K-Basin Sludge Removal

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- 1944: Initiated operations
- 1990: Ended operations
- Nine nuclear reactors
- Four reprocessing plants
- 1944–1971: Approximately 10 million curies released to the Columbia River
- Reference size: City of Los Angeles.





1. Hanford Site - Comparison to Fukushima





1. Hanford Site - Comparison to Other DOE Sites



R. E. Gephart - https://www.pnnl.gov/main/publications/external/technical reports/PNNL-13605rev4.pdf



2. Hanford Site Today - River Corridor Success







3. 100 K Reactor Area K-East and K-West





- 400 yards (365 meters) from the Columbia River
- Two reactors (1955–1971) to be placed into interim safe storage or cocooning configuration
- 2,300 tons of spent fuel stored (until 2004), removed, and placed into dry storage
 - 80% of the spent fuel at the site
- 35 yd³ (27 m³) of sludge resulted from deterioration of the spent fuel stored in the basins
 - Contains the third-highest concentrations of radioactive materials on the Hanford Site (after spent nuclear fuel and Cs/Sr capsules)
 - 2007 consolidated and stored in six engineered containers underwater at the K West Basin.

https://chprc.hanford.gov/page.cfm/Projects/SludgeTreatmentProject



4. K-West Basin Sludge Removal Last Challenge before K-Area Closure



- Sludge is a mixture of fuel corrosion particles, fuel fragments less than 1/4 inch (6 millimeters) in diameter, and other debris generated during basin operations and environmental media such as sand and rocks.
 - Wide range of densities makes it difficult to process (from twice as dense as lead to airy silt)
 - High levels of radioactivity ~30,000 Ci
 - Easily disturbed (creating clouds), affecting underwater operations.
- K basins sludge removal enables:
 - Demolition of K-West basin (K-East basin was demolished in 2009)
 - KW reactor into interim safe storage configuration the last site reactor.

https://chprc.hanford.gov/page.cfm/Projects/SludgeTreatmentProject



4. K-West Basin Sludge Removal - Solution



https://chprc.hanford.gov/page.cfm/Projects/SludgeTreatmentProject

- A DOE contractor, CH2M HILL Plateau Remediation Company (CHPRC), is transferring sludge from the K West Basin into large casks called Sludge Transport and Storage Containers.
- The containers are shipped to T Plant in the center of the Hanford Site, where they will remain in a safe configuration until the sludge is treated and packaged for disposal.
- Ten years of planning, preparation, and training included:
 - Designing a first-of-a-kind system to retrieve and package the sludge
 - Installing sludge retrieval tools and equipment at the mockup facility for testing before installation
 - Constructing a nuclear-grade facility to house the transfer and packaging equipment.



4. K-West Basin Sludge Removal Project Implementation

DOE strongly promotes the effective use of small business

DOE-Sludge

Treatment Project

- CHPRC provides for significant opportunities for small businesses to apply their expertise and experience
- CHPRC contains specific requirements to include:
 - Mentor-protégé agreements
 - Contractor fee reductions if small business goals are not met
 - Hard targets: 49.3% small business.

Phase 1: Engineered container retrieval and transportation system CH2M HILL Plateau Remediation Company (CHPRC)

https://chprc.hanford.gov/

Local fabrication shops hardware tested in cold commissioning and passed factory acceptance test

SME - Development of simulants' full range of sludge properties (dense, abrasive, small particles, etc.)

•SME - Tool developer (aging facility height restrictions, limited visibility)

•SME - Retrieval expert for difficult-to-mobilize materials and solids accumulation

Phase 2: Treatment and packaging for WIPP disposition

Contract in progress

Technology Evaluation and Alternative Analysis

4. K-West Basin Sludge Removal Small Business in the Community



CHPRC is a proud sponsor of the annual Bridging Partnerships Small Business Symposium, which celebrated its 15th year in 2018.

Small businesses played an integral role in the success of the CHPRC cleanup at the Hanford Site. Since the beginning of the contract, CHPRC awarded more than \$1.5 billion worth of work to small businesses. That means more than 27 percent of our \$5.8 billion contract helped strengthen small business, 70 percent of which are locally owned.

CHPRC was successful in providing subcontracting opportunities for small businesses, including small, disadvantaged, veteran owned, women owned, minority owned and historically underused business zone enterprises (HubZone). CHPRC strongly supported the economic stability of this community and small business partners.

In order to help boost small businesses in our community, CHPRC maintained the Mentor Protégé Program, which fostered the growth of small businesses to increase performance capabilities and gain exposure and experience in doing business with DOE and the U.S. government.



CHPRC employees worked closely with small businesses in our community by sponsoring events such as Meet the Buyer, a program connecting businesses with government agencies and prime contractors.



During our contract, we worked closely with our Mentor Protégé company, RC Engineering, a woman-owned small business.

tps://chprc.hanford.gov/10-yr-book/

Small Businesses Drive Cleanup Success



56%

700/0

5. DOE HAMMER Facility Training Thousands Annually

HAMMER - Hazardous Materials Management and Emergency Response

- Training is an investment
- Safety training prevents injury or exposure to workers
- Knowledge, competency, and confidence are created by realistic training
- Typical training includes:
 - Deactivation and decommissioning mock-ups
 - Emergency preparedness
 - Transportation
 - Radiation protection
 - Respiratory protection
 - Lockout/tagout
 - Hazardous waste
 - Hoisting and rigging
 - Fall protection
 - Beryllium
 - Asbestos.



TRAINING AS REAL AS IT GETS



https://hammer.hanford.gov/



6. Hanford Prime Contractors

CH2MHILL Plateau Remediation Company	MEA	BECHTEL	washington river protection solutions
Plateau Remediation Contract PRC	Mission Support Contract MSC	Bechtel National Inc. BNI	Washington River Protection Solutions WRPS
Facility and waste site cleanup groundwater remediation and waste disposal	Cost-effective infrastructure and site services to support the cleanup mission	Design, Construction, and Commissioning of the Hanford Tank Waste Treatment & Immobilization Plant (WTP)	Tank Operations Contract Monitor and manage the 177 underground storage tanks at Hanford, prepare for and provide waste feed delivery to the WTP.
Total Contract Value: \$5.8B Contract Term: 5 year with 5 year option	Total Contract Value: \$3.7B Contract Term: 5 year with 2 and 3 year option	Total Contract Value: \$14.7B Contract Term: Ending in December 2022	Total Contract Value: \$6.1B Contract Term: 5 year with 3 and 2 year options, ending in September 2018
 Total contract fee \$241M Cost plus award fee based on an annual fee determination composed primarily of multi- year project activities \$1.3B in ARRA funds added to the contract 	 Total Contract Fee: \$210M Cost plus award fee with annual performance incentives, including objective and subjective measures 	 Cost-Plus Award-Fee with Award and Multiple Fee Incentives Total Maximum Available Fee \$360M to go 	Total contract fee: \$209M Cost plus award fee with annual award fee performance measure and multi-year performance incentives; 95% quantitative, 5% qualitative

https://www.tridec.org/wp-content/uploads/Keynote-Breakfast_Hanford-Outlook_Brian-Vance-1.pdf

7. Hanford Total Subcontract Spending

Approx. 30% of the total budget (\$2.2–2.4B) goes to subcontractors Approx. 20% of the total budget stays local



https://www.tridec.org/wp-content/uploads/Keynote-Breakfast_Hanford-Outlook_Brian-Vance-1.pdf



8. Hanford Community Partnership

- Education support
 - CBC welding program
 - WSU technical building
 - Internships
- Community support
 - Combined Federal Campaign
 - Feds Feed Families
 - Habitat for Humanity
- Local agencies support
 - United Way
 - Junior Achievement
 - TRIDEC
 - Boys & Girls Club
 - Reading Foundation



https://www.tridec.org/wp-content/uploads/Keynote-Breakfast_Hanford-Outlook_Brian-Vance-1.pdf



9. Hanford Site - River Corridor Summary **Remarkable Progress; Approx. 93% Completed**



https://chprc.hanford.gov/

enables basin demolition, allowing the placement of the KW reactor into an interim safe storage configuration – the last site reactor by 2020

Cost-plus incentive fee contract



30%



percent of the site's spent fuel has been moved

to dry storage

K basin sludge removal

more reactors will be cocooned in the coming years



1,342

waste sites have

been remediated



billion gallons of groundwater have been

treated, removing 350

tons of contamination





882 facilities have been demolished

https://www.tridec.org/wp-content/uploads/Keynote-Breakfast_Hanford-Outlook_Brian-Vance-1.pdf ¹⁷



10. Hanford Post-cleanup Future Returning Land to Beneficial Uses

- Creation of a heritage tourism industry

 https://www.nps.gov/mapr/hanford.htm
- Recreational uses
- Tribal cultural uses
- Industrial uses.







