Tank Closure Progress at the Department of Energy's Idaho National Engineering Laboratory Tank Farm Facility

Presentation to the National Academies Committee on Development and Implementation of a Cleanup Technology Roadmap

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Relatively Small Tank Farm Facility

- A system of 11 underground, 300,000-gallon stainless steel tanks
  - Eight tanks constructed with cooling coils inside to remove radioactive decay heat from highly radioactive wastes
  - Three tanks without cooling coils
  - Tanks are fifty feet in diameter and ~ twenty-five feet tall
  - Each tank has ~ three riser locations available to deploy cleaning equipment – twelve inches in diameter
- Each 300,000-gallon tank is surrounded by a concrete vault for secondary containment
- Four smaller, 30,000-gallon stainless steel tanks were also used for storage (taken out of service in the early 1980s)
- Only four 300,000-gallon tanks being used for storage of tank waste, awaiting waste treatment

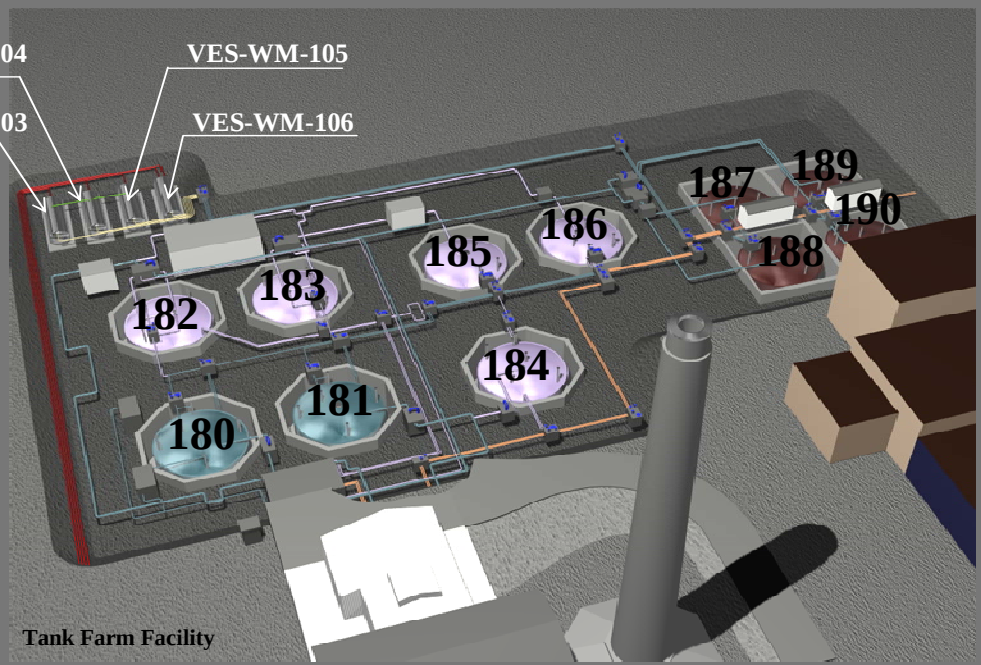
Idaho Tank Waste

- Several types of waste have been stored in tank farm:
  - Reprocessing wastes (1st, 2nd, 3rd cycle wastes)
  - Decontamination solutions from cleanup of equipment and facilities
  - Laboratory wastes
  - Spent fuel basin water treatment discharges
  - Off-gas cleanup scrub solutions
  - Condensate from tank farm transfer equipment
  - Contaminated facility sump water
  - Other low activity miscellaneous plant wastes
- Segregation in tank farm by activity level/chemistry
- No neutralization of reprocessing wastes required - stainless steel tank farm tanks - tank wastes maintained acidic
- Evaporator systems used to minimize needed storage space
- ~9 million gallons of waste sent to tank farm over history

General Characteristics of Tank Waste

- Approximately 900,000 gallons remain in three operational tanks – termed "Sodium-bearing waste" - to be treated in 2009 - 2011
- Waste is a highly acidic liquid (~ 1-3 molar H^+)
- Slightly more dense than water (Specific Gravity ~ 1.3)
- The waste is quite homogenous – no distinct "layering" inside the tanks
- A volume of solid particles exists on the bottom of tanks in use for storage
  - The solids form a layer on the tank bottoms
  - Solids are typically light and relatively easy to move
- Along with the radioactive constituents, the SBW contains constituents identified as "hazardous" under the RCRA - acid, metals, trace organics, requiring regulation by the State of Idaho
- The waste is quite different from tank wastes at DOE's Hanford and Savannah River sites (not caustic; no saltcake)

INTEC TANK FARM CLOSURE



- Octagon Vaults: WM-180, WM-181
- Pillar and Panel Vaults: WM-182, WM-183, WM-184, WM-185, WM-186
- Square Vaults: WM-187, WM-188, WM-189, WM-190

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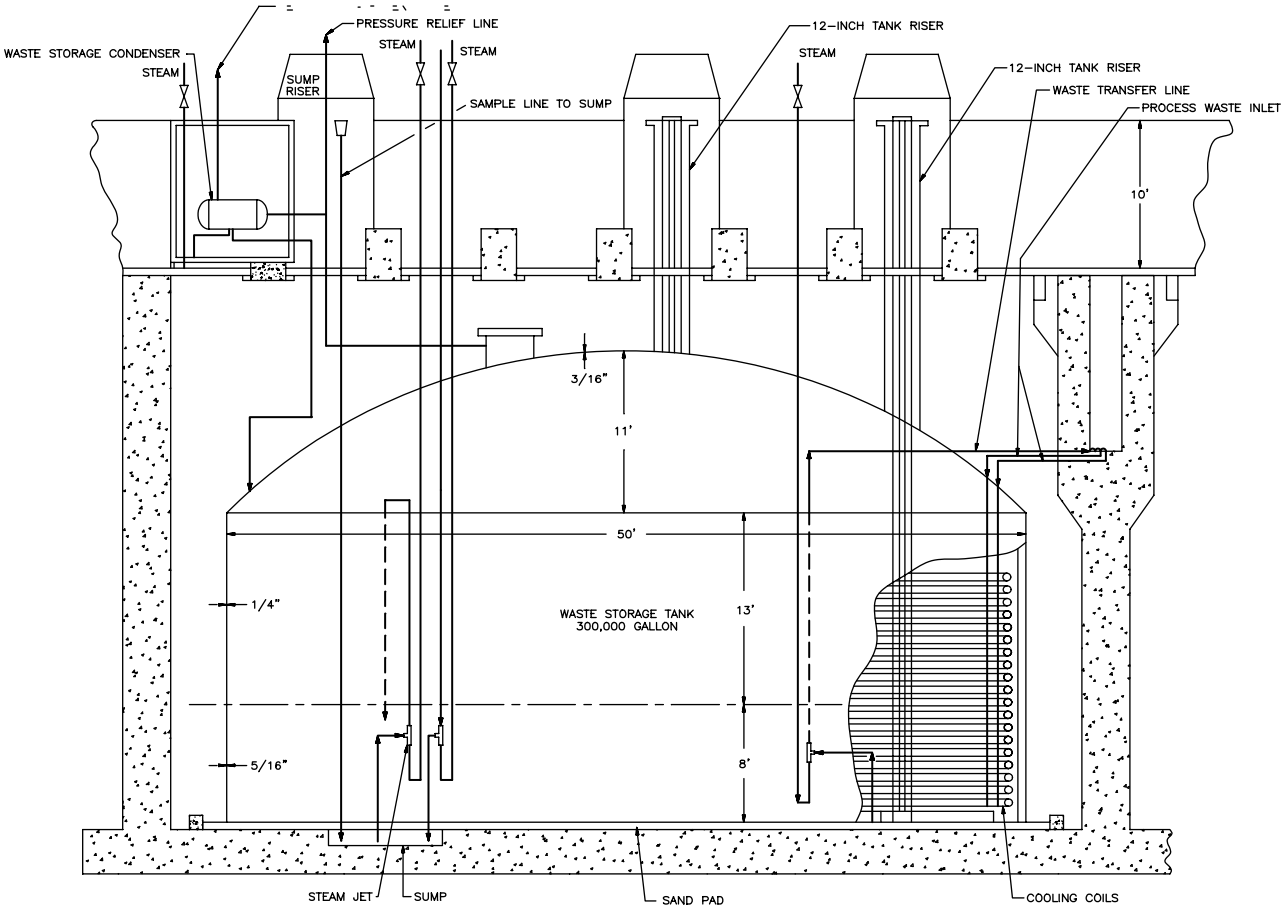
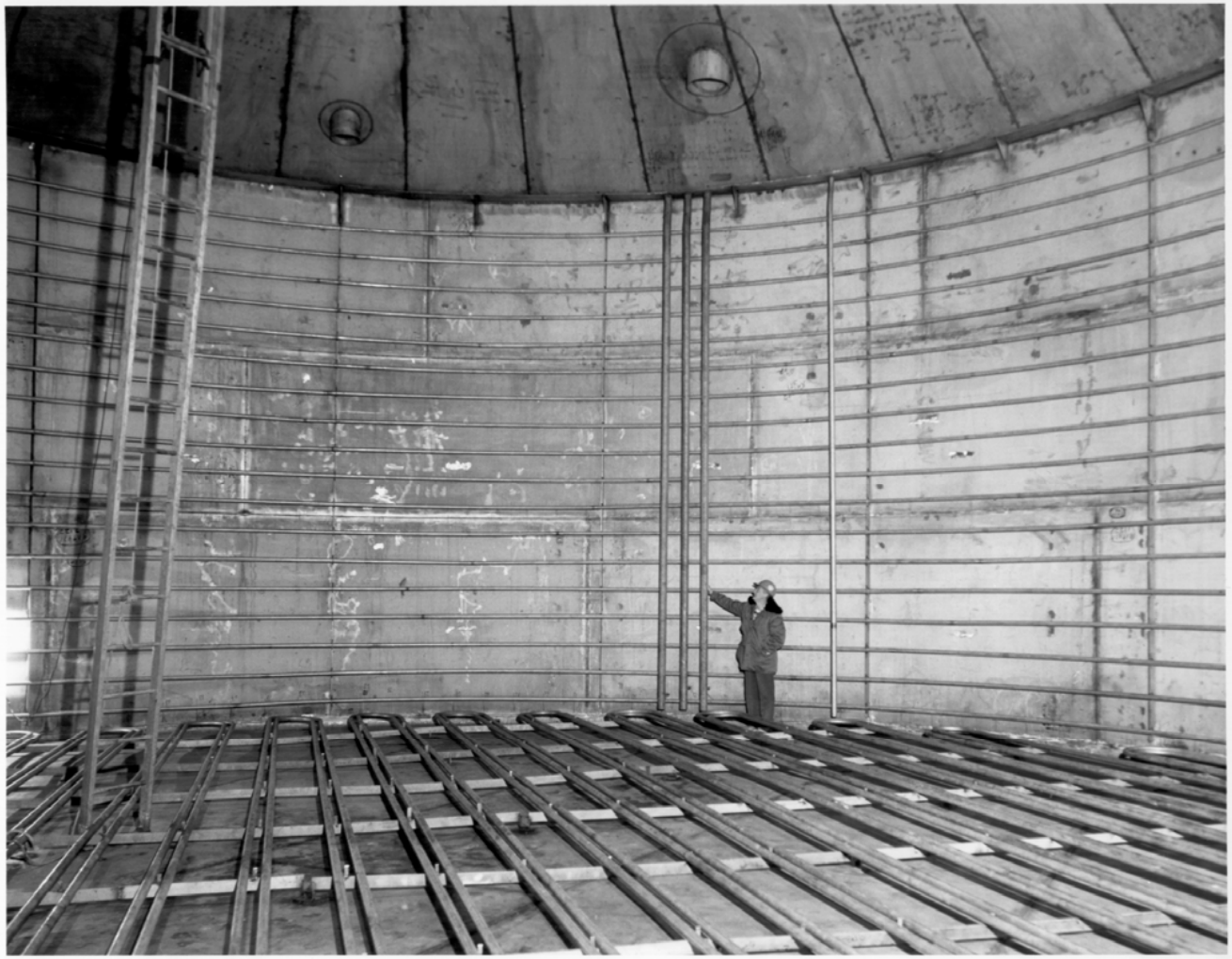
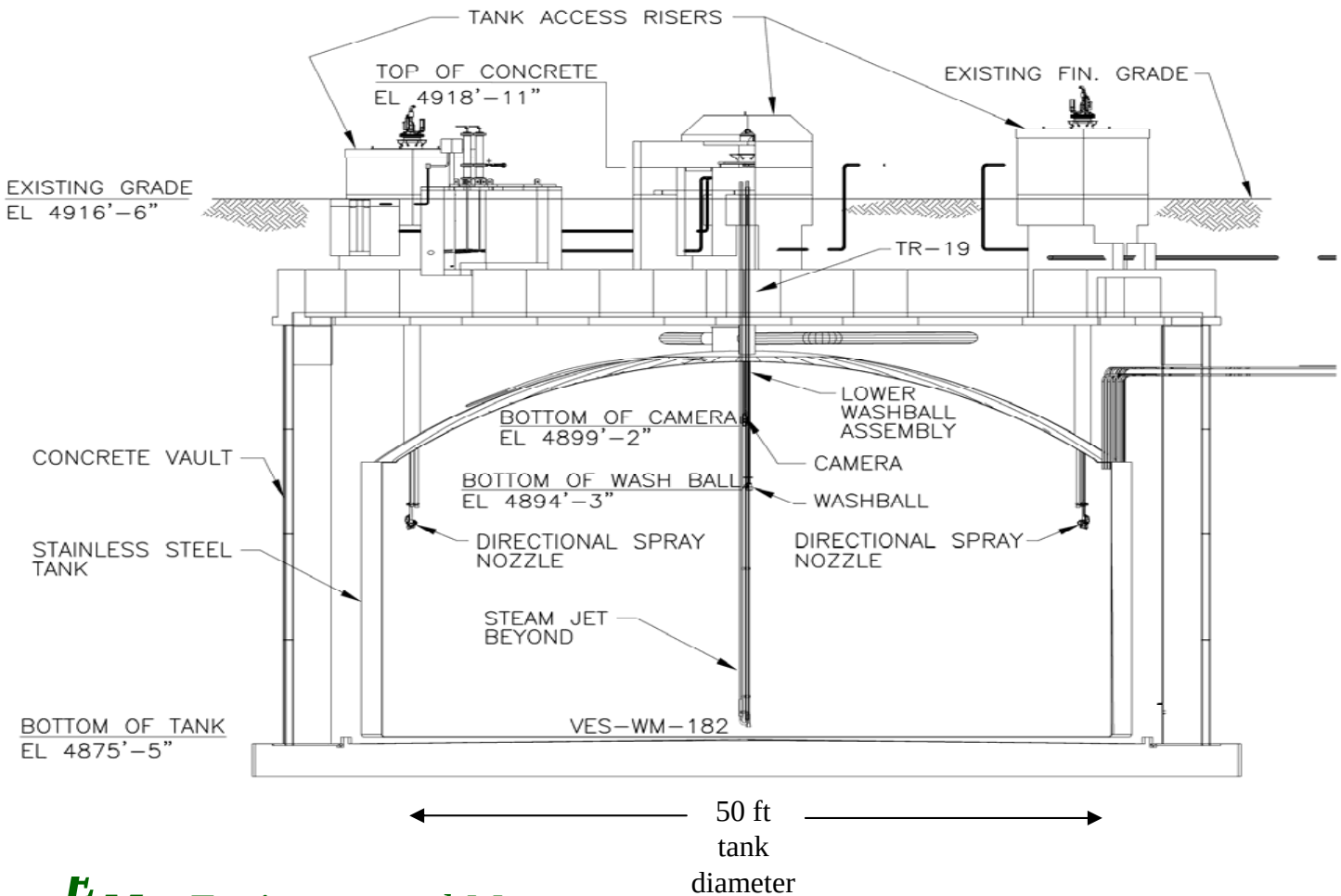
Cross-sectional view of a typical tank with cooling coils



Construction Photo - Interior of Tank



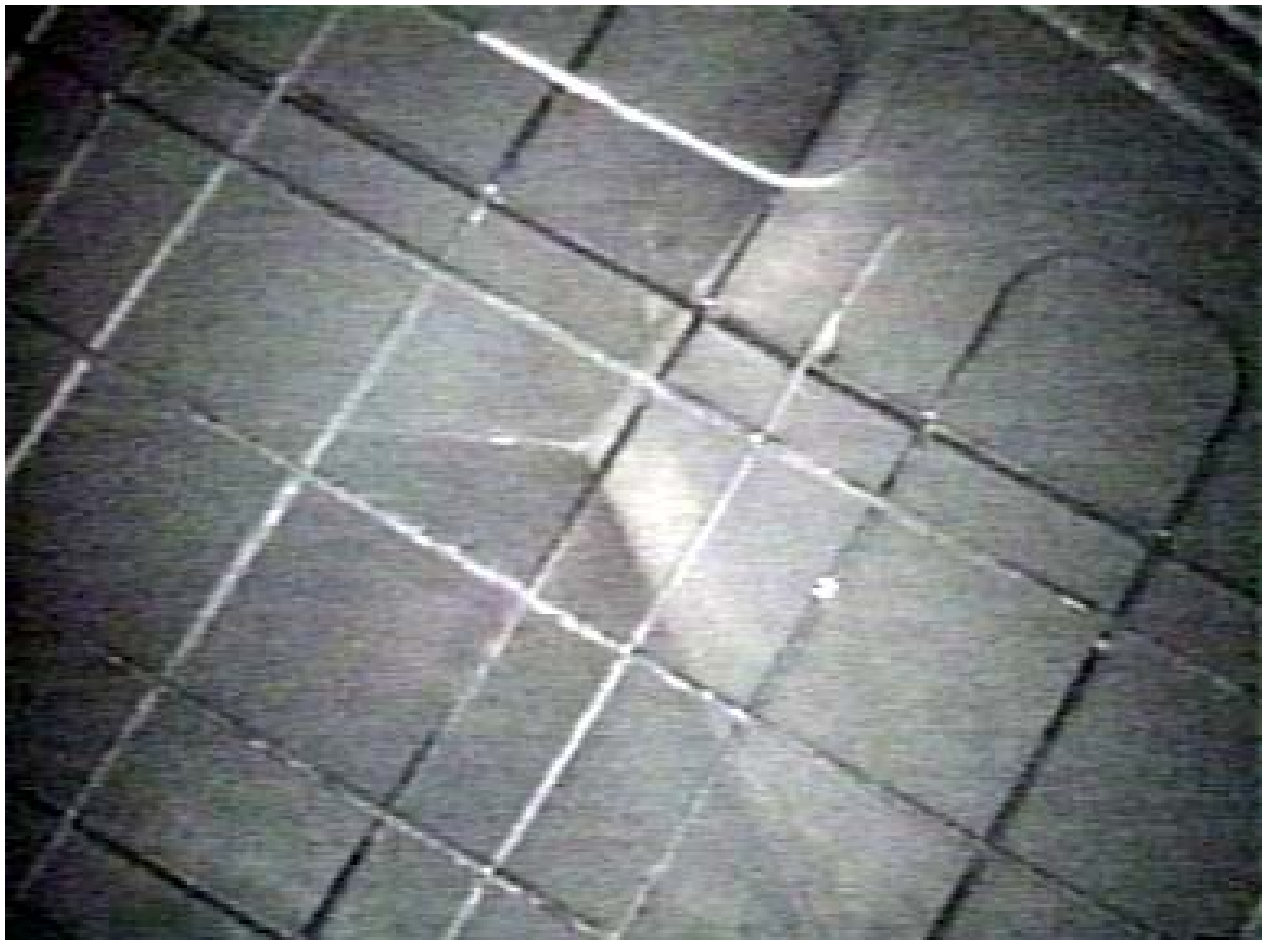
Typical tank cleaning system



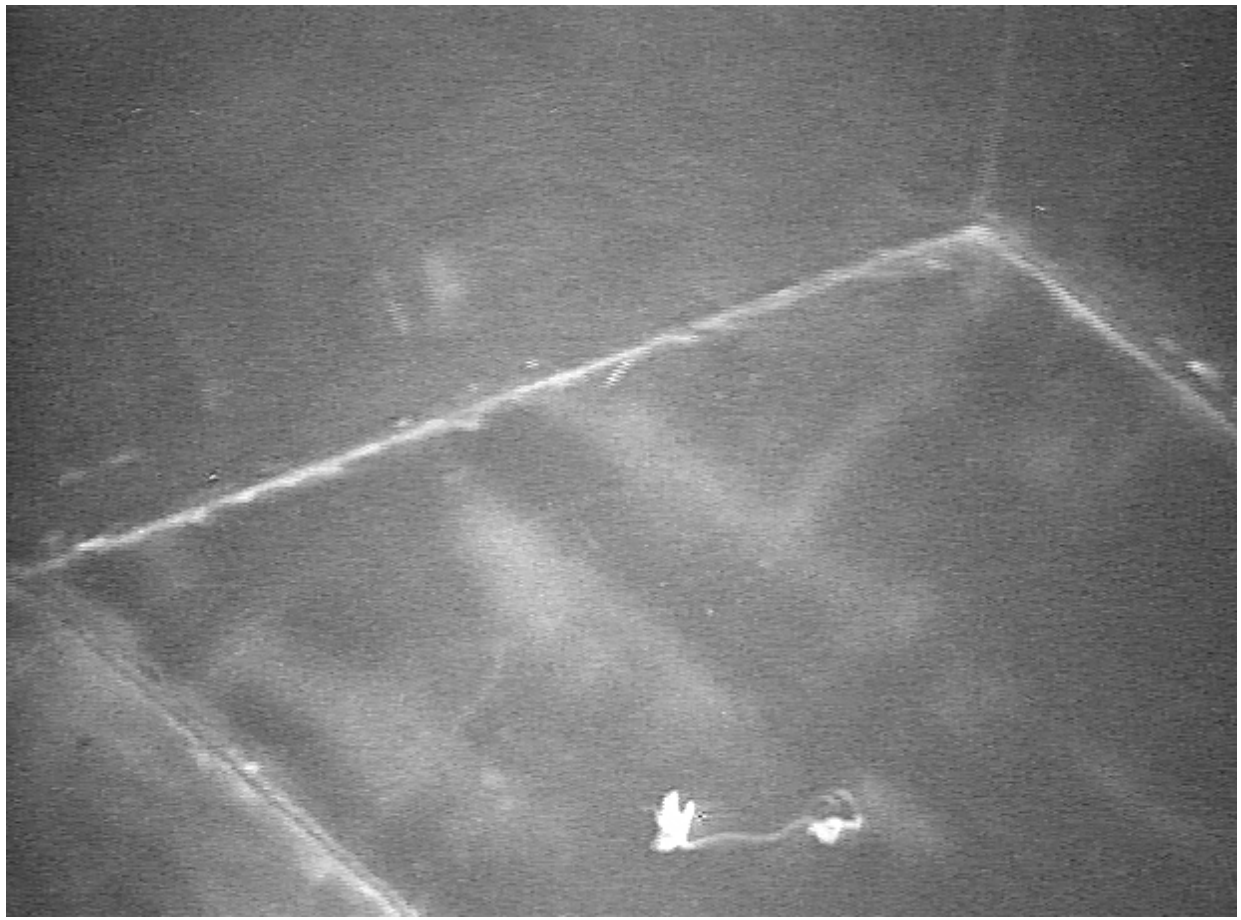
Spray Cleaning

Tank Cleaning Video

Tank WM-180 After Cleaning (Tank bottom)

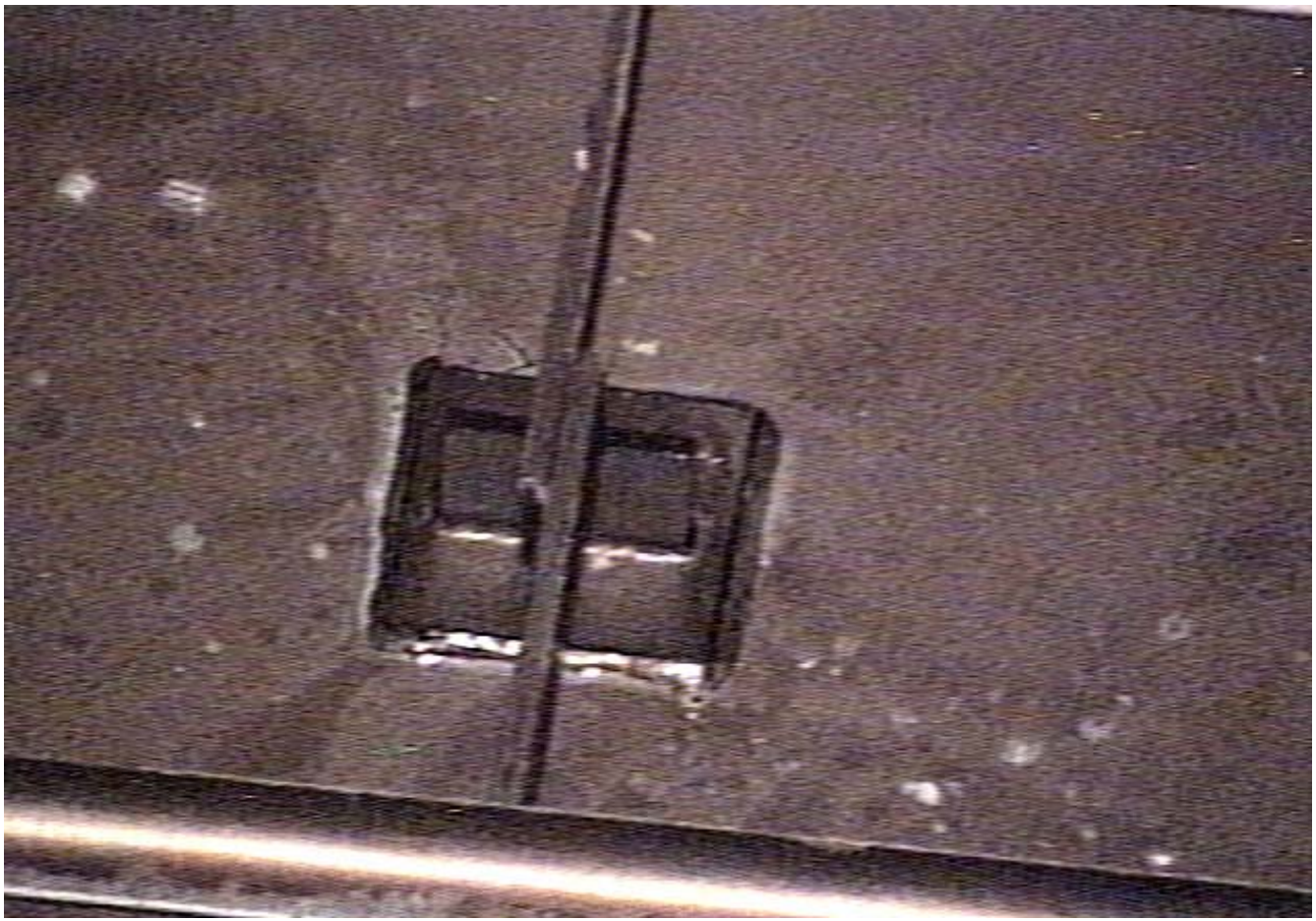


Tank WM-181 After Cleaning (Tank bottom)



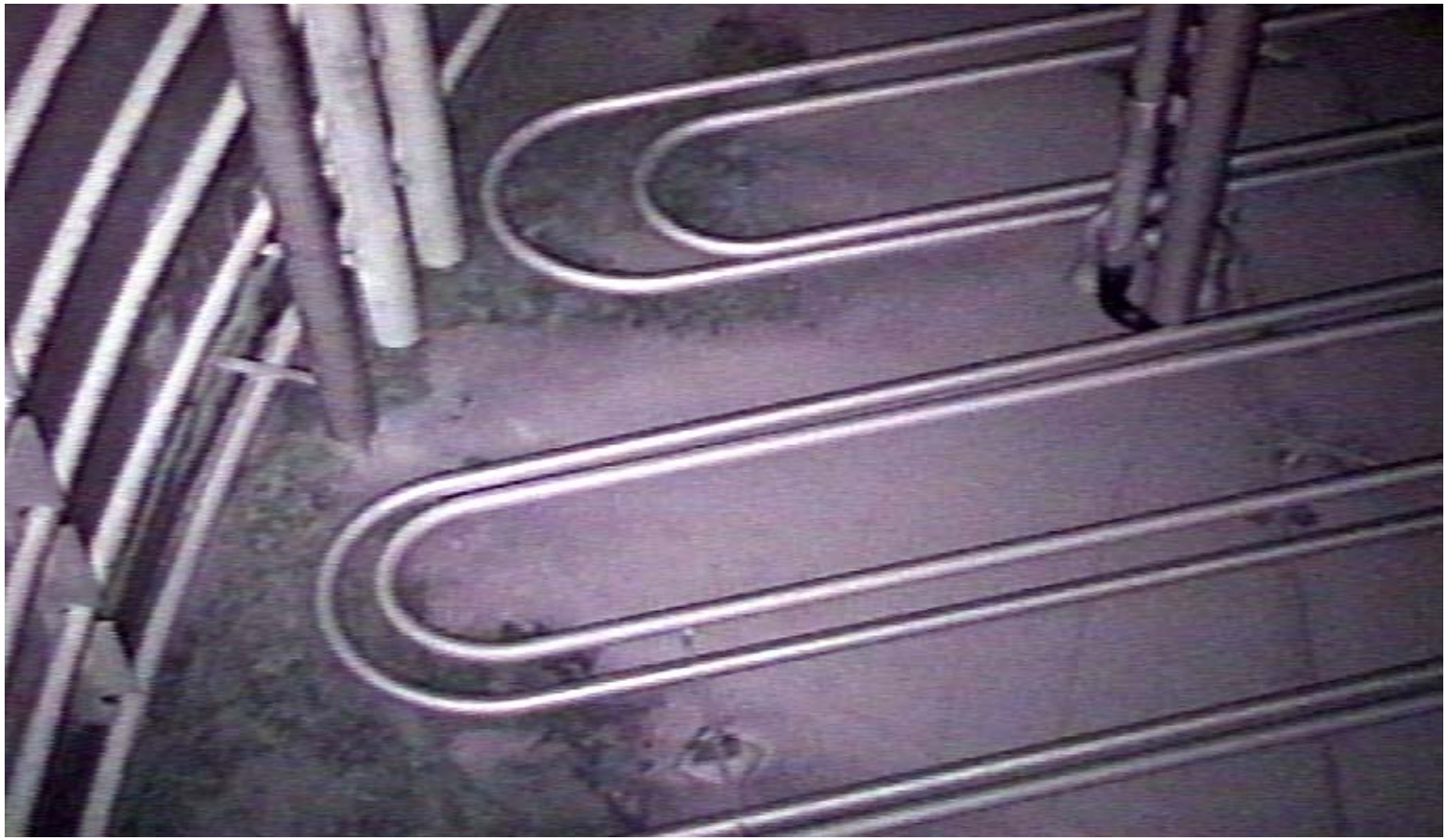
Tank WM-182 After Tank Cleaning (Tank bottom)

Tank WM-183 After Cleaning (Tank bottom base plate)

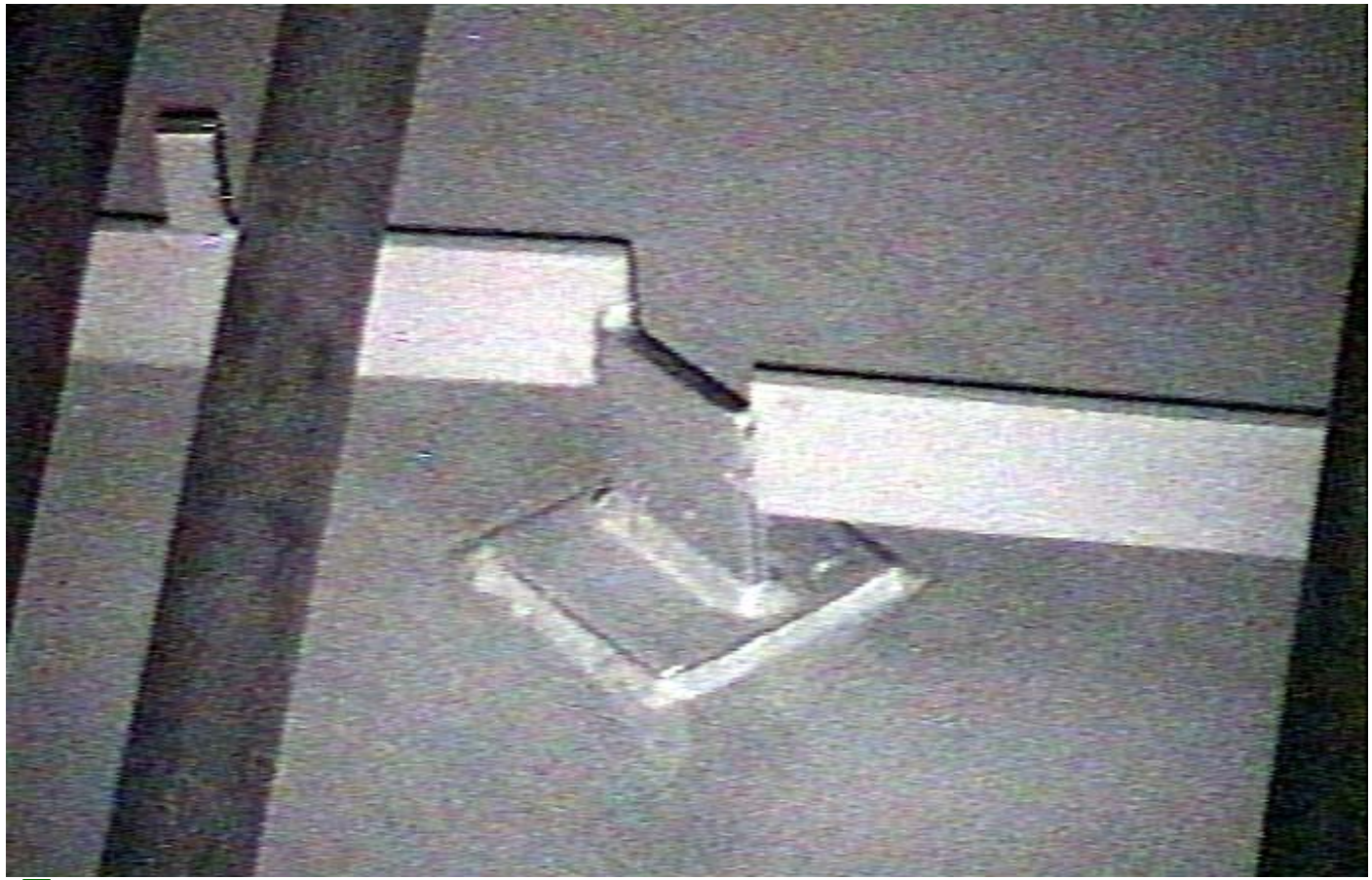


Tank WM-184 After Cleaning (Tank bottom)

Tank WM-185 After Cleaning (Tank bottom)

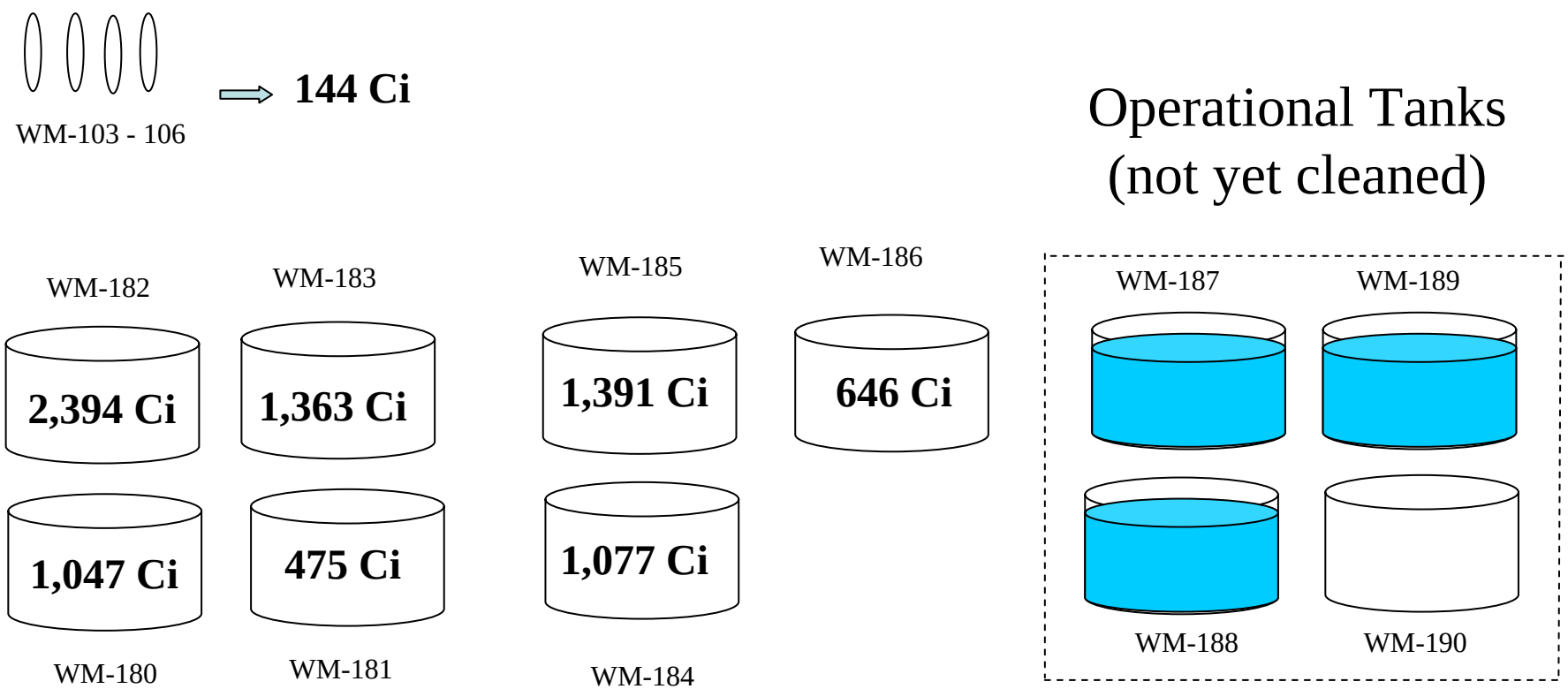


Tank WM-185 After Cleaning (Tank bottom base plate)



Tank WM-186 After Cleaning *(Tank bottom)*

Residual Inventory in Cleaned Tank Farm Facility Tanks (curies)*



*Cs-137/Ba-137 accounts for ~95% of total activity

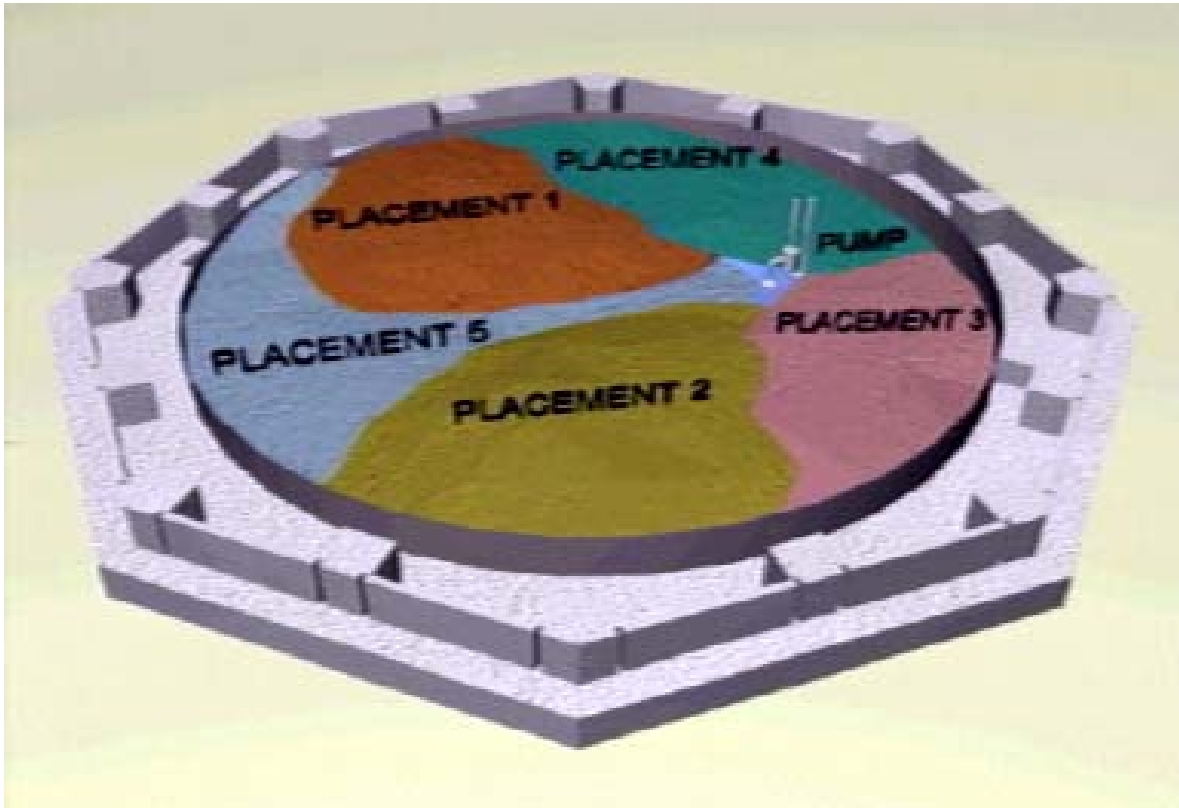
Issuance of Key Authorization Basis Documents

- Section 3116 Determination (November 2006)
- Amended National Environmental Policy Act Record of Decision (November 2006)
- DOE Closure Plans (November 2006)
- Resource Conservation and Recovery Act Closure Plans (2003 – 2006)

Grouting of WM-104 – November 2006

Grouting of WM-184 – August 2007

Schematic of the engineered grout placement sequence



- Grout addition is based upon significant mock-up engineering efforts
- Engineered Grout Placement Sequence provides the opportunity for additional residual liquid and solids in the bottom of the tanks to be removed.

Tank Grouting Progress to Date

- November 2006 – three cleaned 30,000-gal tanks grouted
- March 2007 – fourth cleaned 30,000-gal tank grouted
- April – July 2007 – completed engineered placements in seven cleaned 300,000-gal tanks
- July – August 2007 – additional grout pours to fill up to dome levels in seven cleaned 300,000-gal tanks

Tank Grouting – Next Steps

- Fall 2007 – grout addition to domes of seven cleaned 300,000-gal tanks
- Spring/Summer 2008 – grout addition to cleaned tank transfer piping and secondary containments
- After SBW Treatment Project empties remaining operational tanks (2010), begin cleaning and grouting activities for final closure of tank farm by 2012

Consideration of Needed Technologies

- Water spray cleaning system worked very well – very little residual material remains after cleaning - no plans to augment current cleaning system
- Grout delivery system working well thus far in tanks and vaults – no plans to augment current grout delivery system
- Incorporating experience from tank/vault grouting into planning for grouting of transfer piping - grout delivery system will be smaller scale

Summary

- Significant progress has been made to clean and close emptied tanks at the INTEC TFF.
- Between 2002 and 2005, seven of the eleven 300,000-gal tanks and all four 30,000-gal tanks were cleaned and prepared for grouting to support final closure.
- Several key authorization basis documents, including a Section 3116 Determination and an Amended National Environmental Policy Act ROD, to support tank closures were issued by the DOE in November 2006.
- On-going grouting operations are proceeding well to fill all cleaned 300,000-gal tanks and the four 30,000-gal tanks, as well as all associated tank vaults and interconnecting piping
- The remaining four tanks in the TFF will be cleaned, sampled, and grouted when they are no longer needed for waste storage.
- No technology gaps have been identified which would prevent completion of tank closure of the TFF by 2012.