Site Overview of the Paducah Gaseous Diffusion Plant
January 2011
Land Ownership:
- DOE-owned land consists of 3,420 acres
- Site formerly a World War II munitions plant
- Site chosen for uranium enrichment plant in 1950; operations began in 1952
- Energy Policy Act of 1992 created USEC to operate the plant
- Lease/license agreements with
  - USEC to enrich uranium
  - West Kentucky Wildlife Management Area (WKWMA)
Site Background

Environmental Regulators:
- Commonwealth of Kentucky
- U.S. EPA Region 4

Public Interaction:
- Citizens Advisory Board-CAB
- Paducah Area Community Reuse Organization (PACRO)
- Environmental Information Center (EIC)
- Other Stakeholders

Grants
- Federal Facility Agreement – KY
- Agreement in Principle – KY
- Kentucky Research Consortium for Energy and the Environment – University of Kentucky

Remediation
- LATA Environmental Services of Kentucky, LLC
  - 720 employees

Depleted UF₆
- Uranium Disposition Services
  - 199 employees

Infrastructure
- Swift & Staley
  - 99 employees

GFSI Support
- USEC

DOE Consolidated Business Center

DOE Oak Ridge Operations Office

U.S. Department of Energy
Office of Environmental Management
Portsmouth/Paducah Project Office

U.S. DOE HQ

Contractors

USEC
- Leases production and infrastructure facilities at Paducah

U.S. Department of Energy
Office of Environmental Management
Portsmouth/Paducah Project Office

U.S. DOE HQ
• DOE-related companies provide jobs for more than 2,000 people in the region
• Contractors have made millions of dollars in charitable contributions
• > $5 billion boom from nearly 60 years of operations at DOE site and related industries
The United States Enrichment Corporation has leased and operated the uranium enrichment portion of the Paducah plant since 1993

- DOE responsible for shared site operations (managing multiple contractors and interfaces)
- DOE and USEC work closely to coordinate work
• Major community interfaces
  • Citizens Advisory Board
    • Key method for stakeholder input into decision making
    • Working closely with CAB on key long-range decisions
      • Environmental remediation
      • Waste disposal options
      • Plant D&D
  • Paducah Uranium Plant Asset Utilization Task Force
    • Reindustrialization
    • Economic development
Major EM Challenges

Off-site TCE plumes
• Residential wells contaminated

Burial grounds
• 8 burial grounds, ~66 acres
• Some contain radioactive, pyrophoric and RCRA waste

Tc-99 plume
• Radionuclide releases have migrated off-site, but not above MCLs
• No Tc-99 seen above National Drinking Water Standards

Contaminated soils
• e.g., PCB and uranium

DOE Material Storage Areas
• Returned from USEC
• Inside and outside areas
• About 1/4 returned to USEC, common use

Major TCE source
1. Primary source of off-site contamination
2. DNAPL present
3. TCE >500,000 ppb in groundwater
4. Estimated 6,000-60,000 gals of TCE released

Inactive facilities
• Contaminated facilities; no reuse

Depleted uranium
• More than 39,000 cylinders

TCE seeps
• Upspringing in Little Bayou Creek
### Project Schedule

#### Environmental Remediation – Pre-GDP D&D
- **2009**
  - Legacy Waste
  - DMSA
- **2009**
  - Soils OU
- **2009**
  - D&D OU
- **2009**
  - Surface Water OU
- **2009**
  - Groundwater OU
- **2009**
  - Burial Grounds OU
- **2017**
  - Dissolved Phase Plumes
- **2017**
  - Disposal Options
- **2019**
  - Waste Disposition

#### GDP Transition, S&M, and D&D
- **2015**
  - USEC 2-yr notification
- **2017**
  - GDP Operations
- **2019**
  - GDP Transition/S&M
- **2019**
  - Waste Disposition
- **2019**
  - GDP D&D OU
- **2019**
  - GDP Groundwater Sources OU
- **2019**
  - GDP Lagoons & Ditches OU

#### Depleted Uranium Hexafluoride Conversion Plant
- **2009**
  - Conversion Operations
- **2031**
  - D&D OU/DUF6

#### Final Comprehensive Site OU
- **2030**
  - Final Comprehensive Site OU

#### Ongoing Environmental Monitoring until RAOs Achieved – Final NPL Delisting
Since off-site groundwater contamination was discovered in 1988, DOE has taken a number of actions to protect the public:

- Provided municipal water to ~100 nearby residents
- Installed two systems that have treated about 3 billion gallons of contaminated groundwater
- Extensive site investigation and characterization
- Addressing sources of TCE contributing to off-site contamination
Paducah

C-400 Source Reduction

Source Removal Ongoing

Phase I
Southwest area

Phase II
area

Phase I
East area

DRAFT - TCE PLUME MAP - Regional Gravel Aquifer (Fall 2009)
Burial Grounds

- 8 historic burial grounds covering ~66 acres
- Contain up to 38 million ft$^3$ of material, including RCRA, radioactive and pyrophoric wastes
- May be a major source of groundwater contamination
- Cost could range from $100-$400 million, representing up to half of the site’s budget
- Decision process underway; Record of Decision scheduled for late 2011
- Cleanup work scheduled to begin in 2012
- Cost-effective disposal alternative critical to overall site cleanup
The C-410 Feed Plant complex covers almost 200,000 ft\(^2\). Asbestos abatement, debris and equipment removal underway. Demolition scheduled for completion in 2012.

The C-340 Metals Plant covers more than 60,000 ft\(^2\). Asbestos abatement, debris and equipment removal underway. Demolition scheduled for completion in 2011.
• Complete active cleanup and demolition of old buildings by early FY 2012

• Continue FY 2011 work as planned, ensuring that current FY 2011 regulatory milestones are met

• Clean up historic unlined burial grounds by removing Solid Waste Management Unit 4 and dividing remaining burial ground SWMUs into more manageable scopes of work

• Assuming CERCLA supports it, build an engineered waste disposal facility to support currently scheduled cleanup as well as anticipated cleanup and demolition of PGDP

• Continue cleaning up groundwater contamination sources and plumes

• Investigate potential contamination in two watersheds

• Evaluate alternatives and select a remedy to address contamination in about 34 acres of soil

Full funding is essential to complete work by 2019 under regulatory commitments
**Regulatory End State Vision**

- Consistent with future industrial land use:
  - Contaminated surface soils excavated to maximize plant areas available for reindustrialization
  - Major TCE sources to off-site groundwater contamination treated to extent technically practical
  - High-risk burial grounds posing groundwater threat excavated; low-risk ones capped in place
  - Contaminated sediments excavated to maximize recreation in WKWMA
  - Institutional controls restricting access to groundwater, capped burial grounds, and subsurface soils
  - Long-term monitoring
Utilities/ Infrastructure
• Switchyards
• Cooling towers
• Sewer system
• Water treatment plant
• Fire Department
• Machine shop (leased to USEC)
• Analytical lab (leased to USEC)
• Laundry building
• Electrical grid

Metals¹
• Nickel
• Cooper
• Aluminum
• Steel

Land
• Up to 70% of DOE property releasable by 2019

Security
• Secure facility that can handle equivalent to top secret information

Personnel
• Trained guards
• Trained nuclear workers

Other
• Rail line with proximity to major highways, river, industrial parks
• DOE easement northeast to Ohio River
• Operating landfills that could be converted to commercial or private use

¹ Over 470,000 tons of these metals projected to be generated during D&D of Paducah.
• Concrete/metals from D&D work
  - Reduce cleanup costs and allow for recycling instead of waste disposal
  - More jobs remain local

• Utilities
  - Future use for potential energy park

• Uranium
  - Can be bartered/sold to support cleanup efforts
  - Extends USEC time at Paducah
  - Offsets funding shortfall
  - More jobs remain local

• Scrap metal moratorium limits ability to re-utilize many assets
• Based on the President’s directive for flat-line funding, Paducah will not meet its FY 2019 regulatory obligations and commitments

• Flat funding would result in a $360 million shortfall in FY 2012-2016

• Projected Paducah shortfalls: $26 million in FY 2012 and $26 million in FY 2013

• Maintaining the 2019 investment strategy could result in up to 70% of DOE Environmental Management’s total liability at Paducah being made available for reuse/re-industrialization
• A short-term investment of $500 million at Paducah could save taxpayers $1.5 billion, avoid a 13-year delay to complete cleanup, and meet existing regulatory milestones.

• It would:
  - Avoid a 13-year delay to complete cleanup
  - Meet existing Regulatory Milestones
  - Use workers, land and infrastructure wisely
  - Protect the public by addressing DOE’s two largest offsite groundwater plumes and their sources
  - Reuse assets such as uranium sales and recycled scrap metal to mitigate funding shortfall, achieve results and reduce taxpayer liability
  - Prepare the site for re-industrialization and make infrastructure assets, such as electrical grid and water treatment plant, available
BACK-UP SLIDES
Pre-GDP shutdown
- Accessible, nonoperational areas
- Significant risk reduction
  - Major Sources of off-site contamination
  - Hot Spot removal of soils/sediments
  - Burial Grounds
- Mortgage reduction
  - D&D of inactive facilities
  - Legacy waste/DMSAs

Post-GDP shutdown
- D&D of operating GDP
- Underlying soil contamination
- Final groundwater & surface water decision
- NPL delisting
Paducah Groundwater Strategy

Operating Gaseous Diffusion Plant

- Prevent exposure to groundwater (completed)
- Prevent or minimize plume migration
- Prevent or minimize further migration from sources
- Return groundwater to its expected beneficial uses wherever practicable

Water Policy (off-site risk eliminated)

- NG Plume Treatment System (centroid plume control)
- NE Plume Treatment System (centroid plume control)

Cylinder Test Pit

- C-400 Sources
- SW Plume Sources
- C-747 Burial Ground

Dissolved-Phase Plumes

- NW Plume
- NE Plume
- SW Plume

D&D/RA of Gaseous Diffusion Plant And Underlying Soils

Final CSOU Action

Final Decision for Groundwater Restoration

5-Year Review and Long-Term Stewardship

On-Going Environmental Restoration and Performance Monitoring Data Activities

Environmental Management

Safety ♦ Performance ♦ Cleanup ♦ Closure
Potential "DNAPL" Zone based only on MIP data

Conceptual Site Model
CROSS-SECTION VIEW (looking north)
• **Completed Phase I Operations 12/07/2010**
• Recovered ~560 gals of TCE from Phase I source areas
• Equipment removal and site restoration activities ongoing
• Evaluating Phase II path forward
• Phase I equipment removal and site restoration ongoing

• Phase I confirmatory sampling to start by end of January

• Regulators reviewing Phase II Field Sampling Plan (main focus to increase our confidence in the conceptual model regarding DNAPL volume and location)

• Preparing remedial decision strategies and identifying data gaps

• Proposed schedule and strategies for Phase II to be presented to the FFA parties in early to mid-February
Northwest plume
North Well Field

Northwest Plume
South Well Field and
Fence Line Wells
10 CFR 770.4 establishes Community Reuse Organizations (CRO) to represent a community adversely affected by DOE workforce restructuring at a defense nuclear facility and to have the authority to enter into and fulfill the obligations of a DOE financial assistance agreement.

- Requires DOE to work with CRO first on transfer of Real Property.
- Establishes a detailed process for DOE to follow on Real Property transfer.
- Paducah-Area Community Reuse Organization (PACRO) established per this requirement to help lessen potential downsizing and restructuring of the Paducah Gaseous Diffusion Plant workforce.

**Real Property Transfer Process**

- List to PACRO on an annual basis of what Real Property is available for economic development

- PACRO submits proposal

- Proposal Acceptable
  - Property not transferred
  - DOE develops transfer agreement

- Congressional Notification
- Property Transferred
Paducah-Area Community Reuse Organization (PACRO) was formed with DOE funding to help lessen potential downsizing and restructuring of the Paducah Gaseous Diffusion Plant workforce.

A regional organization, PACRO gave birth to the Paducah Uranium Plant Asset Utilization Task Force:
- PUPAU identifies Paducah plant assets that could be reused to benefit both the plant workforce and community
- Assets may include buildings, land, equipment, infrastructure, nickel ingots, aluminum ingots, scrap ferrous metals, and depleted uranium hexafluoride cylinders

Task Force accomplishments:
- Reached agreement with TOCXO Inc. to obtain the excess fluorine cells at PGDP, saving the government about $2.5 million in cleanup costs
- Supports continued adequate funding for Paducah PGDP cleanup
- Supports DOE efforts for deposition of nickel ingots at PGDP
- Supports reusing plant assets for nuclear and other industries