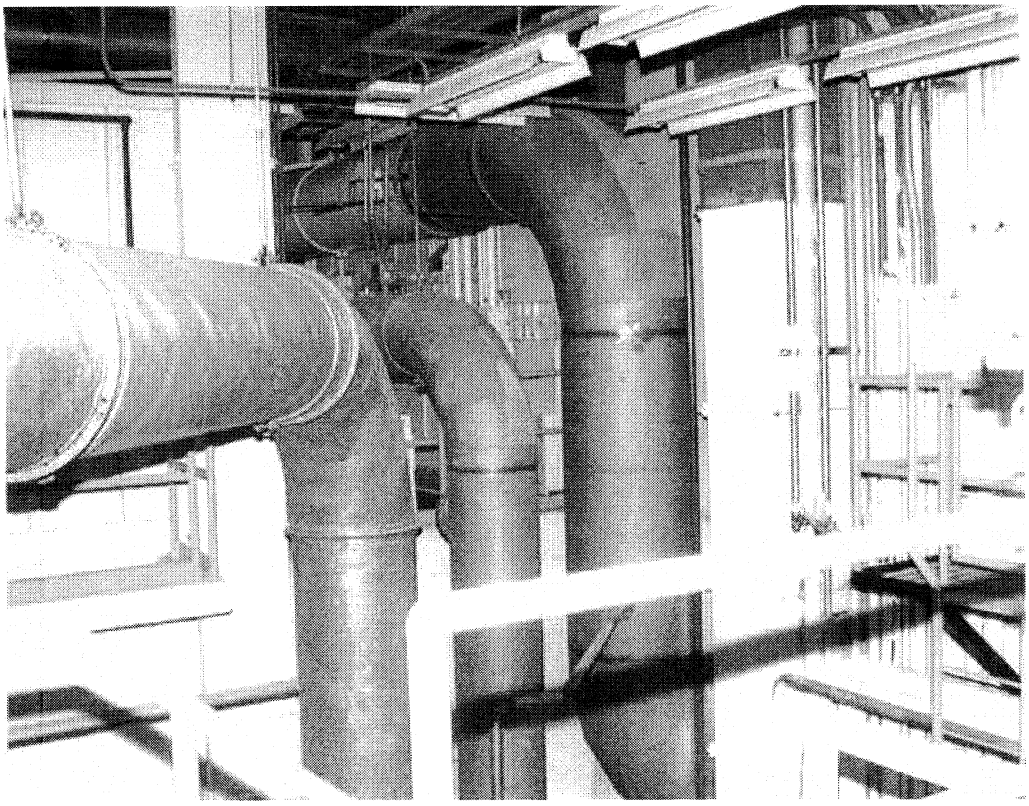

Photo 4 – Plenum Inlet Duct

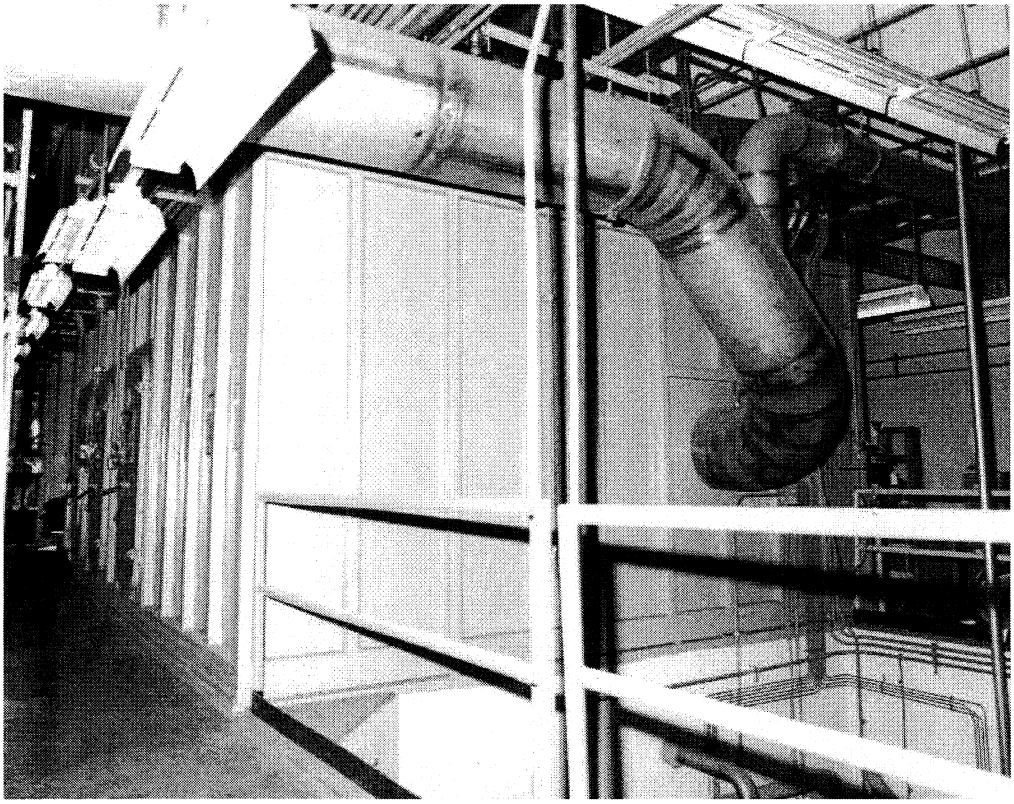

Photo 5 – Plenum Inlet Duct

Plenum Demolition

The demolition of Building 782 Plenums began after the need for ventilation in Building 779 Hoods, glove boxes and rooms had ended. The method for demolition of the duct systems was - start at the farthest point (hood or glove boxes) remove the equipment and duct work and work toward the plenum. Photo 6 shows exhaust ducting removed to the plenum inlet. Once exhaust was no longer required in the process area the fans were turned off and portable exhausters were used to keep a negative on the plenum. (Photos 7 & 8) HEPA filers were removed and package for disposal. (Photos 9 & 10). The fans were cut up in place (Photo 11). The non-contaminated final stage of the plenum was cut up using mechanical means. (Photos 12, 13 & 14) The contaminated stages of the plenum were isolated. (Photos 15 & 16) Plastic houses were built around the contaminated stages. (Photos 17 and 18) Entry was made using airlock and supplied air. (Photos 19 & 20) Demolition was performed using mechanical means. (Photos 21 & 22) Waste was packaged and pads were decontaminated. (Photo 23) Final interior waste materials were removed. (Photos 24, 25, 26, and 27)

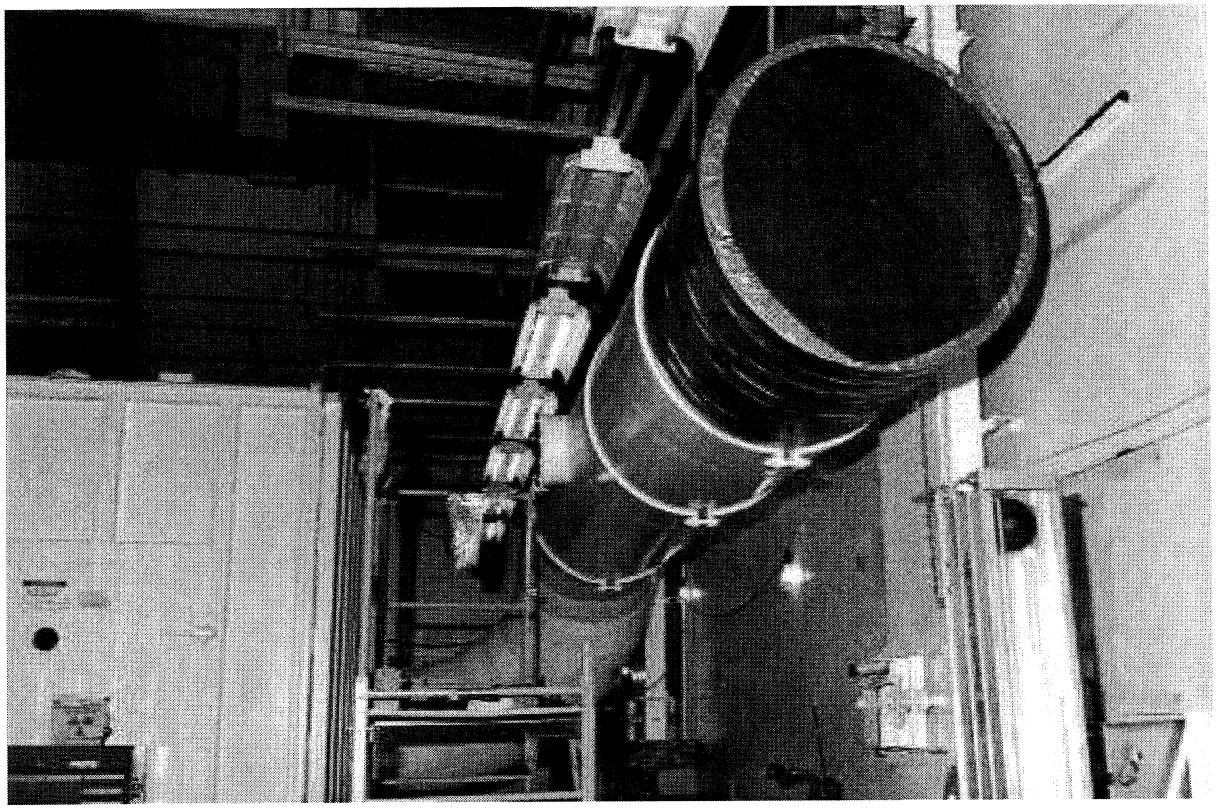

Photo 6 – Decontamination And Decommissioning Of Duct

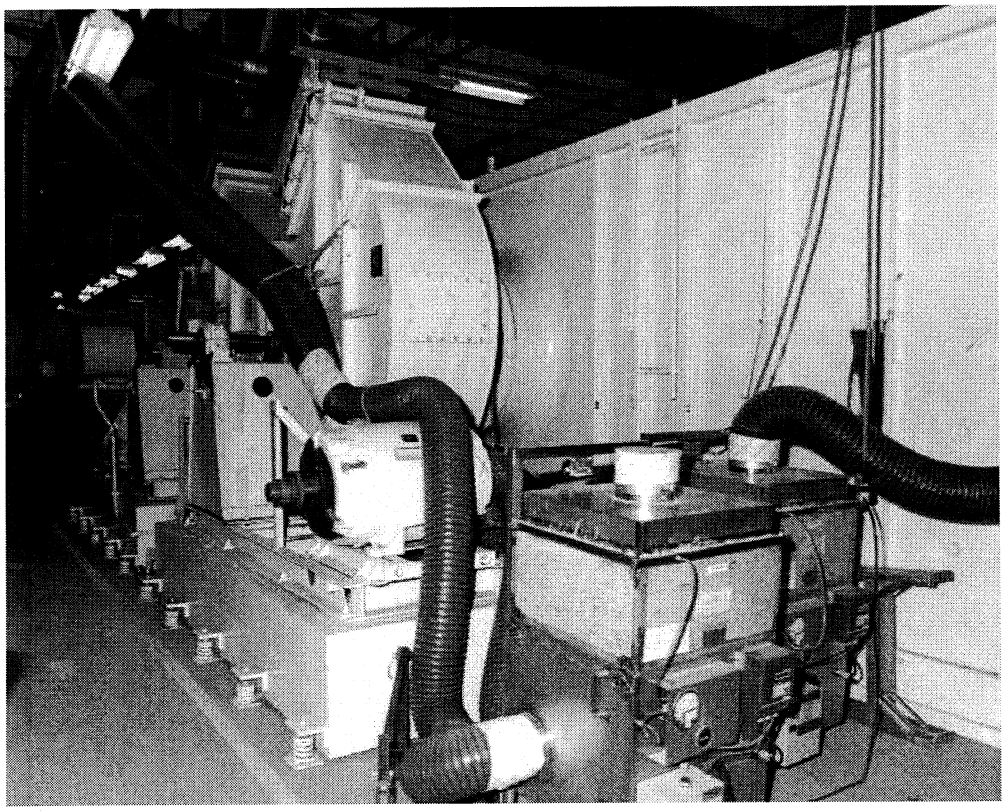

Photo 7 – Portable Exhaust Unit

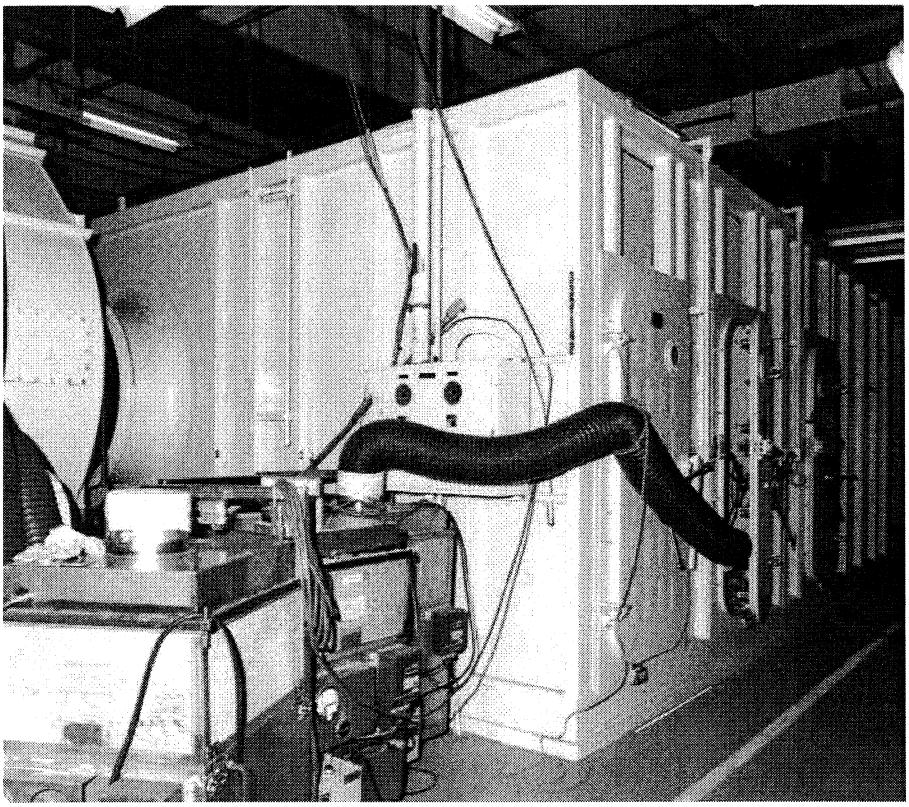

Photo 8 – Portable Exhaust Unit

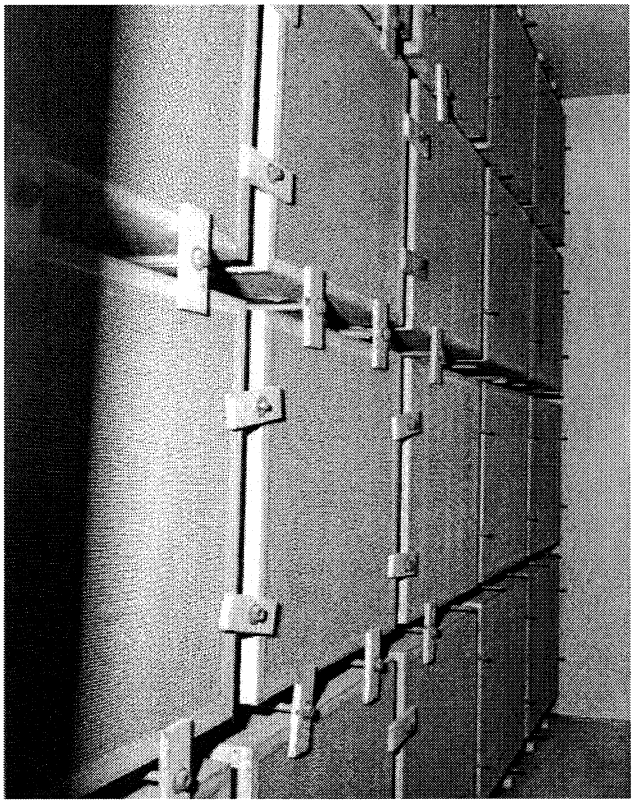

Photo 9 – HEPA Filters

Photo 10 – Bagged HEPA Filters

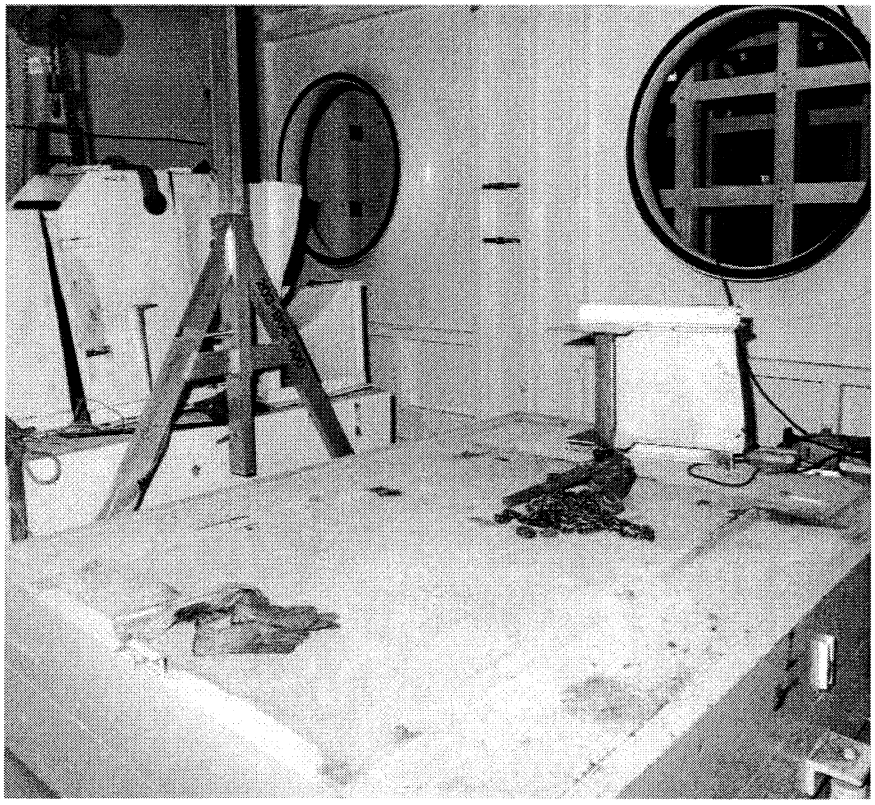

Photo 11 – Exhaust Fan Removal

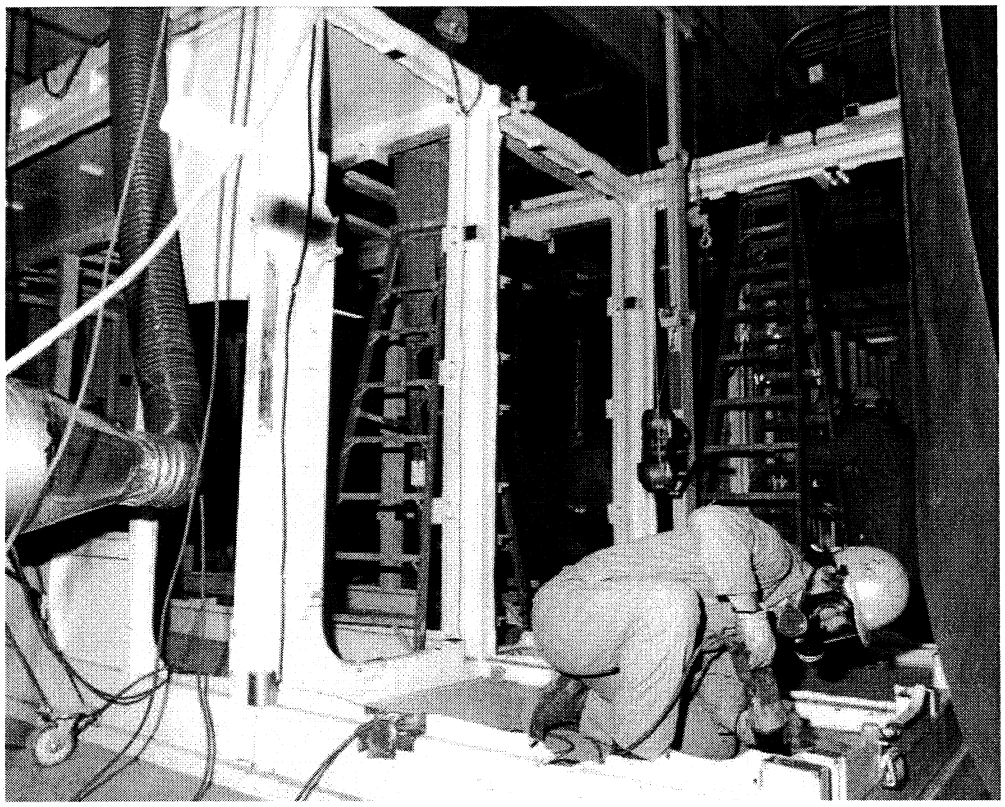

Photo 12 – Non-Contaminated Plenum Demolition

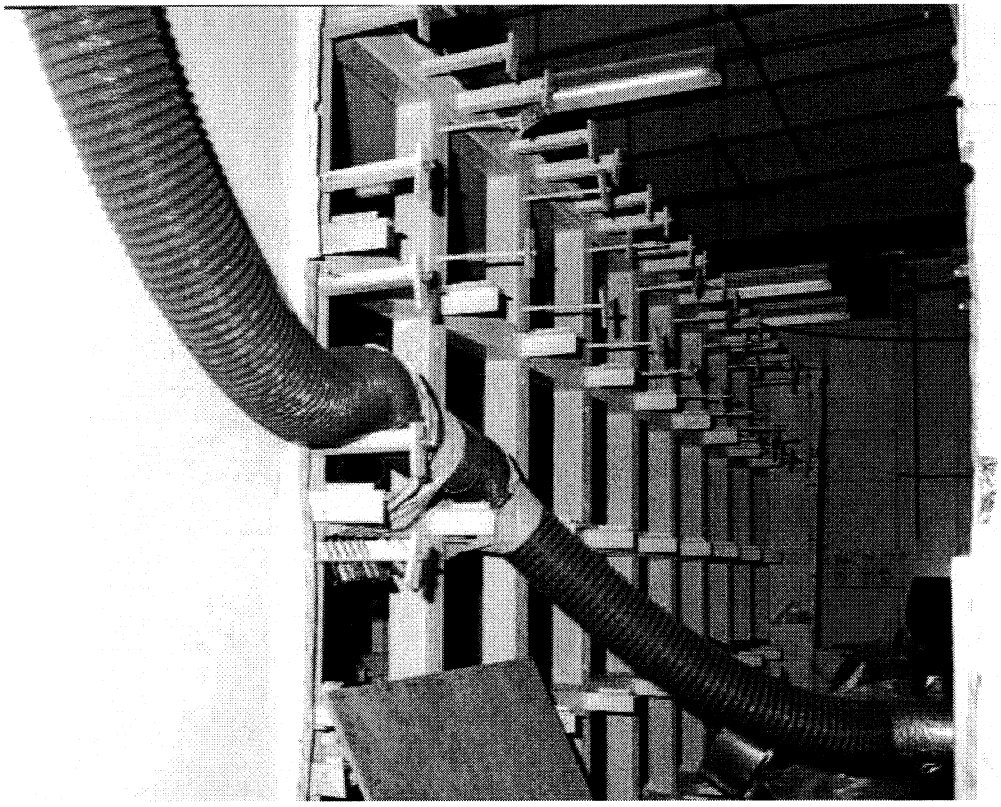

Photo 13 – Non-Contaminated Plenum Demolition

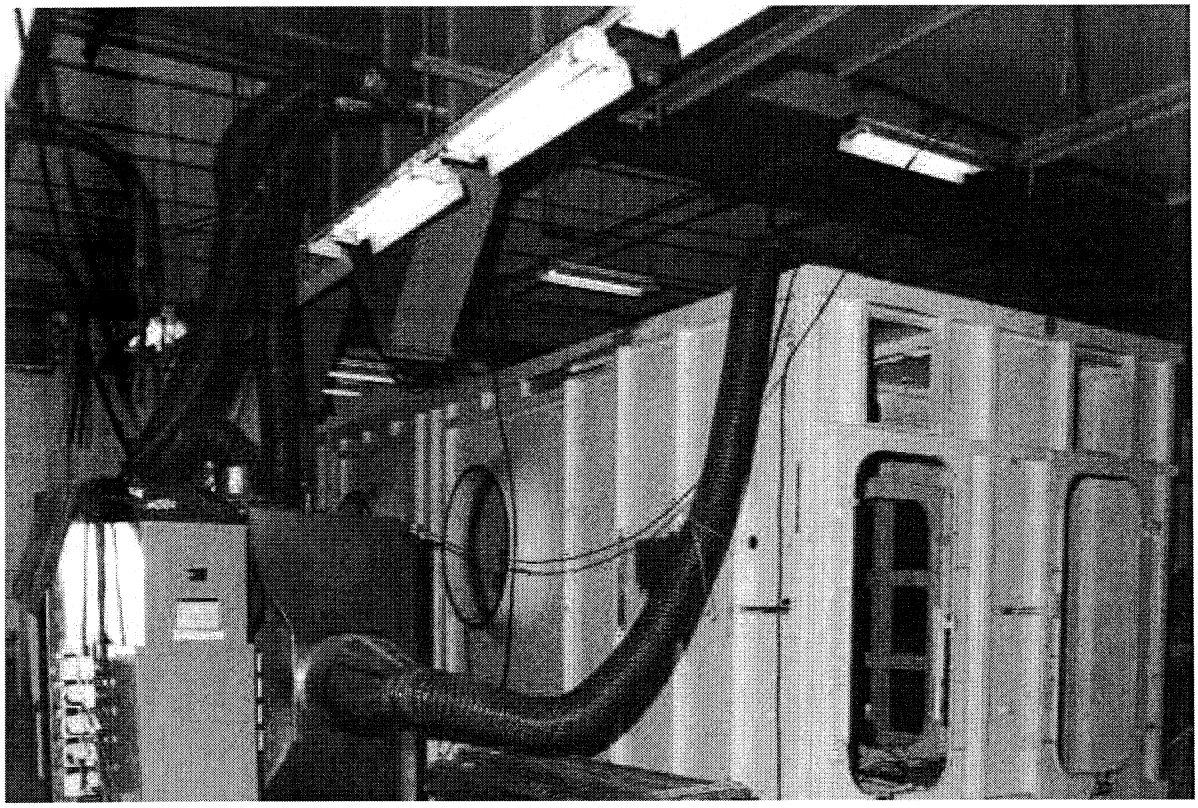

Photo 14 – Non-Contaminated Plenum Demolition

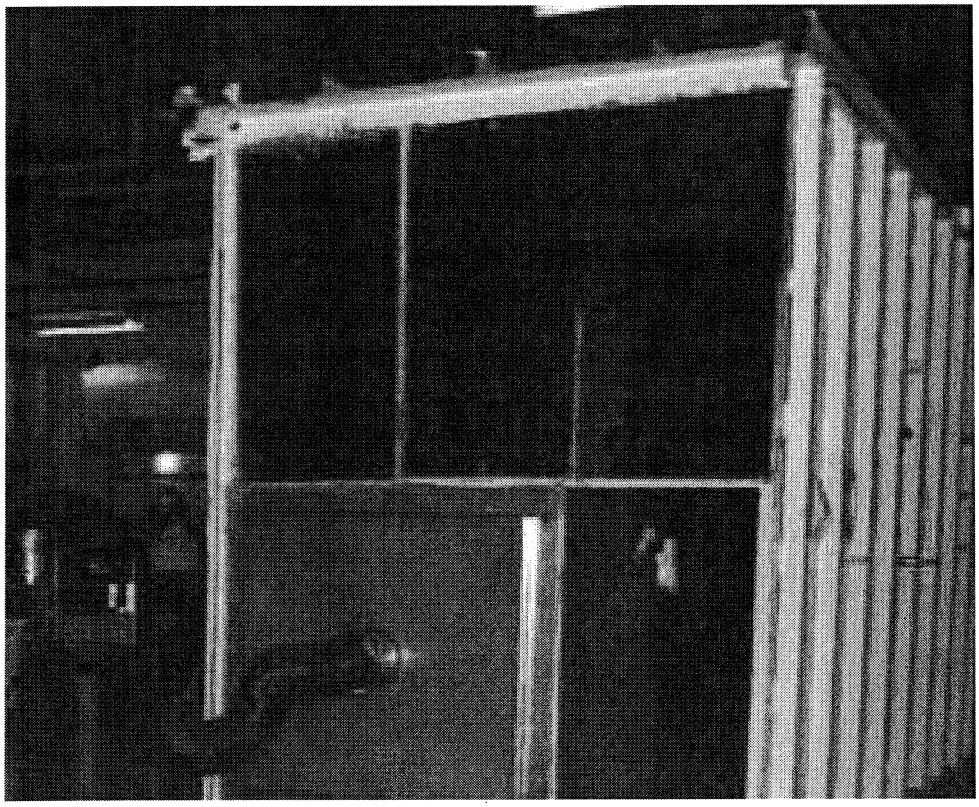

Photo 15 – Exhauster Connection to Contaminated Plenum

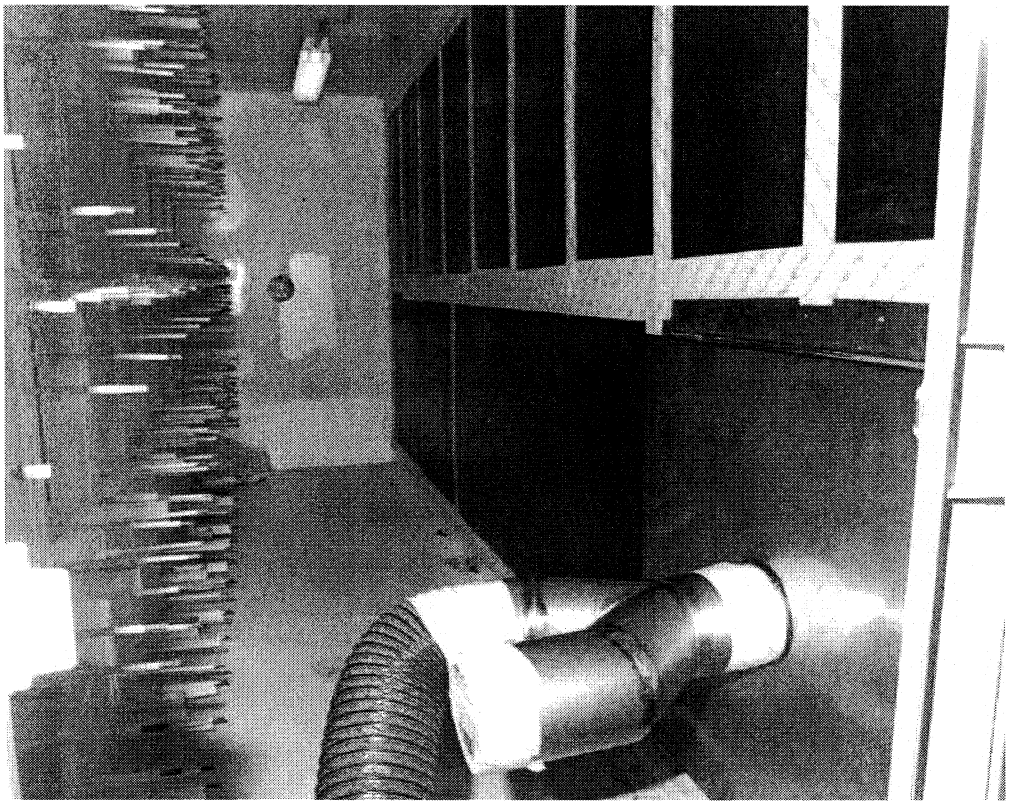

Photo 16 – Exhauster Connection to Contaminated Plenum

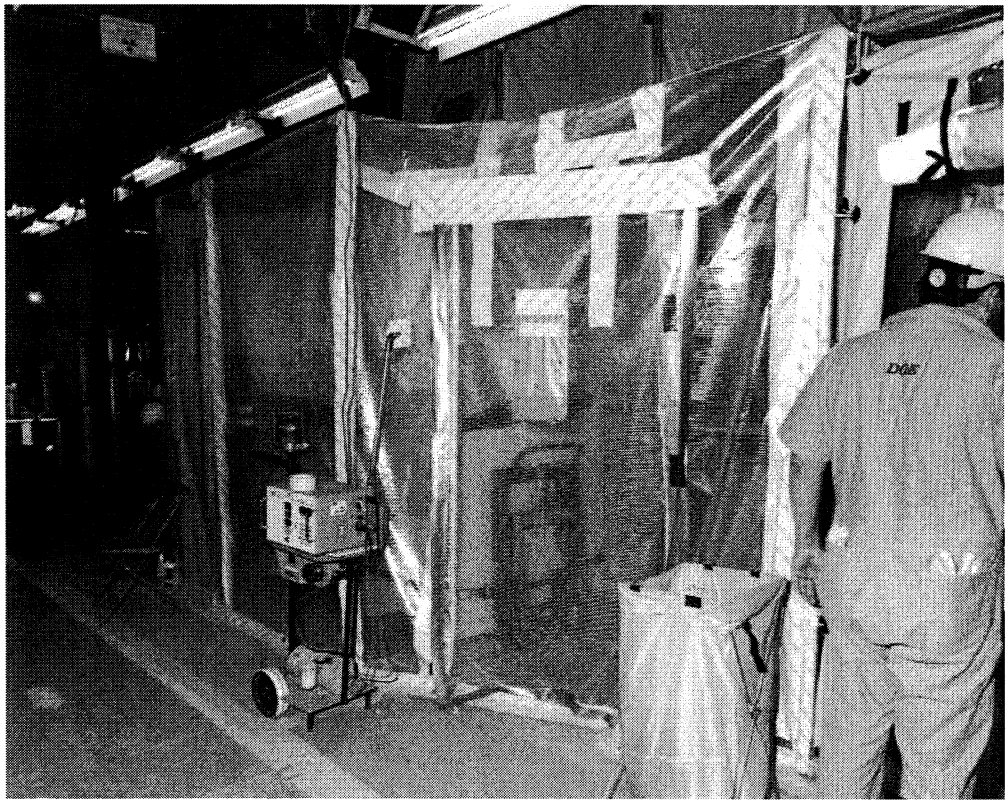

Photo 17 – Plastic Enclosure Around Contaminated Plenum

Photo 18 – Plastic Enclosure Around Contaminated Plenum

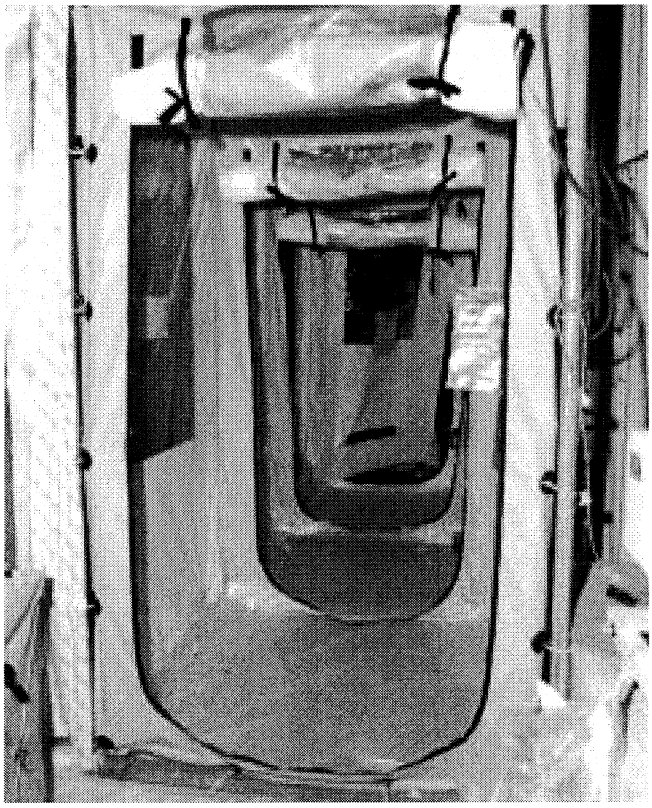

Photo 19 – Airlock To Enclosure

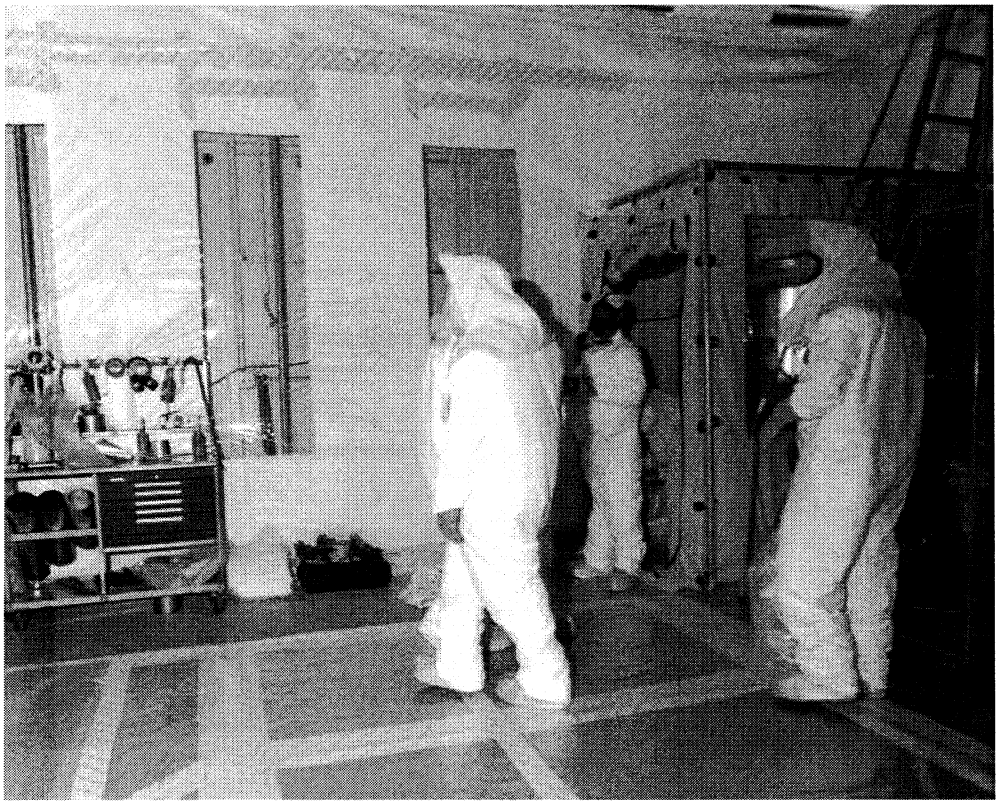

Photo 20 – Airlock To Enclosure

Photo 21 – Contaminated Plenum Demolition

Photo 22 – Contaminated Plenum Demolition

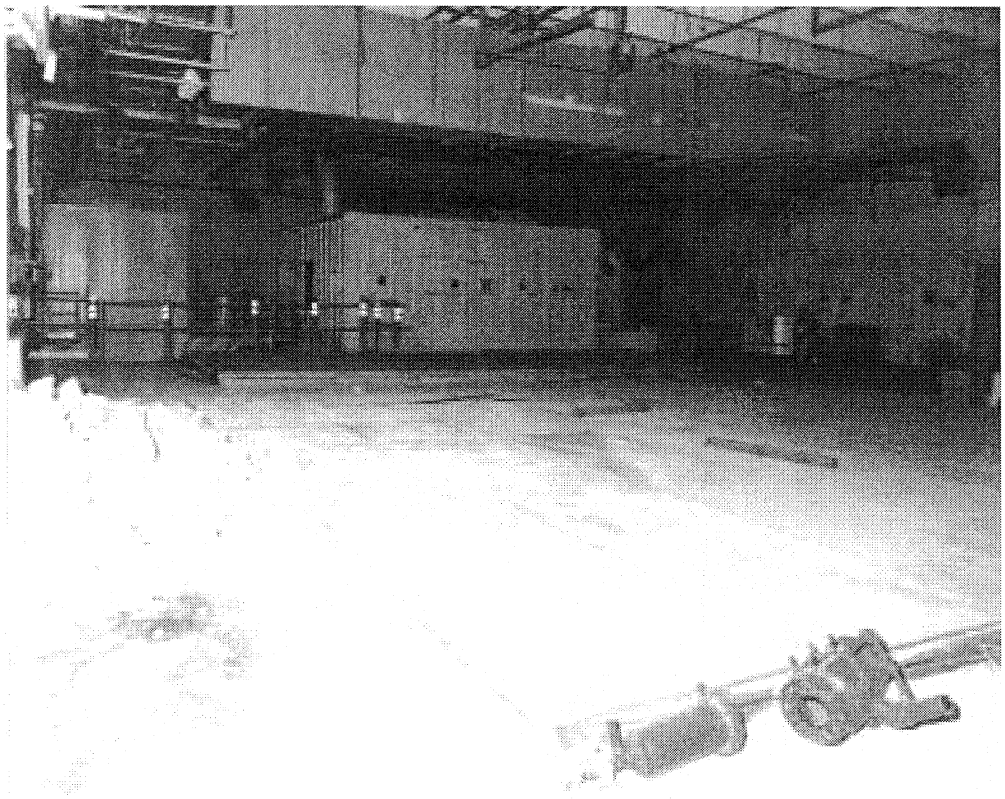

Photo 23 – Plenum 401 And 402 Removed

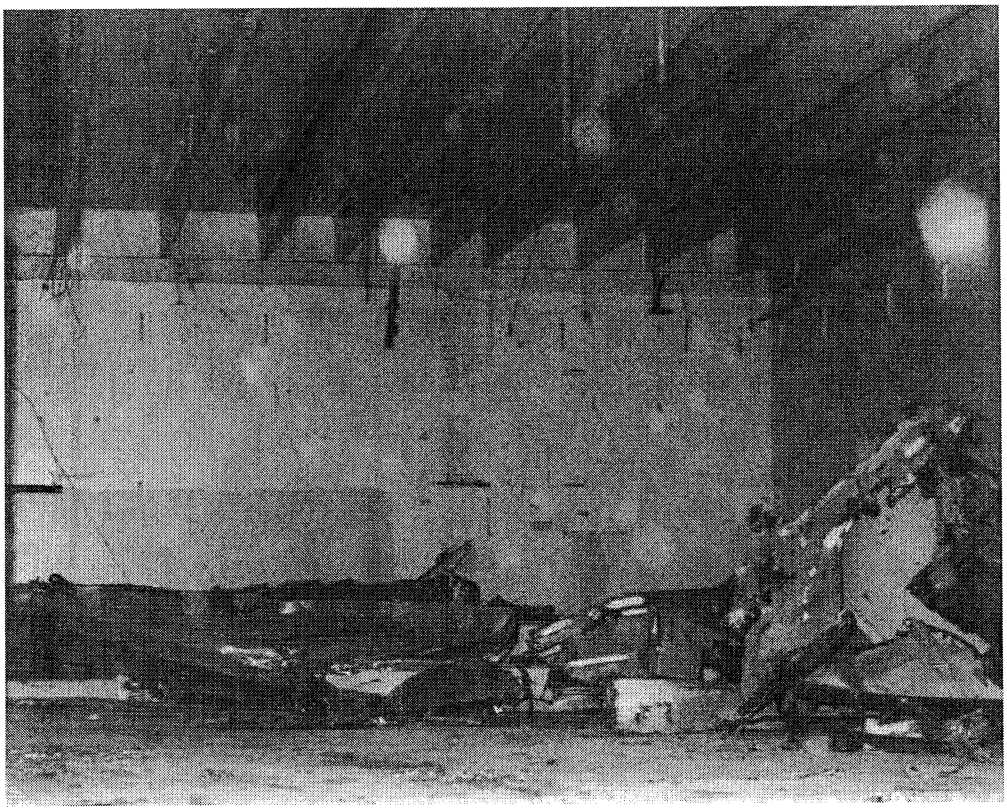

Photo 24 – Supply Plenum Demolition

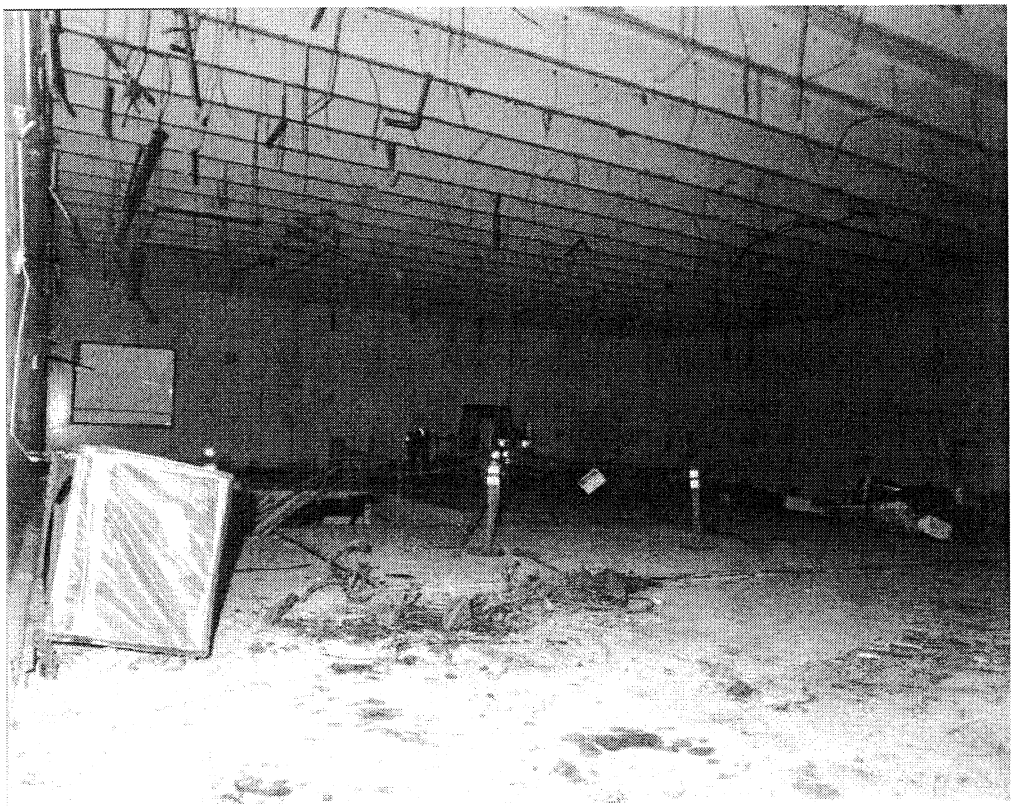

Photo 25 – Building 782 Demolition

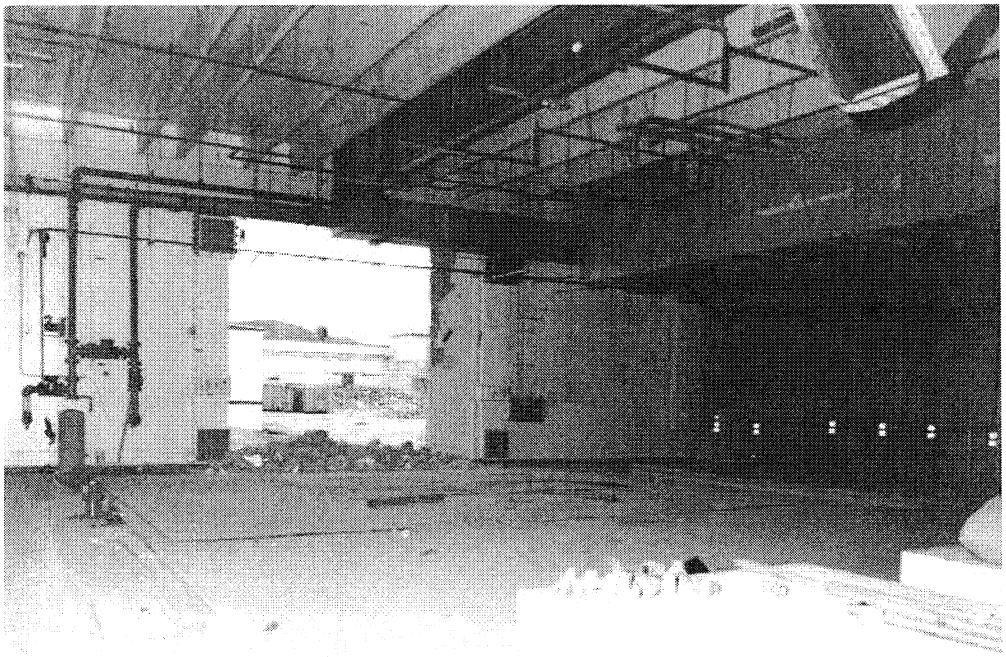

Photo 26 – Building 782 Demolition

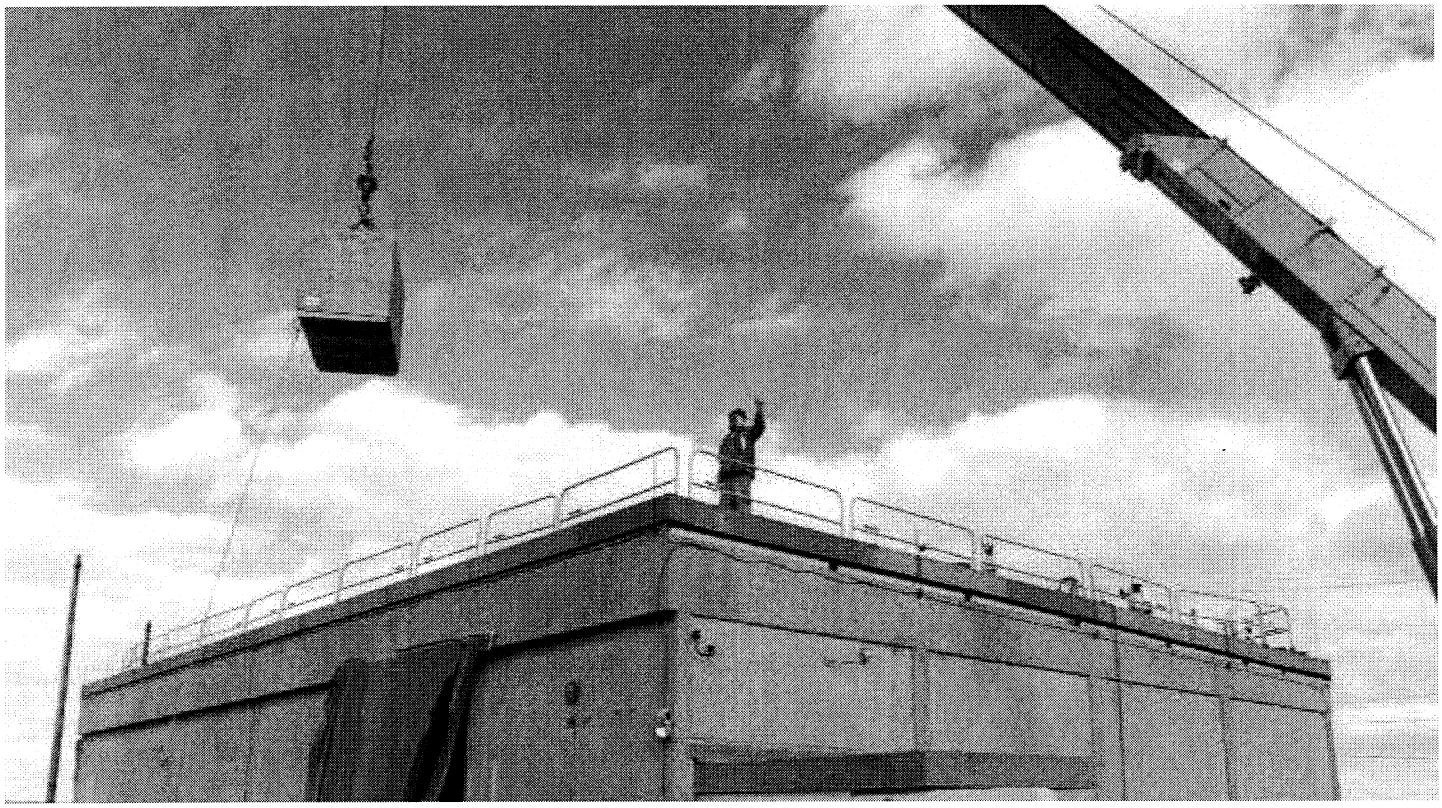

Photo 27 – Waste Crate Removal

Equipment Demolition

Internal equipment and components were removed and asbestos was abated from Building 782. In-process contamination surveys identified that three areas of Building 782 were contaminated. The Building 782 roofing material was found to have fixed radioactive contamination and was removed and packaged prior to demolition. The building was demolished and the building rubble transported and stored on site. The Building 782 foundation slab was left undisturbed. (Photo 28)

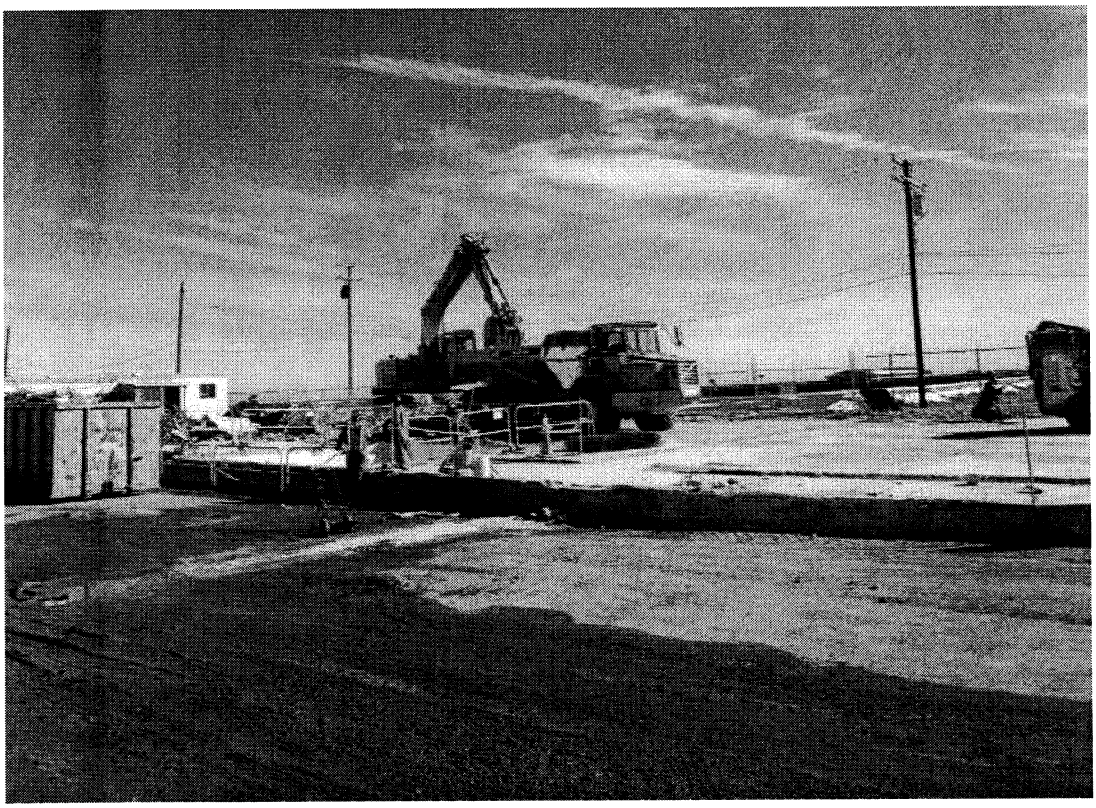

Photo 28 – Building 782 Foundation Slab After Demolition

Pipe and conduit openings in the Building 782 slab were plugged and grouted at the foundation level. Process waste piping penetrations were covered with metal plates that are fastened to the foundation. (Figure 3) After the Building 782 structure was removed, a cover was constructed over the Building 782 pit. The pit cover is constructed so that the groundwater migration into the Building 782 pit can be sampled and removed. Preliminary data has been obtained from water samples that have been collected from this pit. The groundwater infiltrate will be sampled on a periodic basis.

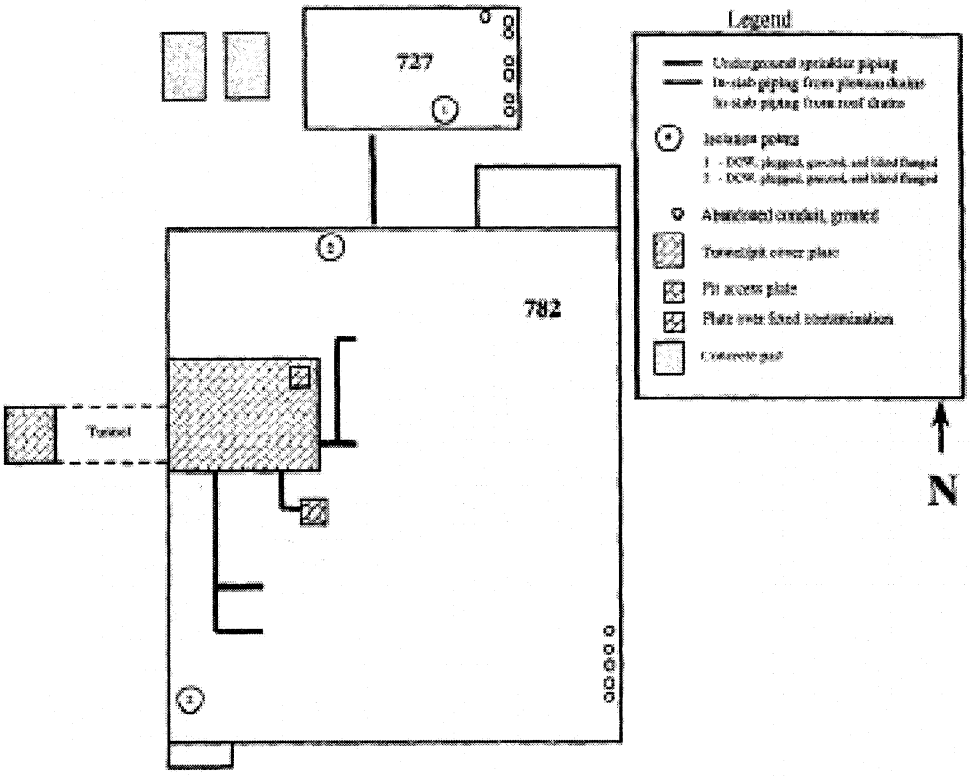

Figure 3 – Building 782 Foundation Slab Details

Goals Met

These accomplishments were completed while the project maintained an excellent safety record and experienced no unplanned releases to the environment. The scheduled completion date for demolition of the 779 Closure Project facilities was June 2000. Actual completion of the demolition activities was February 18, 2000.

Treatment Processes

No RCRA treatment processes were utilized within the 779 Cluster Closure Project. Processes were initiated to fix radioactive contamination in equipment and building systems in order to minimize the potential for airborne radioactivity and worker risk through contamination.

Radiological Analysis and Survey Results

At the onset of the 779 Cluster Closure Project, a Reconnaissance Level Characterization (RLC) was performed on those buildings within the Cluster in order to plan Decontamination and Demolition (D&D) activities and to provide input to the Final Status Survey Design.

Building 782 Ventilation Tunnel and Basement

The Building 782 basement and tunnel surfaces were surveyed and found to be below the DOE Order 5400.5 limits. A small sump located in the northwest corner of the basement receives groundwater infiltrate. Isotopic analysis of the groundwater collected from the sump indicates radiological levels in excess of RFCA Tier 1 limits. The sump currently fills at a rate of 100 gallons per day.

Building 782 Slab

The Building 782 slab was decontaminated to levels less than the DOE Order 5400.5 limits. Contamination process drains penetrating the foundation slabs were filled to grade with grout. Large penetrations, such as drain clean-outs, were covered with metal prior to demolition to maintain the integrity of the grout. The plates will remain in place until the Environmental project files copies of the 779 DOP and modifications can be found in the CERCLA Administrative Record.

Conclusion

The successful completion of the decontamination and demolition of contaminated exhaust plenums in the 779 Project has set the stage for all future plenum work at the Rocky Flats Environmental Technology Site.

Acknowledgement

I wish to express my appreciation to Messrs Michale Stark and Arthur Stithem for their assistance.