Decommissioning Case Studies

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Ford Nuclear Reactor

Stephen Giebel & Theodore Smith
NRC Reactor Decommissioning Branch

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Michigan Memorial Phoenix Project – Ford Nuclear Reactor

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Site History

- May 1959 – 3,600 gallon (13,500 L) pool water leak through beam port
- May 1961 – 1st & 2nd floors contaminated with Ag-110m
- June 1963 – Beam port collimator leak, contaminating 1st floor
- Sept 1967 – Fuel element failure identified by air sampling
- Oct 1967 – Ventilation system contaminated
- Oct 1971 – Argon-41 release due to beam port flooding
- Jan 1977 – Pneumatic tube failure releases fission products
- Dec 1977 – New pneumatic system generates airborne release
- April 1987 – Spill of 1 quart (1 L) of heavy water on 3rd floor
- Jan 1989 – Fuel element failure identified by pool water chemistry
- Nov 1991 – Fuel element failure identified by air monitoring
- July 1993 – 7,500 gallons (28,000 L) of low level radioactive water released through building foundation drain over 36 days
- May 1998 – 75 gallons (280 L) pool water leak from resin column
- March 2001 – 3rd floor contaminated by flux measurement device

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Located in Ann Arbor, Michigan

- 2 MW (thermal) heterogeneous core open pool reactor
- Integrated lifetime power = 17,868 MW-days.

Regulatory Milestones

- 1957 – Reactor operations begin
- July 2003 - Shutdown
- December 2003 - Fuel shipped to US Department of Energy
- June 2004 – Decommissioning Plan (DP) submitted
- January 2006 – Revised DP submitted, D&D begins
- October 2007 –major structures removed, incl pool wall & floor
- December 2007- Last waste shipment completed
- April 2011 to Sept 2012 (8 total) - Partial Survey Plans Submitted
- October 2012 - partial survey plans approved by NRC

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Schedule

- Nov - Dec 2012 - Final Status Surveys
- Dec 3-7, 2012 – Confirmatory Surveys
- Early 2013 – Submit remaining survey plans (subsurface areas)
- Spring 2013 – NRC approve subsurface survey plans
- Late 2013 Terminate License

Cost Estimate = $14,400,000 US ($9,800,0000 est.)

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Cost Overrun Factors

– Total overrun = $4,600,000 US

1. Concrete removal of reactor pool walls & floor
   - Based on *proposed facility reuse*
   - Cutting and removal of 10,500 feet^3 (~300 meter^3) of high density concrete
   - Effort increased due to embedded components
     - Capped pipe containing lead shot
     - Unanticipated piping and conduit runs
     - Movement of structural materials during cutting
   - Added time & effort cost = $1,750,000

Cost Overrun Factors

2. Waste Disposal Costs
   - One low level waste facility in US
   - Market rates changed after initial estimate
   - Initial estimate excluded rigging cost for concrete block loading
   - Added cost = $1,100,000 US
3. Increased oversight, decreased productivity, & delays
   - Thermal column assembly conditions
   - Insurance requirements
   - Reactor pool draining delays
   - Added cost = $1,150,000 US
4. Contingency added = $600,000 US

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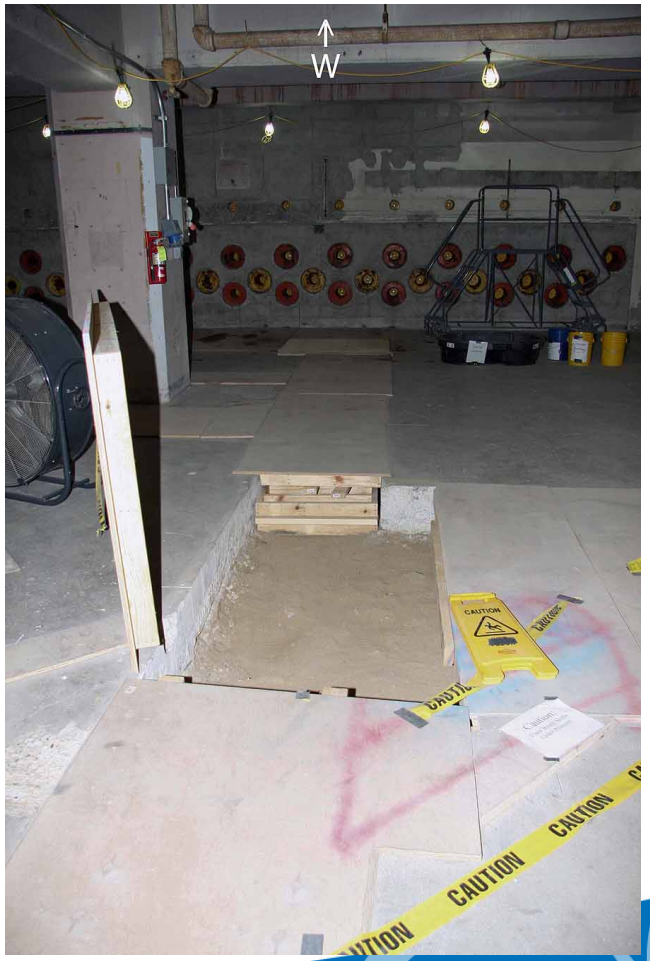

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