

Technology Application and Lessons Learned from ORNL Fuel Facility D&D

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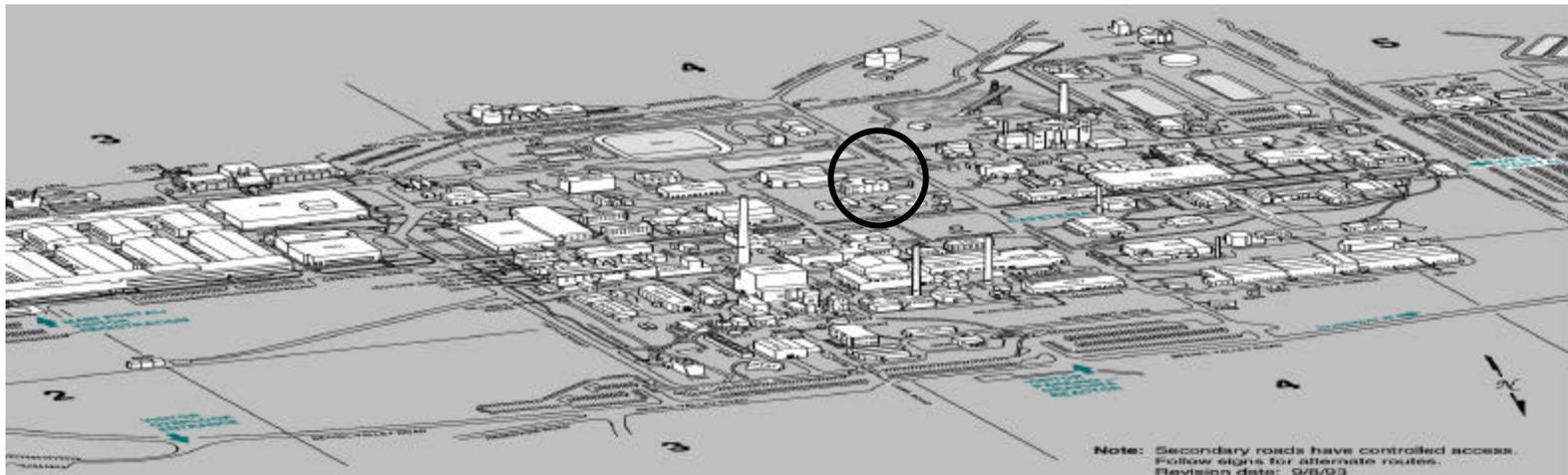
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Project Description

D&D of ORNL Metal Recovery Facility (Building 3505)

- D&D of a small-scale PUREX nuclear fuel reprocessing plant (1952-1960) in “downtown” ORNL
 - Removal of all above-ground structures
 - Stabilization of below-ground pits and drains
 - Interim capping pending site-wide subsurface remediation plan.

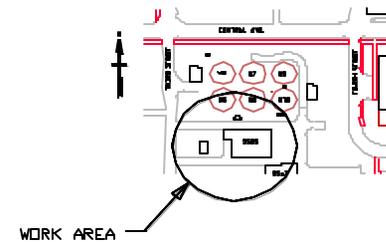
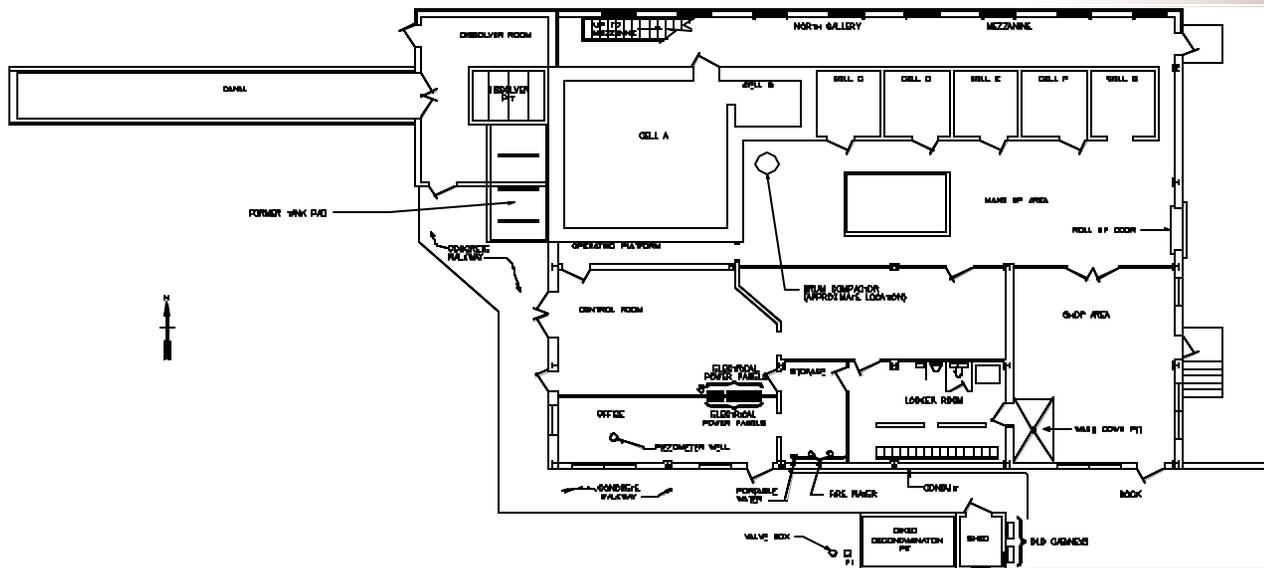


Building 3505 Description

- **Primary features:**
 - ~10,000 ft² concrete & steel facility
 - Seven concrete hot cells
 - Below-grade dissolver pit and fuel transfer canal
 - Support facilities (Control Room, offices, Locker Room, adjacent storage building, etc.)



ORNL Building 3505 Floor Plan



Building 3505 Facility Conditions

- Highly contaminated hot cells (U, Pu, NP, Am, Sr, Cs, Tc)
 - up to 1M dpm/100cm²
 - TRU 90-100 nCi/gm
- Asbestos, PCBs
- Deteriorated structure and roof



Major Project Challenges



- Maintain worker safety
 - Minimize rad/chemical exposure
 - Maximize facility safety for D&D work
 - Optimize safe work design
 - Design ease of execution into work
 - Minimize PPE that interferes with safety
- Prevent uncontrolled release during facility demolition

Primary Objective: Sufficient Decon to Facilitate Safe D&D Work



- Reduce / stabilize loose surface
 - Reduces worker exposure potential
 - Reduces PPE requirements
 - Reduces possibility of release in downtown ORNL
- Large interior surface area of $\sim 100,000$ ft²
(~ 2.5 acres)

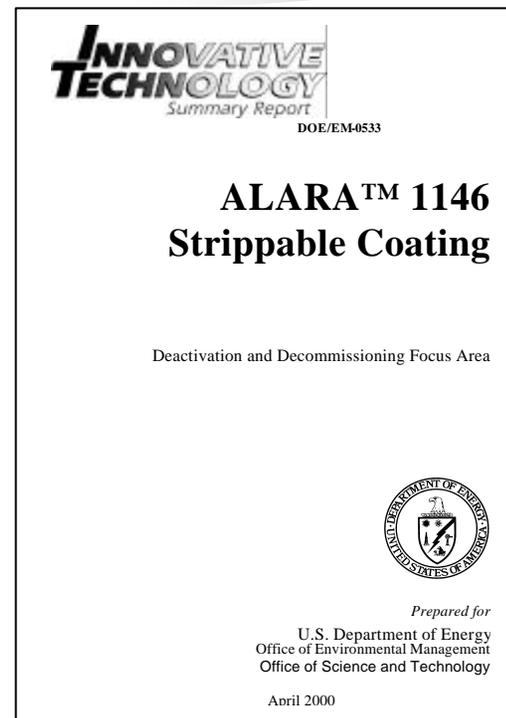
Decon Technology Selection Criteria



- Ease of execution for workers
 - minimize exertion in a difficult environment
 - minimum training/skill development required
 - forgiving over a wide range of conditions
- Low hazard execution
- Low waste volume
 - Minimize secondary liquid waste
- Low capital investment

Selected Decon Technology

- Strip Coat Decon
- Recently demonstrated technology under similar conditions with 80% to 85% contamination reduction (DFs = 5 to 7)



Strip Coat Application Results



- Contamination reduction exceeded expectations.....
 - General Low Contamination areas: DFs from 5-10
 - General High Contamination areas: DFs from 10-20
 - Hot Cells and Hot Spots: DFs up to 160 alpha and
1400 beta/gamma
- Low Contamination areas reduced to Fixed CAs
- High Contamination areas reduced to Low CAs
- Hot Cells downgraded from High CA supplied breathing air required to standard negative pressure respirators

Strip Coat Application

- Strip coat effectively applied over a wide range of conditions:
 - Temps from 25°F-70°F
 - Wet to dry conditions
 - Painted/unpainted surfaces
 - Steel, wood, concrete, plastic, debris, etc.



Strip Coat Success: Bottom Line.....

- Loose contamination was removed/stablized
- Worker exposure opportunities reduced
 - Added benefits: Less PPE / less body stress
 - Higher work productivity
- Risk of environmental release lowered
 - Scale back on design of demolition enclosure
- ***Reduced cost: savings estimated @ \$ 40-50K***



Hot Cell Demolition Technology Selection



- The challenge:
 - Concrete walls up to 2 feet thick
 - High levels of contamination remain up to 4”-5” deep

.....therefore, the hot cell walls remain a significant source term and worker exposure hazard during demo.
- The ideal solution:
 - Remote controlled demolition equipment

Hot Cell Demolition Technology Selection

- Track-mounted, pendant-controlled, mobile telescopic boom machines
- Compact, low-profile with long reach and swing
- DOE-sponsored test demonstration March 2000



Technology can provide great tools -- but remember the ISMS basics.....



- **ISMS Lesson:**
 - Configuration management of work control documents (change control) is vital to optimizing the work conditions to allow a zero-accident project
- *Practical Lesson:*
 - While technology application (and the inherent planning that goes with it) can reduce risk on high hazard jobs, don't drop your pants on the perceived low risk work – inadequate planning there can cause equally serious problems as high hazard work.....

Conclusion



The risk associated with effectively deploying a new, tested technology is typically small – and the reward can be significant:

.....enhanced worker safety and improved effectiveness of execution for projects with high hazard D&D work.