233-S PCF Demolition Project

RadCon practices and techniques

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The 233-S Facility

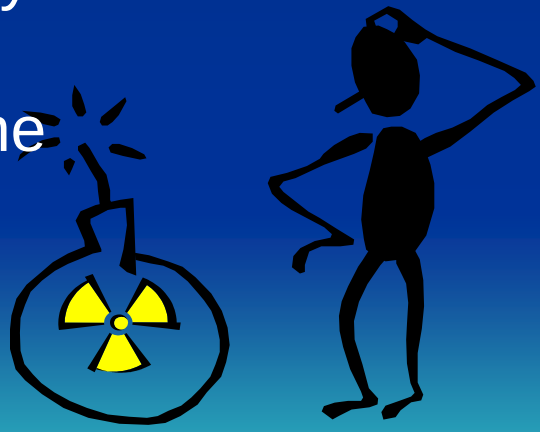
- Located North of the 202-S “Redox” Facility.
- The process area was a reinforced concrete structure 37 feet high, 86 feet long and 43 feet wide with twelve-inch walls and six-inch thick floors.
- The non-process areas were a single story structure with eight-inch walls and six-inch thick floors.

Existing Conditions

- In 1956 a spill of approximately 32 grams of plutonium solution caused extensive contamination of the facility, including outside areas.
- In 1963 a fire spread gross alpha contamination to all areas of the facility, including the outside roof area.
- Major Decon activities occurred from 1978 to 1981. Stabilization of the facility was completed in 1987.
- Dismantlement and removal of process equipment began in 1996. Contamination levels range from 2,000 d/m/100 cm^2 to greater than 20,000,000 d/m/100 cm^2.

D&D Radiological Control - The Challenge

- Different Than Nuclear Operations
  - Contamination control and monitoring is much more difficult when demolishing facilities
    - Removing walls creates a lack of containment
    - Weather conditions affect the ability to monitor contamination (e.g., detecting alpha contamination in the rain)
    - Temporary facilities and dressing rooms are used



D&D Radiological Control – The Solution

- Apply Innovative Techniques To Maintain Radiological Control While Still Meeting Requirements

Innovation With 233-S Demolition
Contamination Control

Grout/Section/Remove	Shear Only
•Requires massive equipment •Impractical for location •Unacceptable cost/schedule	•Cont. Area >300 M (386 ft.) •Least cost
Shear w/Containment Tent	**Shear w/Controlled Demolition**
•Expensive •Personnel risks •Did not demonstrate open air	•Cont. Area manageable 40 M (131 ft.) •Existing equipment available •Acceptable cost/schedule

Radiological Planning

- Extensive interfacing with D&D Operations, Waste Management, and demolition vendors is needed in order to establish an effective contamination control program while allowing efficient personnel and vehicle access.
- Planning and execution of an effective decontamination program is a vital part of the process.

Radiological Planning

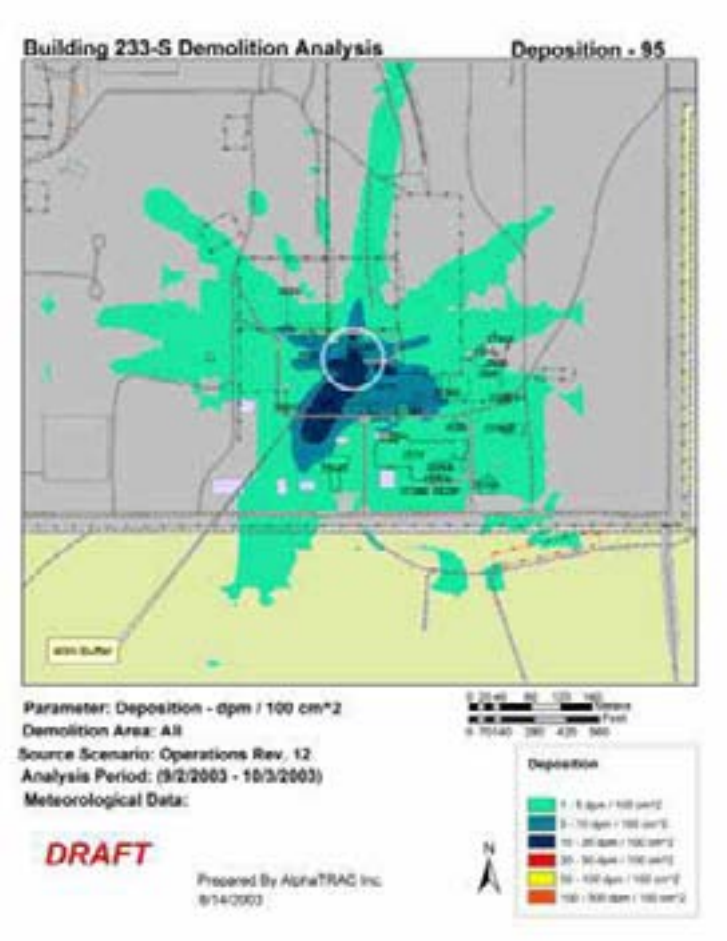
- Establishment of routine sample points at the CA/RBA boundary allows the detection of low level contamination in time to effect remediation efforts without impacting demolition activities.

Radiological Planning

Continuous monitoring of Airborne contamination levels is a necessity.

- Four Canberra “Alpha Sentry” Continuous Air Monitors provided real time remote monitoring.
- A portable Eberline Alpha-5 monitor provided spot monitoring.

Radiological Planning



- Atmospheric dispersion modeling can provide a pre-demolition estimate of releases of radioactive material and assist in site boundary planning.
- No indication of spread beyond boundary

Administrative Controls

- A control point desk at the demolition area access point allows on the spot decisions to expedite job flow.

Administrative Controls

- All personnel were issued radios to allow rapid and effective communication.

Administrative Controls

- Keeping non-essential personnel outside of the work area prevents over tasking both radiological and operational resources.

Engineering Controls

- Whenever active demolition was paused, the application of fixatives to the demolition site mitigated the windborne spread of radioactive material.

Engineering Controls

- Misting Nozzles were installed on the Shear and bucket to mitigate the spread of airborne contamination at the source.

Engineering Controls

- Fog Canons provide an effective way to further limit the spread of airborne contamination during active demolition.

Engineering Controls

- In order to expedite the release of transport vehicles, a clean pathway to the ERDF Box was created using disposable plastic sheeting.

Engineering Controls

- The application of plastic wrap allowed highly contaminated areas of contamination exposed during cutting to be rapidly fixed prior to packaging.

Mockups – A vital tool.

- Utilizing Mockups and walk downs allowed workers to solve problems and refine procedures in a safe environment, saving time and exposure in the demolition zone.

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Problems and Solutions

Excessive Wind Speeds

- Wind speeds in excess of 65 mph were recorded at the demolition site. Although the application of fixatives prevented the spread of contamination, equipment tents did not fair so well.
- “Hardening” of the tents to survive higher winds speeds was necessary.

Problems and Solutions

Temperature Extremes

- Temperatures, both Hot and Cold, became a limiting factor for work activities.

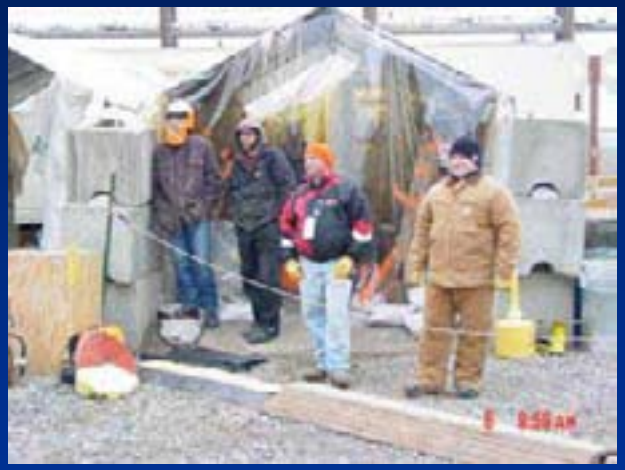
Problems and Solutions

High Temperatures reached 112°

- A work/rest regimen based on WBGT index was used.
- Evaporative coolers were located in worker cool down areas.

Problems and Solutions

Low Temperatures reached -14°



- Cold weather gear was issued to all outside workers.
- Modifications were made to existing RWPs to allow workers to wear cold weather gear under their protective clothing.
- A heated staging area was built to allow workers to remain warm without leaving the area.

Problems and Solutions

Change Trailer Size

- The size of the change trailer was inadequate for the number of personnel entering and exiting the area.
- The level of PPE required for entry into the demolition area required the presence of additional personnel to assist workers.
- A new trailer was procured and configured based on feedback from the workers in the field.

Expect The Unexpected

Contaminated Paint Flaking Off Pipes

Pipe With Legacy Nitric Acid…Found When Cut

Beginning to End

- Demolition commenced October 22nd, 2003.
- Slab on Grade was achieved April 30th, 2004

The Final Steps.

- June 3rd, 2004 - A worker levels the clean gravel fill in preparation for pouring the final grout cap.
- June 8th, 2004 - The final concrete cap is poured.

Lessons Learned

- D&D Experience May Be Hard To Find
- Use All Available Resources
  - DOE Complex
  - Vendors
  - ALARA Center
  - HAMMER
- ALARA Is An Ongoing Process
- Don’t Underestimate The Impact Of Environmental Condition
- Have The Right Equipment At The Beginning
- Tailor Radiological Monitoring To The Project
- Look For Innovative Contamination Control Techniques

Summary

- Plan Carefully
- No Two Projects Are The Same
- Listen To Co-Workers
- Use Responsible Innovation
- Keep An Open Mind and...Always Expect The Unexpected

The End