



U.S. DEPARTMENT OF  
**ENERGY**

OFFICE OF  
**ENVIRONMENTAL  
MANAGEMENT**

# Richland Operations Office Cleanup Strategy, Scope

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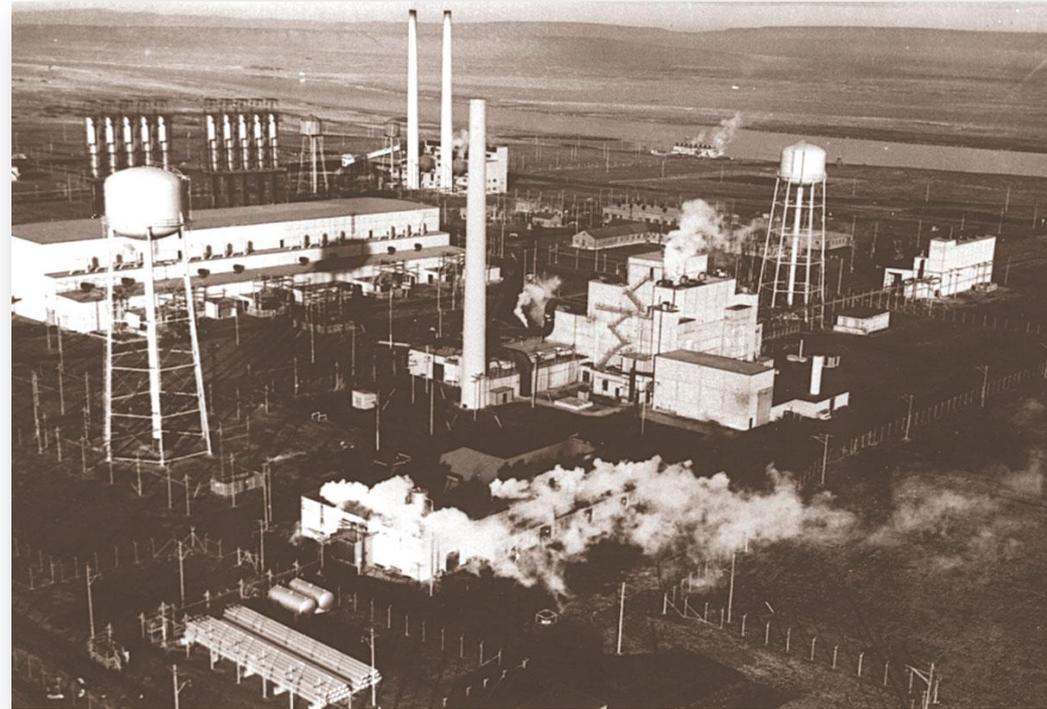
**Frank Armijo**

*President and General Manager*  
Mission Support Alliance

**May 1, 2014**

## Hanford

- Hanford began in 1943 as part of the Manhattan Project
- Production of plutonium increased during Cold War (peaking between 1959-1965)
- Hanford produced 2/3 of the nation's plutonium between 1945-1985
- Home to the first full-scale production reactor (B Reactor)
- Transitioned to cleanup in 1989



**B Reactor Complex during operations (1940s-1960s)**

## Richland Operations Office

- River Corridor
- Central Plateau

## *Cleanup Work*

- Deactivate and Demolish facilities
- Move buried waste, contaminated soil away from Columbia River
- Treat contaminated groundwater
- Isolate contamination from environment on Central Plateau

## *Workforce*

- 4,341 federal and contractor employees



# Cleanup Strategies, Vision, Agreements



# Regulatory Cleanup Drivers

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
  - Three active National Priority List (NPL) sites at Hanford – 100, 200 and 300 Areas
  - Facility D&D, soil, and waste site cleanup
- Resource Conservation and Recovery Act (RCRA)
  - State of Washington authorized by Environmental Protection Agency (EPA) to administer RCRA program pursuant to State authority.
  - Safe storage, treatment and disposal of hazardous waste
- Tri-Party Agreement (Hanford Federal Facility Agreement and Consent Order, signed in 1989)
  - Agreement among DOE, State of Washington and EPA
  - Provides framework to implementing and complying to the above requirements

# Richland Operations Office Cleanout, Demolition of Facilities



*407 of 522 facilities have been demolished*



# River Corridor 300 Area Progress



1977

*For nearly 60 years, the 300 Area was the center of Hanford's radiological research and fuel fabrication. Now the above ground field work and building demolition is nearly complete.*

2014



# River Corridor Waste Site Cleanup

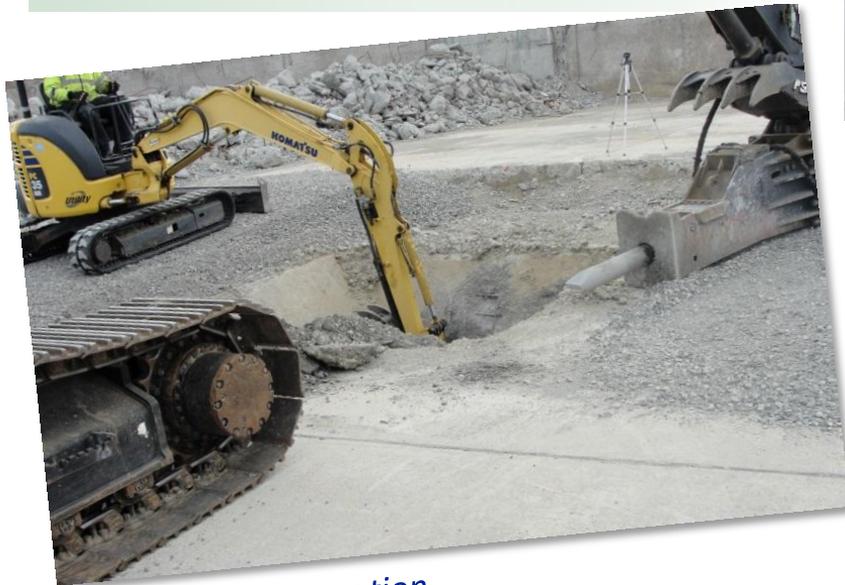


*864 of 1,012 waste sites  
have been cleaned up*



## Key Focus Areas

- Expand pump and treat systems
- Continue progress on decision documents
- Drill additional wells



*Well drilling preparation*



*200 West Pump and Treat Facility – online and treating groundwater*



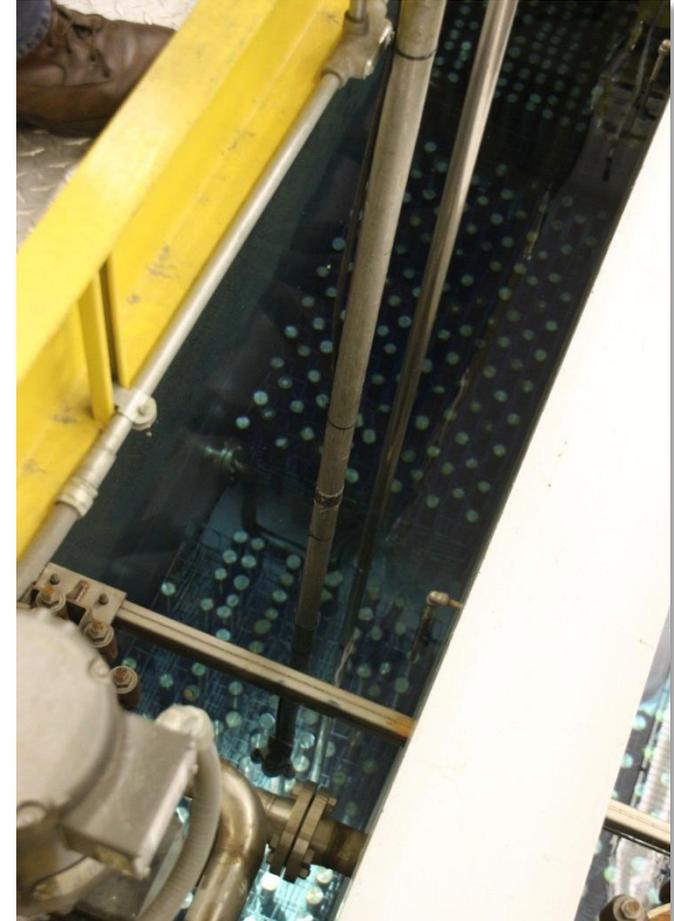
*Installing aquifer sampling tubes*

# Central Plateau Cleanup



## ***Plutonium Finishing Plant***

*Workers are removing gloveboxes and pencil tanks at the high-hazard Plutonium Finishing Plant. Deactivation at the plant is almost 70 percent complete.*



## ***Cesium and Strontium Capsules***

*Nearly 2,000 capsules of highly-radioactive cesium and strontium need to be moved out of a storage pool into dry storage*

# Richland Operations Office Prime Contracts



## River Corridor Closure RCC

Cleanup of 220 sq. mi. along Columbia River: facility demolition, waste site remediation, operation of disposal facility

Awarded in 2005  
Total Contract Value: \$2.6 billion  
Cost-plus incentive-fee completion contract



**CH2MHILL**  
Plateau Remediation Company

## Plateau Remediation Contract PRC

Facility and waste site cleanup, groundwater remediation, waste disposal

Awarded in 2008 for 5 years, with 5 option years (Sept. 2018)  
Total Contract Value: \$5.7 billion  
Cost-plus award-fee contract

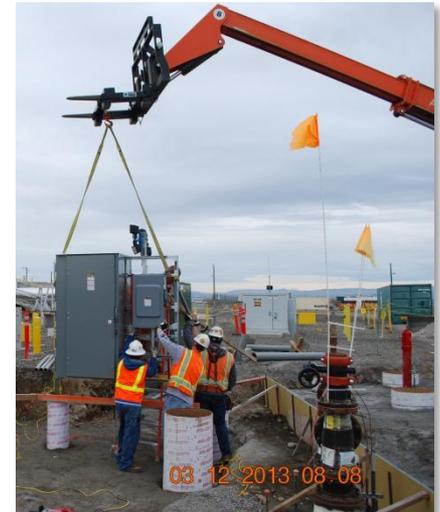


## Mission Support Contract MSC

Cost-effective infrastructure and site services to support the cleanup mission

Awarded in 2009 for 5 years, with 5 option years (May 2019)  
Total Contract Value: \$3.3 billion  
Cost-plus award-fee contract

# Safety at Hanford



# Richland Operations Office Budget Overview

PBS Title	FY 2013 Enacted	FY 2014 Omnibus	FY 2015 President's Budget
NM Stabilization and Disposition - PFP	\$160,056	\$142,670	\$168,228
SNF Stabilization and Disposition	\$89,506	\$98,369	\$103,067
Solid Waste Stabilization and Disposition - 200 Area	\$118,480	\$130,126	\$112,371
Soil and Water Remediation - Groundwater/Vadose Zone	\$134,879	\$141,500	\$116,916
<b>Central Plateau Remediation</b>	<b>\$502,921</b>	<b>\$512,665</b>	<b>\$500,582</b>
Nuclear Facility D&D - Remainder of Hanford	\$61,943	\$70,992	\$65,922
Nuclear Facility D&D - River Corridor Closure Project	\$294,264	\$337,642	\$266,866
<b>River Corridor and Other Cleanup Operations</b>	<b>\$356,207</b>	<b>\$408,634</b>	<b>\$332,788</b>
Safeguards and Security	\$63,668	\$69,078	\$63,668
Nuclear Facility D&D - Fast Flux Test Facility Project	\$2,562	\$2,545	\$2,562
Richland Community and Regulatory Support	\$17,969	\$19,701	\$14,701
<b>Richland Field Office Funding Summary</b>	<b>\$943,327</b>	<b>\$1,012,623</b>	<b>\$914,301</b>

# Intro -- River Corridor Cleanup

## Scope

- 9 production reactors
- 1 large research reactor
- 49 solid waste burial grounds
- More than 1,000 buildings to demolish
- More than 1,000 soil waste sites to remove

## Regulatory driver

- 100 and 300 Areas both Superfund sites on the National Priority List (NPL)
- Cleanup being done under CERCLA Records of Decision (interim & final)

## Cleanup Strategy

- Remove contamination that could be a threat to groundwater and the river and allow for unrestricted surface use as much as possible
- Deactivate and demolish excess facilities and research reactors
- Place 8 plutonium production reactors in the interim safe storage
- Stop key contaminants from entering the river

# Cleanup Progress at Hanford's River Corridor

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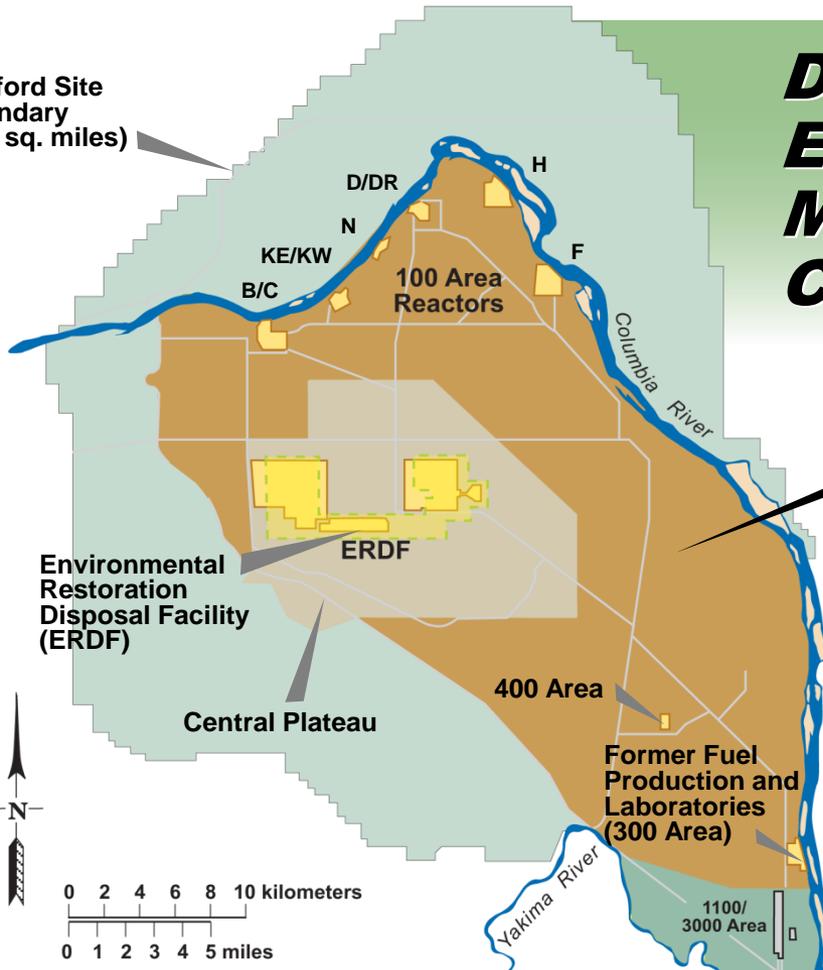
**Scott Sax**

*President and Project Manager*  
Washington Closure Hanford

**May 1, 2014**

## ***DOE's Largest Environmental Management Cleanup Closure Project***

Hanford Site  
Boundary  
(586 sq. miles)



**River Corridor**  
(220 square miles and 46 linear miles along the Hanford portion of the Columbia River)

- \$2.6B contract
- Cost-plus incentive fee contract
- Making great progress
- Project is 91% complete

# Our Work Scope

*Hanford's River Corridor is home to Cold War legacy wastes from nuclear reactors and support facilities dating back to the early 1940s.*



*Deactivate, decontaminate, decommission and demolish 320 facilities*

*Clean up and close 592 burial grounds, waste sites*



*Treat, transport, and dispose 11.2 million tons of waste debris to Environmental Restoration Disposal Facility*

# Risks and Hazards Facing Our Workers

- High-risk working conditions
- Radiological, chemical and contamination hazards include chromium, asbestos, beryllium, mercury and tritium
- Industrial and construction hazards
- Un-inventoried waste sites
- High-dose fuel elements and other reactor parts



*A 1,082-ton test reactor is loaded for transport to ERDF for disposal.*



*Trench excavation at the 618-10 Burial Ground.*



*N Reactor river structure demolition.*

# Success in Project Performance

- 91.5% complete
- 93% of facilities are decontaminated and demolished (298 out of 320)
- 81% of waste sites are remediated (480 out of 592)
- 136 of 220 square miles cleaned up
- \$276M of ARRA work completed
- \$230M saved through efficiencies and reinvested back into the project
- Over \$1B in small business subcontract awards



*Field remediation at IU-2/6.*



*326 Material Science Laboratory demolition.*

# Progress at 100-B/C Area



*Excavation at the 100-C-7 chrome waste site reached groundwater at 85 feet.*



*Field remediation near C Reactor.*



*Excavation and backfill are complete at waste sites near B and C Reactors.*

# Progress at 100-N Reactor Area

2005



*N Reactor before being cocooned.*

2014



*Clean waste sites to be backfilled this summer.*

# Progress at 100-N Reactor Area



*Concrete anchor blocks were removed from the site of a former pump house on the Columbia River near N Reactor.*



*Loadout at 100-N area of contamination.*



*Demolition of the 100-N Fuel Storage Basin.*

# Progress at 100-D Reactor Area

2009



*Demolition of water filter building near D Reactor.*

2014



*Chromium excavation near D Reactor reached groundwater – 85 feet deep.*



# Progress at 100-D and 100-H



*Field remediation near D Reactor.*



*Field remediation near H Reactor.*



*Waste site remediation at H Reactor Area.*

# 100-F Area – First Reactor Area Completed



*F Reactor Area during operations.*



*F Area cleanup was  
completed in 2012.*

# 618-10 Burial Ground Remediation Progress



*The 618-10 Burial Ground operated from 1954 until 1963. It covers approximately 5.2 acres, and contains 12 trenches and 94 vertical pipe units. Remediation of trenches is scheduled for completion in 2015.*



*Methods testing for removal of the vertical pipe units at 618-10 Burial Ground is under way.*

# Progress at Hanford's 300 Area



Waste site remediation in the 300 Area.



A hot cell is removed from the Gamma Irradiation Facility in the 300 Area.



# 300 Area Cleanup Progress

## 309 Plutonium Recycle Test Reactor (PRTR)



Workers removed hundreds of contaminated process tubes and pipes to support the removal of the reactor.



The 1,082-ton PRTR was lifted and transported to ERDF for disposal.

## 340 Tank Vault



A complex lift system was constructed beneath the vault.



The 1,153-ton vault was transported to ERDF for disposal.

# ERDF is the "Hub" of the Site's Waste Disposal

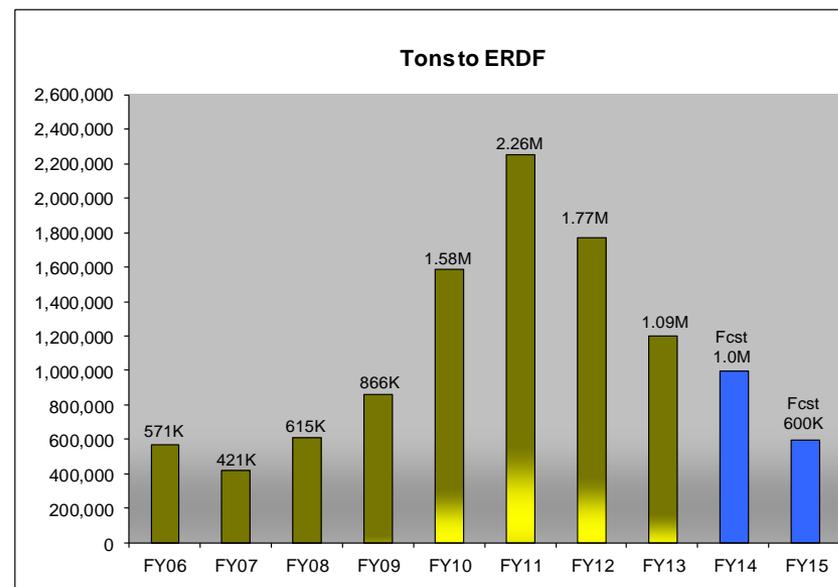
- 473,441 truck loads disposed since 2005
- 52,382 truck loads disposed in FY2013
- Over 9.8M tons disposed since 2005
  - 15.7M tons disposed since 1996
- Over 16 million miles driven by Waste Operations drivers since 2005
- \$100M ARRA expansion project completed without injury



ERDF's disposal cells cover an area equivalent to 52 football fields.

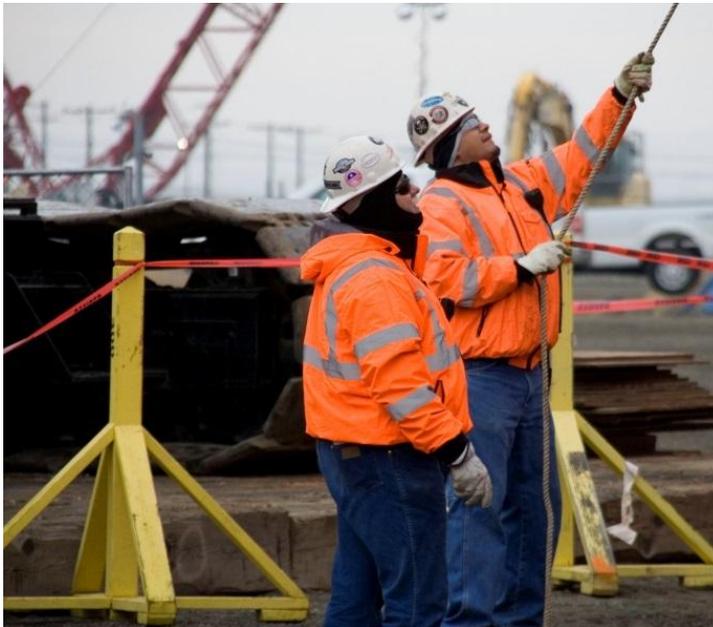


Chromium waste from D Reactor area is disposed of at ERDF.



# Our Priorities

- Safe execution of work
- Customer satisfaction
- Financial performance
- Reward, recognize, and retain our employees

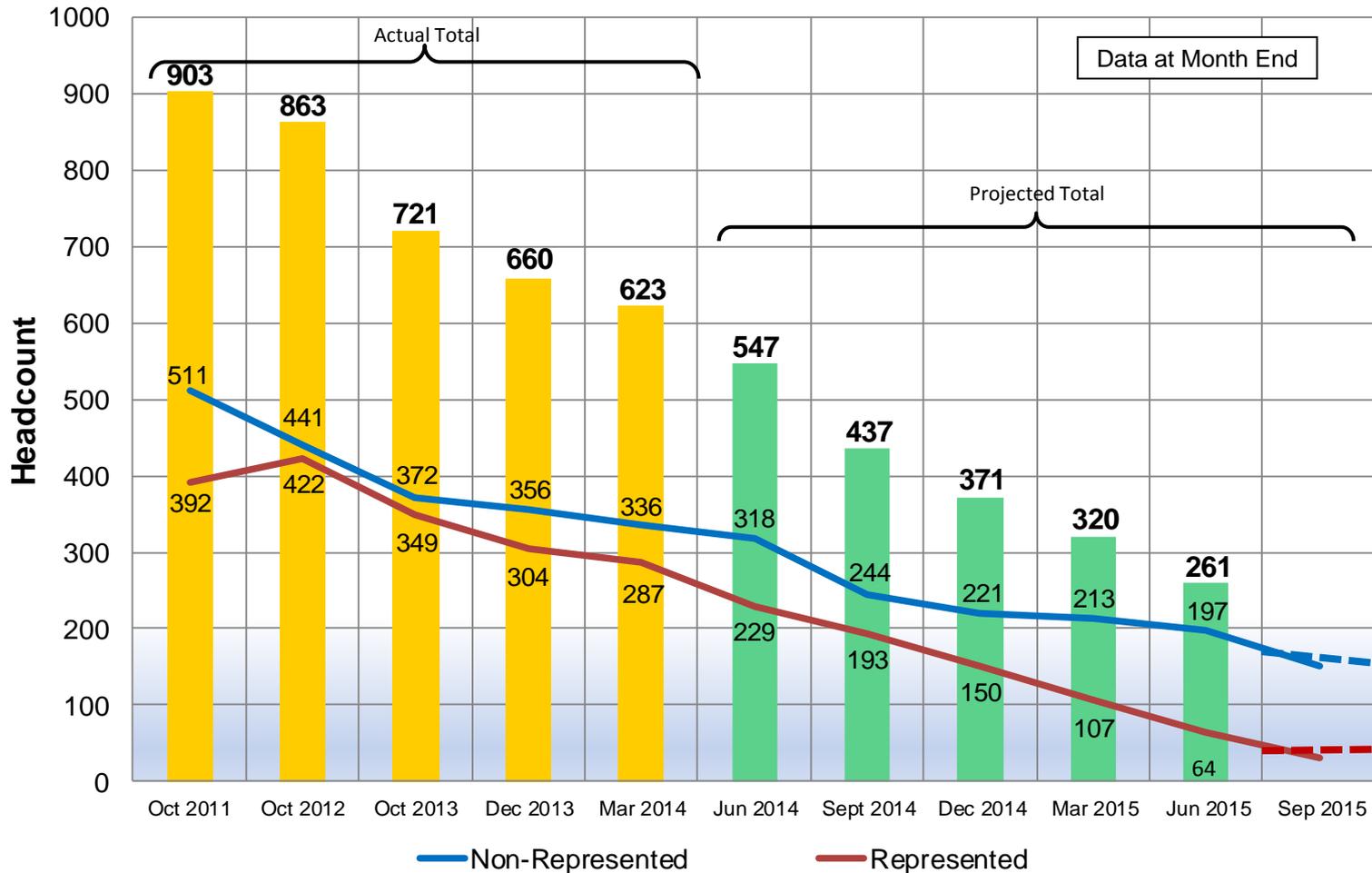


# What's Going Well

- Extraordinary safety record
- Positive safety culture
- Dedicated and committed staff
- Clearly defined scope
- Work progressing on schedule
- People planning for closure



# Staffing Profile: Through FY-2015



# Work Remaining

- Finish chromium waste sites along the Columbia River
- Cleanup and transition of 84 square miles to Long-Term Stewardship
- Completion of 300 Area waste sites
- Complete scope at reactor sites B, C, N, D, and H
- Manage radioactive hazards at 618-10/11 Burial Grounds
- Clean up 324 Building and waste site below



*Excavation of a waste site near H Reactor.*



*Trench excavation at the 618-10 Burial Ground.*

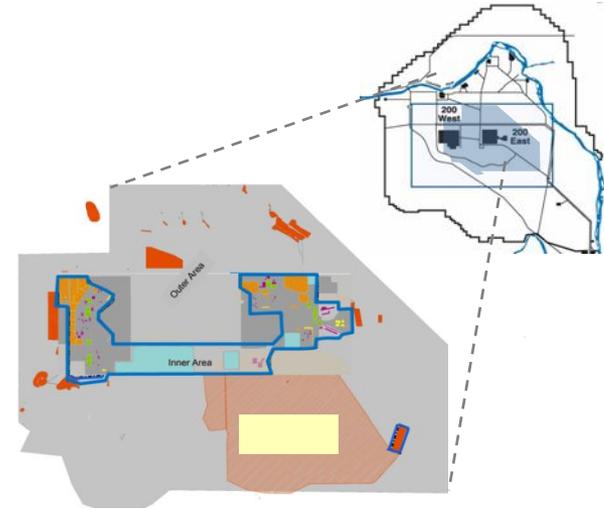
# Intro -- Central Plateau Cleanup

The **Central Plateau** is a Superfund site on the National Priority List (NPL)

- Shrink Hanford Site cleanup down to Central Plateau footprint
- Protect human health, ecological resources, groundwater

Central Plateau cleanup is focused in three areas:

- **Inner Area** (~10 sq. miles)
  - Final footprint
  - Less than 2% of the original Site
- **Outer Area** (> 55 sq. miles)
  - Cleanup to be protective of future land uses
- **Groundwater**
  - Contain and remediate key groundwater contaminants

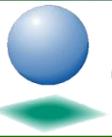


*5 canyons*

*>1400 waste sites and pipelines*

*>900 structures*

*61 square miles contaminated groundwater*



**CH2MHILL**

# CH2M HILL Plateau Remediation Company Scope and Progress

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**John Ciucci**

*Chief Operating Officer*

**May 1, 2014**



# CH2M HILL Work Scope

## K Area

- ✓ K East Basin Demolished
- ✓ Interim Safe Storage of K East Reactor Complete
- ✓ K West Sludge Removed from the River Corridor
- ✓ Interim Safe Storage of K West Reactor Initiated
- ✓ K Area Final ROD Remedial Actions Complete and TSD Units Closed with the Exception of those Associated with K West
- ✓ K Area Groundwater Remedies Implemented
- ✓ 2,300 Tons of Scrap Nuclear Fuel Removed
- ✓ 109 Facilities Demolished
- ✓ 2 Waste Sites Remediated
- ✓ ~361,000 Tons of Soil Removed
- ✓ Initiate 100-K Transfer to Legacy Management

## Central Plateau Cleanup

- ✓ 200 West Carbon Tetrachloride, Uranium and Technetium 99 Groundwater Remedies Implemented
- ✓ Conduct Additional Cleanup

## 400 Area

Fast Flux Test Facility in Surveillance and Maintenance

## 200 Areas

- ✓ Special Nuclear Material Shipped Off-site
- ✓ Slightly Irradiated Fuel Shipped to the Canister Storage Building for Safeguarding
- ✓ PFP Complex Reduced to Slab on Grade
- ✓ 18 Facilities Demolished
- ✓ U Plant Zone D&D Completed
- ✓ Initiate Purex, PFP & 200 West Ponds Zone Closure
- ✓ Initiate Cesium/Strontium Capsule Disposition



ROD = Record of Decision  
TSD = Treatment, Storage, Disposal

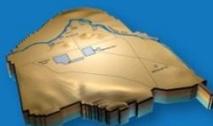




## CH2MHILL Plateau Remediation Company

## 5 YEARS of Progress on the Plateau

**CH2M HILL** Plateau Remediation Company is the prime contractor for the U.S. Department of Energy Richland Operations Office managing the 10-year, \$5.7- billion Plateau Remediation Contract to safely and efficiently reduce hazards to the inner most area of the Hanford Site.



**OUR WORK** is moving hazards away from the Columbia River and shrinking the active area of cleanup to just 75 square miles by:

- Maintaining safe and compliant operations
- Demolishing the Plutonium Finishing Plant to slab on grade in 2016
- Treating groundwater to shrink contamination plumes and protect the Columbia River
- Developing decision documents for long-term cleanup along the river
- Retrieving highly radioactive sludge stored 400 yards away from the river
- Managing some of DOE's highest hazard facilities and waste streams
- Partnering with small businesses and supporting the local community



331m<sup>2</sup> cleanup footprint reduction



157 buildings demolished



194 gloveboxes and 110 pencil tank units removed from the Plutonium Finishing Plant



1<sup>st</sup> phase of highly radioactive sludge retrieved



5.4 billion gallons of contaminated groundwater treated, 50 tons of contaminants removed

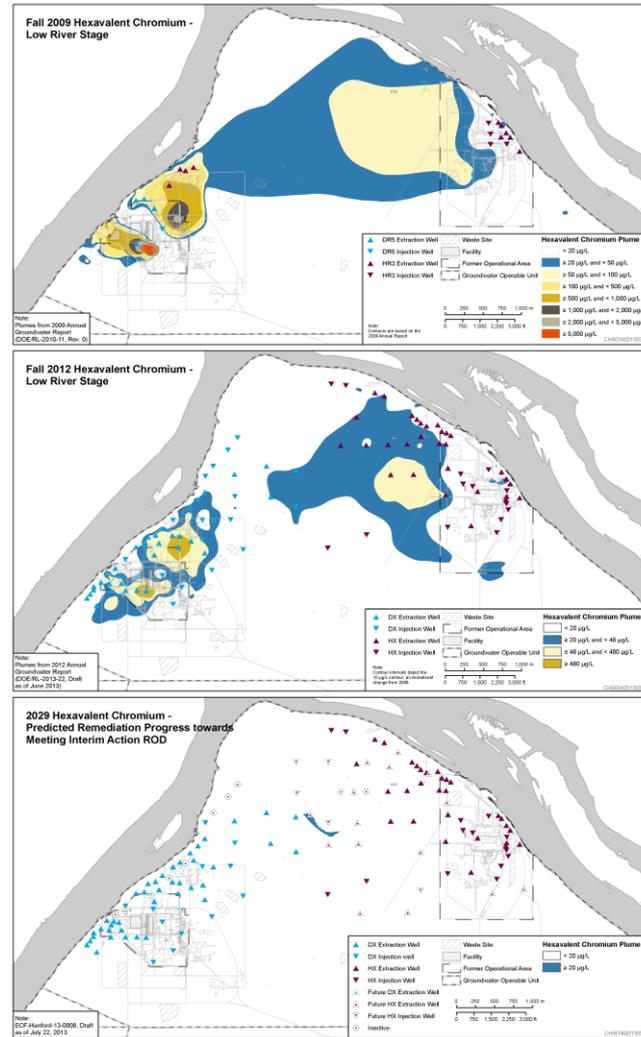


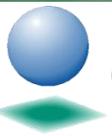
2,866 m<sup>3</sup> of transuranic waste retrieved

January 2014 CHPRC1401-04

- Plutonium Finishing Plant deactivation reached 68% complete
- Treated 1.9 billion gallons of groundwater and removed a record 2 tons of contaminants
- Surpassed \$1 billion cumulative awarded to small businesses

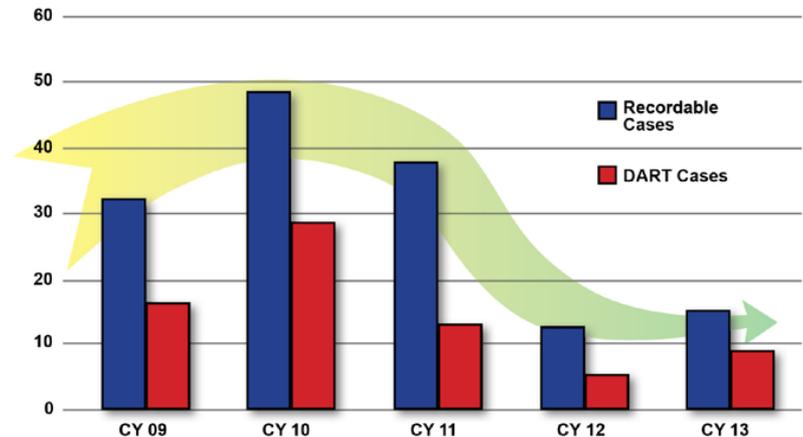
100-HR-3 Hexavalent Chromium Remedy Progression



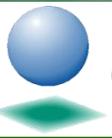


- Achieved DOE Voluntary Protection Program Star Status
- Surpassing DOE safety goals while performing high hazard work
- Excellent radiological and nuclear safety performance
- Continually improving
  - Strong safety culture during change
  - Encouraging workers to use questioning attitudes
  - Developing field work supervisors – leadership program

## TRC-DART Cases



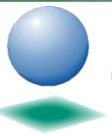
Met DOE FY2013 performance goals for total recordable and days away safety rates



- Implementing new subcontracting strategy (\$35-40 million savings) over 5 years
- Maximizing efficiencies and capabilities
  - Supplied-air breathing suits to maximize safety and productivity
  - Expanding 200 West Pump and Treat system to treat uranium
  - Installing wells to enhance and optimize treatment of groundwater plumes



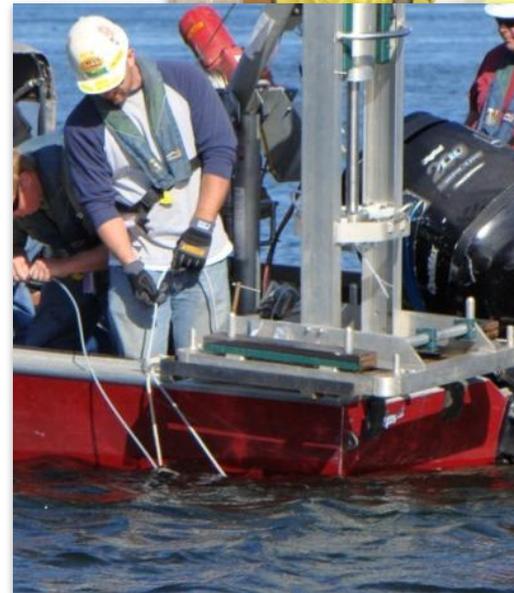
*Installation of a groundwater treatment well*



- Mining efficiencies to accomplish more cleanup work
- Maintaining cleanout and waste processing capabilities
- Adapting to changing funding profiles and priorities



*Preparing large pieces of contaminated equipment, called gloveboxes, for disposition at PFP*



*Installing aquifer tubes along the Columbia River*

- Plutonium Finishing Plant
  - Remove 13 gloveboxes
  - Disposition 25 pencil tanks units
  - Demolish 9 ancillary facilities
- Groundwater Treatment
  - Treat 1.8B gallons of contaminated groundwater
  - Remove more than 45,000kg of contaminants
- K Basin Sludge
  - Complete construction of K West Annex for radioactive sludge removal
  - Procure long-lead engineered equipment
- Waste Encapsulation and Storage Facility
  - Preliminary procurement/engineering for transferring highly radioactive cesium and strontium capsules to dry storage
  - Addressing the aging ventilation system



*Removing a glovebox from PFP*



*Placing concrete for the KW Annex*

# Intro -- Hanford Site Services

- The Mission Support Contract offers a single contractor responsible for base operations and infrastructure at the Hanford Site, while other prime contractors focus on Hanford cleanup.
  - Site Infrastructure
  - Emergency Services
  - Security
- Saved over \$161 million since 2009





# Mission Support Contract

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**Frank Armijo**

*President and General Manager*  
Mission Support Alliance

**May 1, 2014**



# Scope of Work

- Providing critical infrastructure services to
  - Richland Operations Office
  - Office of River Protection
  - 5 other prime contractors
- Maintaining and consolidating site infrastructure and site-wide systems
- Ensuring 45 to 65 year old infrastructure has the capacity and reliability to support the cleanup mission
- Providing reliable services to ensure protection and safety of nuclear facilities
- Aligning services to support changing cleanup needs



There are over 6,000 electrical poles delivering power across the site



Water lines were installed in the 40s and 50s.



# Complexity of Scope



Reliable infrastructure services are necessary for Hanford cleanup operations



Hanford has over 350 lane miles of roads

- Water Systems
  - Over 95 miles of buried pipe
  - 800M gallons of water used annually
- Electrical Utilities
  - 246 miles of power lines
  - 6,000 power poles
- Emergency Services & Systems
  - Radio Fire Alarm Reporting is essential to the safety and security of facilities and employee welfare
- Information Technology
  - Legacy applications to be updated
  - Cyber security improvements
- Roads
  - Over 5,700 passenger vehicles (daily average)
  - 350+ lane miles of paved roads
  - 500 trips by heavy haul trucks (daily average)



# Safety

Maintaining safe and secure operations, and ensuring worker safety are MSA's key priorities

- Led and implemented site-wide safety programs
- ISO 14001 certification
- 3 VPP Star of Excellence Awards
- Confirmed security posture
- Graduated 22 new patrol officers

Supporting safety throughout the DOE complex

- Supported safety assessments at other DOE locations
- Provided mentoring on VPP campaigns
- Shared "Lessons Learned" database (OPEXShare)



MSA has experienced a 55% reduction in recordable injuries



Lock out/Tag out is a site wide safety program



# Supporting Hanford Cleanup

Working closely with the Richland Operations Office to provide services for River Corridor and Central Plateau cleanup activities



MSA riggers provided support to glove box removal at PFP

- Upgraded Central Plateau water system to improve pressure control essential to nuclear facilities
- Provided highly-specialized services to support CHPRC's Plutonium Finishing Plant glove box removal
- Provided IT support to help improve electronic processes to increase efficiency with patient flow at site medical provider
- Implementing Waste Sampling and Characterization Facility shutdown plan



# Supporting Hanford Cleanup

MSA identifies efficiencies and implements programs and services to accelerate cleanup

- 630 fuel efficient vehicles in the DOE fleet
- 500+ square miles of secure wireless transport
- 9,000 digital phone lines (VoIP)
- 2,000+ server-based workstations deployed (thin clients)
- 1,555 metric tons of recycled materials
- 2.5 million square feet of managed facilities
- \$161 million in cost savings to date
- Over \$430 million in small business subcontracting since 2009; 40% over goal



Hanford has over 500 square mile of secure wireless transport



MSA is adding electric and alternative fuel vehicles



# 2014 and 2015



**Implement Commercial**  
Service Delivery Model



**Right-Size** the Infrastructure



**Lead** Site-Wide Integration



Be a **National Leader** in  
Clean Energy



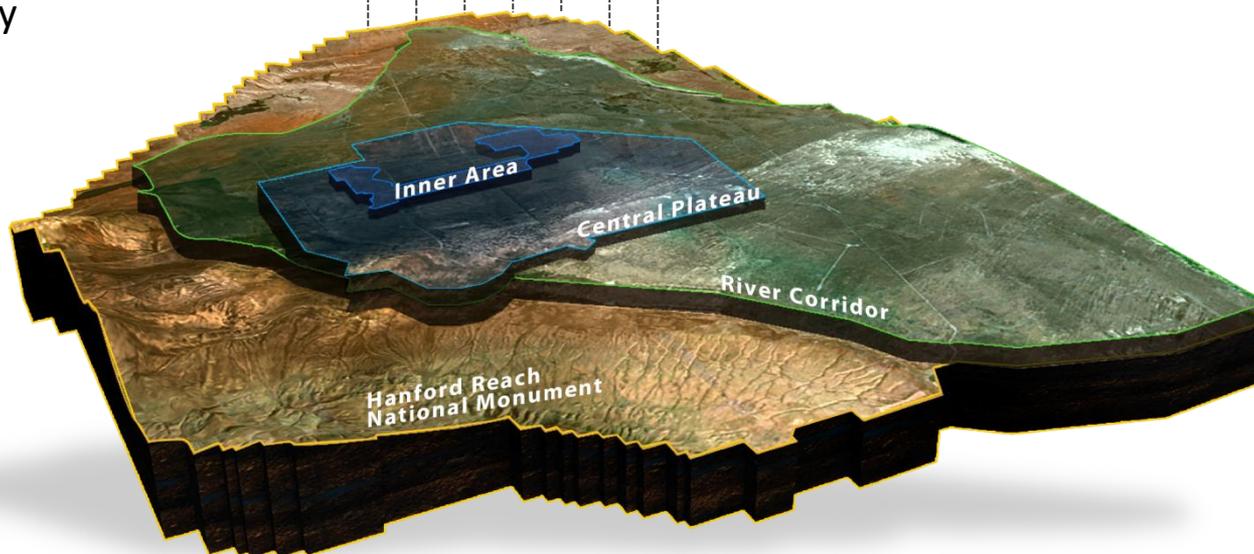
**Drive Innovations** and  
Cost Savings



**Support** Waste  
Complex Operations



Excel in the **Safe and Secure**  
Performance of Work





# HANFORD SITE CLEANUP BY THE NUMBERS

RICHLAND OPERATIONS OFFICE

**SIX** of Hanford's nine reactors have been "cocooned"



**100** percent of the site's spent fuel has been moved to dry storage



**743** buildings have been demolished



**859**

waste sites have been remediated



**12K**

cubic meters of underground waste have been removed



**10**

billion gallons of contaminated groundwater have been treated



# Conclusion

- Richland is making tangible and visible cleanup progress at Hanford and performing cleanup in a predictable and safe manner
- Richland has a strategy, vision and plan and we will continue to work together with EPA, Ecology and our stakeholders to ensure continued success

