



Paducah Gaseous Diffusion Plant  
Citizens Advisory Board

October 16, 2008

## Proposed Agenda for the October Board Meeting

**Chair**  
Allen Burnett

**Chair-Elect**  
Bobby Lee

**Board Members**  
John Anderson  
Judy Clayton  
Shirley Lanier  
Elton Priddy  
Alex Roman

John Russell, Ph.D.  
Jim Smart, Ph.D.  
Don Swearingen

**Board Liaisons**  
Reinhard Knerr  
*DOE DDFO*

Rob Seifert  
*DOE Federal Coordinator*

Ed Winner  
*Division of Waste  
Management*

Turpin Ballard  
*Environmental Protection  
Agency*

Mike Hardin  
*Fish and Wildlife Resources*

Stephanie Brock  
Rob Gresham  
*Radiation Health Branch*

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### 6:00

Call to order, introductions  
Review of agenda

### DDFO's Comments

-- 20 minutes

### Federal Coordinator Comments

-- 5 minutes

### Liaison Comments

-- 10 minutes

### Presentations

-- 30 minutes

- Status of Waste Disposal Options Public Meeting
- Bioremediation Review
- Paducah Site Trends/Uncertainties for Scenario Planning

### Chairs Meeting Review

-- 10 minutes

Approve Letter for Chairs Signature

### Public Comments

-- 10 minutes

### Administrative Issues

-- 10 minutes

#### Motions

- Chair-Elect Election
- Work Plan Approval
- Recommendations

### Final Comments

### Adjourn



# PADUCAH GASEOUS DIFFUSION PLANT CITIZENS ADVISORY BOARD

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## **Paducah Gaseous Diffusion Plant Citizens Advisory Board Meeting Minutes October 16, 2008**

The Citizens Advisory Board (CAB) met at the CAB office in Paducah, Kentucky, October 16, 2008, at 6 p.m.

**Board members present:** John Anderson, Allen Burnett, Bobby Lee, Shirley Lanier, Elton Priddy, John Russell, Jim Smart and Don Swearingen

**Board members absent:** Judy Clayton and Alex Roman

**Board Liaisons and related regulatory agency employees:** Bill Clark, Kentucky Division of Waste Management (KDWM); Stephanie Brock and Dewey Crawford, Kentucky Radiation Health Branch (RHB)

**Deputy Designated Federal Official:** Reinhard Knerr

**DOE Federal Coordinator:** Rob Seifert

**U.S. Department of Energy (DOE) related employees:** Rich Bonczek, Yvette Cantrell, Bryan Clayton, Kim Crenshaw, Tracey Duncan, Bruce Gardner, Marc Hill, Gail Mattson, Eric Roberts, Buz Smith and Tom Snyder

**Public:** Louella Aletads, Randall Barnes, and Melissa Kelly

**Agenda**

The agenda was modified to discuss the status of the Waste Disposal Options public meeting during the Federal Coordinator Comments. **The Board approved the agenda as modified.**

**Deputy Designated Federal Official Comments**

Knerr presented project updates to the Board. All presentations are available on the CAB Website at [www.pgpdcab.org](http://www.pgpdcab.org). Questions and answers (paraphrased) appear below.

<b>Questions/Comments</b>	<b>Answers</b>
<b>Burnett:</b> Where was the waste from the DOE Material Storage Area disposed?	<b>Knerr:</b> Most of the waste was sent to Energy Solutions. Some of the waste may have been sent to the Nevada Test Site and some volumes were sent to the C-746-U Landfill.
<b>Smart:</b> Will Phase I of the Electrical Resistance Heating at C-400 be complete before Phase II begins?	<b>Knerr:</b> The Independent Review Team that was put together by Headquarters recommended a phased approach to focus on one area. Any improvements or adjustments would be incorporated prior to installation of Phase II. It will be a sequential activity.
<b>Smart:</b> Will there be continuity issues on the C-400 project since the remediation contract may be issued to a different contractor?	<b>Knerr:</b> DOE will make available existing subcontracts to the remediation contract awardee to take over management.
<b>Smart:</b> Is Paducah Remediation Services (PRS) eligible to rebid the contract?	<b>Knerr:</b> Yes.
<b>Lee:</b> Will the Depleted Uranium Hexafluoride Conversion Facility be operational in January?	<b>Knerr:</b> Construction will be complete in January and the readiness review process will begin. Operations are scheduled to begin in 2010.
<b>Burnett:</b> It is a two year process from construction completion to operations. Are there benefits for DOE to reduce that time period?	<b>Knerr:</b> Paducah is fortunate that Portsmouth is going through the process first and will have the lessons learned from any issues. Lessons learned from across the complex will also be utilized. That is part of the reason for the schedule.
<b>Lee:</b> Is there a contamination measurement for the Decontamination and Decommissioning buildings?	<b>Knerr:</b> The facility can be torn down to slab. The slabs are surveyed for residual contamination and as an additional precaution fixative is applied to the slabs to prevent migration of contaminants and for protection of the workers. The survey data identifies the levels of contamination and area will require routine surveillance. Radiation ropes and postings will also be maintained.
<b>Lee:</b> Could other buildings be constructed on top of those slabs or are their restrictions?	<b>Knerr:</b> The slabs are not categorized according to end use. DOE would have to evaluate release to a commercial entity or reuse for DOE. It would depend if the contamination was completely removed or controlled.
<b>Burnett:</b> What is the status of the Environmental Indicator since the signs were posted?	<b>Knerr:</b> Hopefully by the next Board meeting Kentucky will have an announcement to make on the Environmental Indicator.

## Federal Coordinator Comments

Seifert thanked Burnett for his service and work as Chair for the past couple of years and welcomed Lee as the new Board Chair.

Burnett has made DOE aware that his employer will be supporting the nickel procurement portion of the Request for Proposal and is concerned of a potential conflict of interest. Burnett will recuse himself from discussions or votes pertaining to the nickel.

DOE will host a waste disposal options public meeting on November 18 from 4:00 to 7:00 at the Robert Cherry Civic Center. The meeting will be an educational type workshop in preparation for future meetings and focus on DOE activities and scope up to the 2019 timeframe, explain the CERCLA process and opportunities for public input. The CAB is invited to provide a booth explaining who they are and the CAB mission. Seifert asked the CAB for interest in setting up a subcommittee meeting to review the materials that will be presented at the public meeting. Staff will contact Alex Roman, Public Outreach Subcommittee Chair, to organize a subcommittee meeting to review the materials.

DOE has issued responses to all of the CAB recommendations.

## Presentations

### Green Remediation

Clayton, PRS, provided a briefing on Green Remediation. The presentation is available on the CAB Website at [www.pgpdcab.org](http://www.pgpdcab.org). Questions and answers (paraphrased) appear below.

Questions/Comments	Answers
<b>Lee:</b> How does DOE initiate a test on a technology?	<b>Clayton:</b> If the work is being done through the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process, a Treatability Study and Work Plan would be developed and submitted to the regulators for approval of the action. If the test is governed by another process, a permit modification would be necessary.
<b>Smart:</b> The Permeable Treatment Zone is a well proven technology. Four or five years ago DOE invested considerable time and money on this project. As I recall, it could not be injected due to a contractor that had proprietary technology and wanted to charge DOE a considerable amount of money and the project was terminated.	<b>Clayton:</b> The portion of the project that failed was associated with the injection. The contractor planned to retool but wanted DOE support. Another contractor had a different installation method but there were issues with patent. That technology does have flaws such as clogging and does require maintenance.

<p><b>Lee:</b> It sounds like some of the technologies won't work at Paducah due to the depth of the Regional Ground Aquifer (RGA).</p>	<p><b>Clayton:</b> The depth limitation is a factor. Going away from the plant around Little Bayou Creek, the RGA is closer to the surface and technologies such as Geo-Siphon may work. PRS is in the process of modifying the baseline to include a treatability study in the area of Little Bayou Creek but are not to the point of identifying the technology. That technology will hopefully be able to be utilized at the plant.</p> <p><b>Knerr:</b> DOE is looking at the Geo-Siphon if additional funding for testing is available.</p>
<p><b>Burnett:</b> Does the Environmental Protection Agency require or suggest Green Remediation at the site? Does green remediation change the approach at the site?</p>	<p><b>Clayton:</b> DOE's approach is driven by CERCLA. The components of CERCLA for a Feasibility Study analyze nine components of criteria. Two criteria have to be met to use that technology or response action. Five of the criteria are balancing criteria used to determine implementation and the two other criteria are modifying criteria, which is state and public acceptance gained from comments.</p>

### Scenario Planning: Future Uses for the Paducah Site

Lee provided a briefing on Scenario Planning: Future Uses for the Paducah Site. The presentation is available on the CAB Website at [www.pgpdcab.org](http://www.pgpdcab.org). The process included the following process:

1. **Assemble a team:** Six to eight people recommended
2. **Select a Timeframe:** Envision 20 years from now at the Paducah site
3. **Trends and Uncertainties:** Identify trends that influence the site and have a known pattern. Uncertainties are important but the direction is unclear.

The presentation listed political, economic, cultural, demographic and technological trends and uncertainties and provided a matrix to determine positive, negative, unclear or no correlation.

Lee requested that the Board send a list of uncertainties that influence the site to staff to update the matrix and initiate the four scenarios. The Long-Range Stewardship Subcommittee will meet several times to develop full descriptions of the four scenarios.

### Administrative Issues

#### Motions

**Letter for Chairs Signature** - Lee presented a letter that was prepared at the Washington D.C. Chairs Meeting. The letter commended Assistant Secretary James Rispoli on his support of the Environmental Management Site-Specific Advisory Board and public involvement during his tenure. **The Board approved adding the Chair's signature to the letter.**

**Chair-Elect** - Judy Clayton was elected Chair-Elect by acclamation.

**CAB Work Plan** – Staff will revise the Work Plan to indicate the Waste Disposal Options public meeting in November instead of October. **The Board approved the Work Plan.**

**Recommendation** - The CAB recommended that if DOE decides to pursue the radiation survey flyover plan, the area of the flyover should be expanded to include the DOE reservation and the West Kentucky Wildlife Management Area. Specifically, the CAB would like for DOE to include the area west of the Paducah site to Bethel Church Road, east to Mayfield Metropolis Road, south to Woodville Road and north to the Ohio River. **The Board approved the proposed recommendation.**

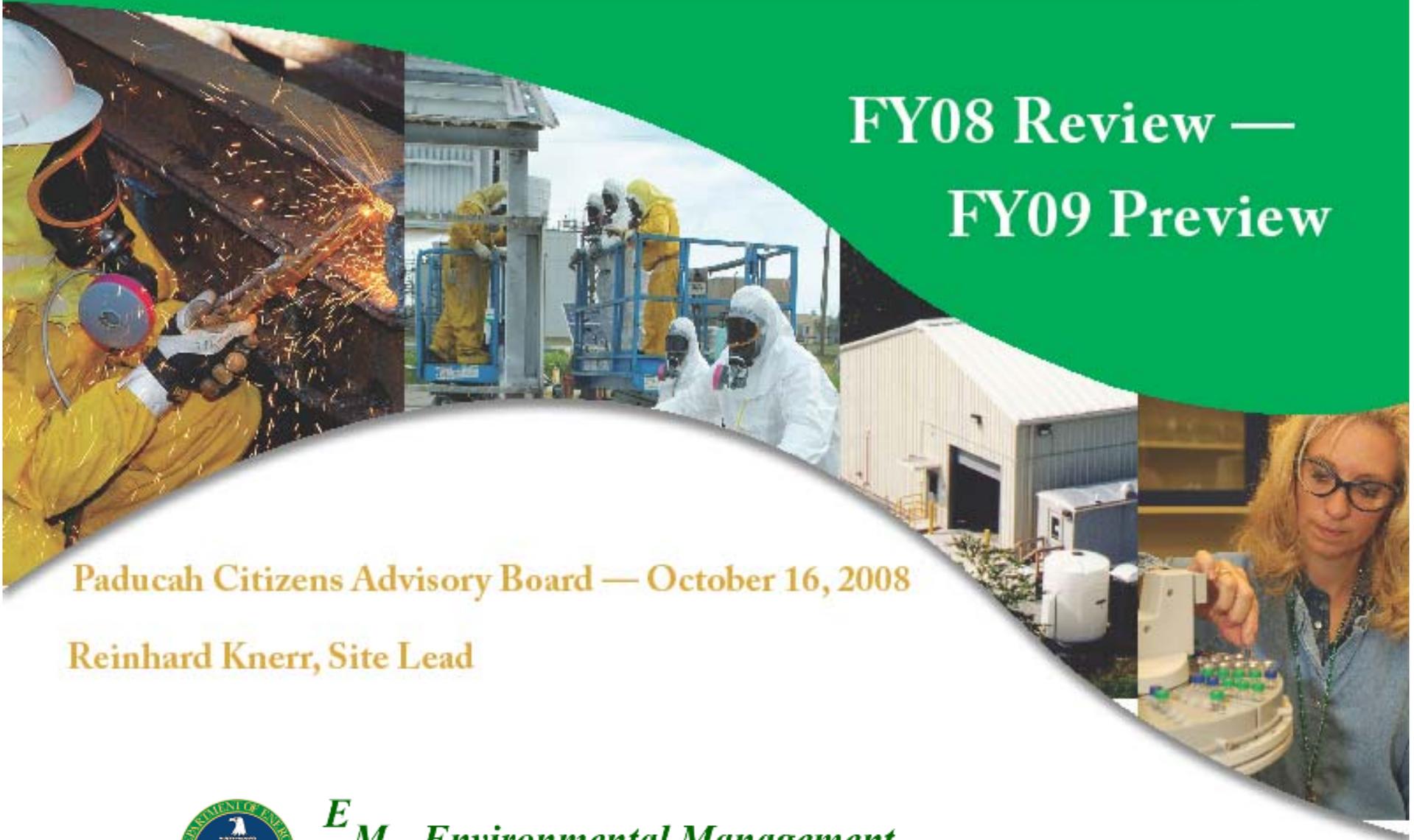
### **November Agenda**

The November Board meeting agenda will include presentations on the Generic Engineering Evaluation/Cost Analysis and the CERCLA Five-Year Review. Lee will present the status on the Scenario Planning and DOE will provide an overview of the Public Meeting.

The meeting adjourned at 8:45 p.m.

# Solving Cleanup Challenges Through Risk Reduction

## FY08 Review — FY09 Preview



Paducah Citizens Advisory Board — October 16, 2008

Reinhard Knerr, Site Lead



***EM*** Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

# 2008 Environmental Remediation

## Surface Water Operable Unit



DCELN07-01054.D2  
Primary Document

Site Investigation Report  
Surface Water Operation Unit (On-Site)  
Paducah Gaseous Diffusion Plant  
Paducah, Kentucky



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Office Trail and Safety Team  
Date: 10/3/08



DCELN1  
Primary

Removal Notification  
Surface Water (On-Site)  
Paducah Gaseous Diffusion P  
Paducah, Kentucky



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DCELN07-01054.D2  
Primary Document

Site Management Plan  
Engineering Estimate/Cost Analysis  
Surface Water (On-Site)  
Paducah Gaseous Diffusion Plant  
Paducah, Kentucky



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**Surface Water Operable Unit Site Investigation Report**  
**Surface Water Operable Unit Removal Notification**  
**Surface Water (On-Site) Engineering Estimate/Cost Analysis**



# 2008 Environmental Remediation

## Groundwater Operable Unit



DCELN97-01064.D2  
Primary Document

C-400 Electric Resistive Heating  
Remedial Design Report  
Paducah Gaseous Diffusion Pla  
Paducah, Kentucky



DCELN97-01064  
Primary Docum

C-400 Electric Resistive Heati  
Land Use Control  
Implementation Plan  
Paducah Gaseous Diffusior  
Plant  
Paducah, Kentucky



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DCELN97-01064.D2  
Primary Document

C-400 Electric Resistive Heating  
Remedial Action Work Plan  
Paducah Gaseous Diffusion Plant  
Paducah, Kentucky

SUBMITTED

DCELN97-01064.D2  
Primary Document

C-400 Electric Resistive Heating  
Quality Assurance Control Plan  
Paducah Gaseous Diffusion Plant  
Paducah, Kentucky



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Office Trail and Safety Team Date: 6/20/08

- C-400 Electric Resistive Heating Remedial Design Report (RDR)**
- C-400 Electric Resistive Heating Land Use Control Implementation Plan (LUCIP)**
- C-400 Electric Resistive Heating Remedial Action Work Plan (RAWP)**
- C-400 Electric Resistive Heating Quality Assurance Control Plan (QACP)**



# 2008 Environmental Remediation

## Groundwater Operable Unit



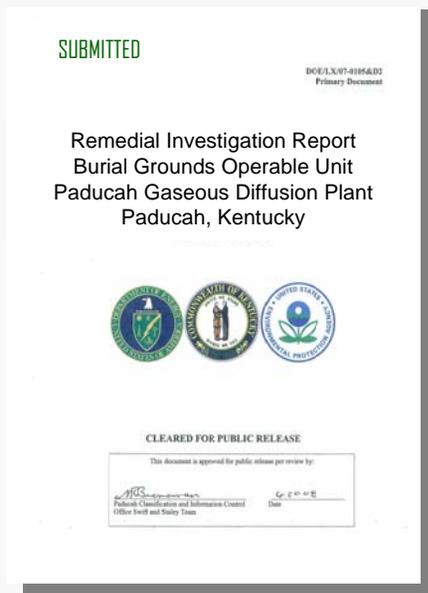
**Southwest corner of C-400 before infrastructure removal**



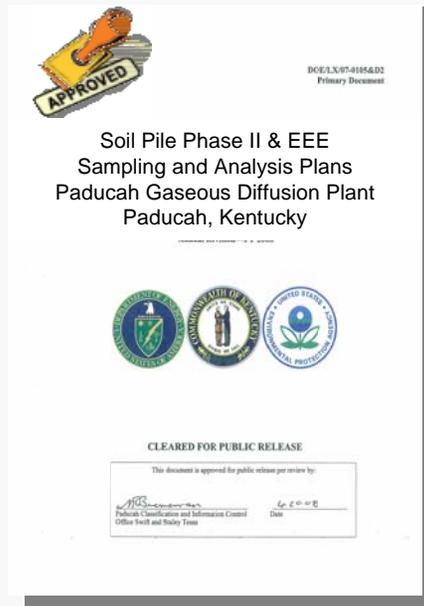
**Southwest corner of C-400 after infrastructure removal**

# 2008 Environmental Remediation

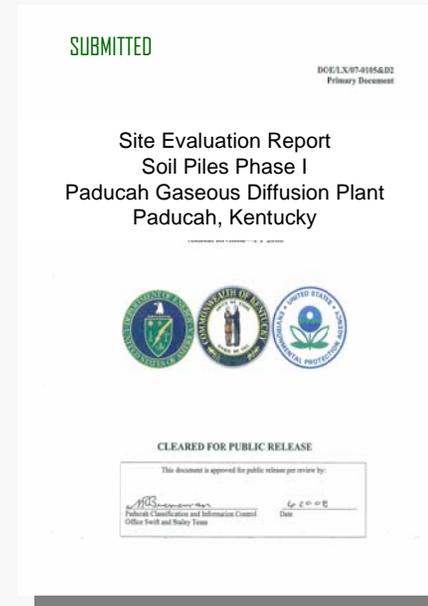
## Burial Grounds Operable Unit



## Soils Operable Unit



## Soils Operable Unit



**Burial Grounds Operable Unit Remedial Investigation Report**  
**Soil Piles Phase II & III Sampling and Analysis Plan**  
**Soil Piles Phase I Site Evaluation Report**



# 2008 Environmental Remediation

## Soils Operable Unit



**Workers place flags to pinpoint sampling locations on Phase II of the soil piles characterization project**

# 2008 - Inactive Facility Demolition



- 14 of 21 currently inactive facilities now demolished

**West End Smelter  
before and after  
demolition**



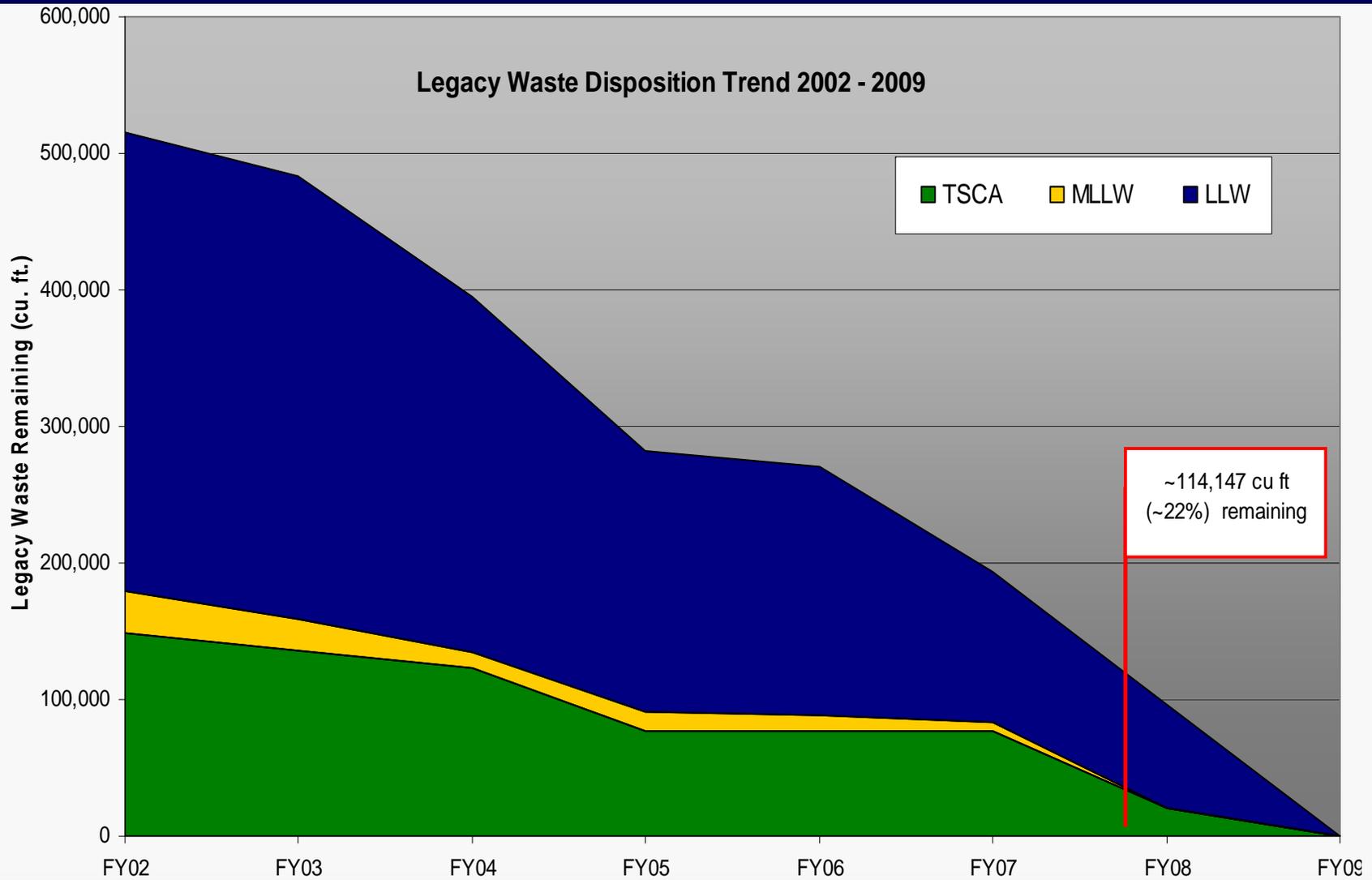
# 2008 - Inactive Facility Demolition



**Ammonia Dissociator (2 facilities)**



# 2008 – Materials Disposition



# 2008 – Materials Disposition- DMSA



- Characterization 97% complete
- Disposition 92% complete
- Nearly 70,000 ft<sup>3</sup> of waste dispositioned in FY 08

**A container of waste material from a DMSA is loaded for disposal**



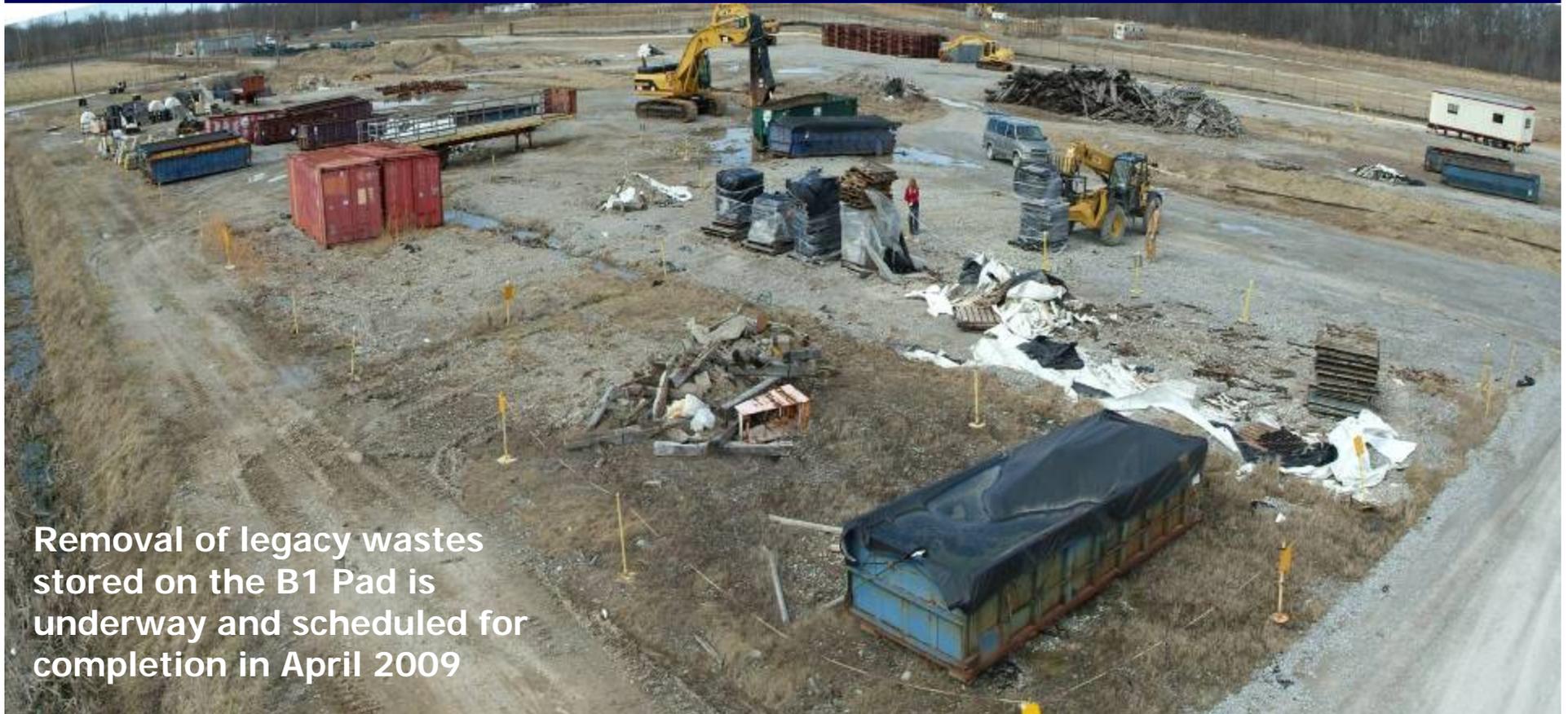
# 2008 – Materials Disposition- Nickel Ingots



# 2008 – Depleted Uranium Hexafluoride Plant



# 2009 Look Ahead – Material Disposition



Removal of legacy wastes stored on the B1 Pad is underway and scheduled for completion in April 2009

- On schedule to remove all legacy waste by 9/30/09
- On schedule to complete characterization and disposition of all DMSA material by 9/30/09



# 2009 Look Ahead – Inactive Facilities

Neutralization Pit



Firing Range

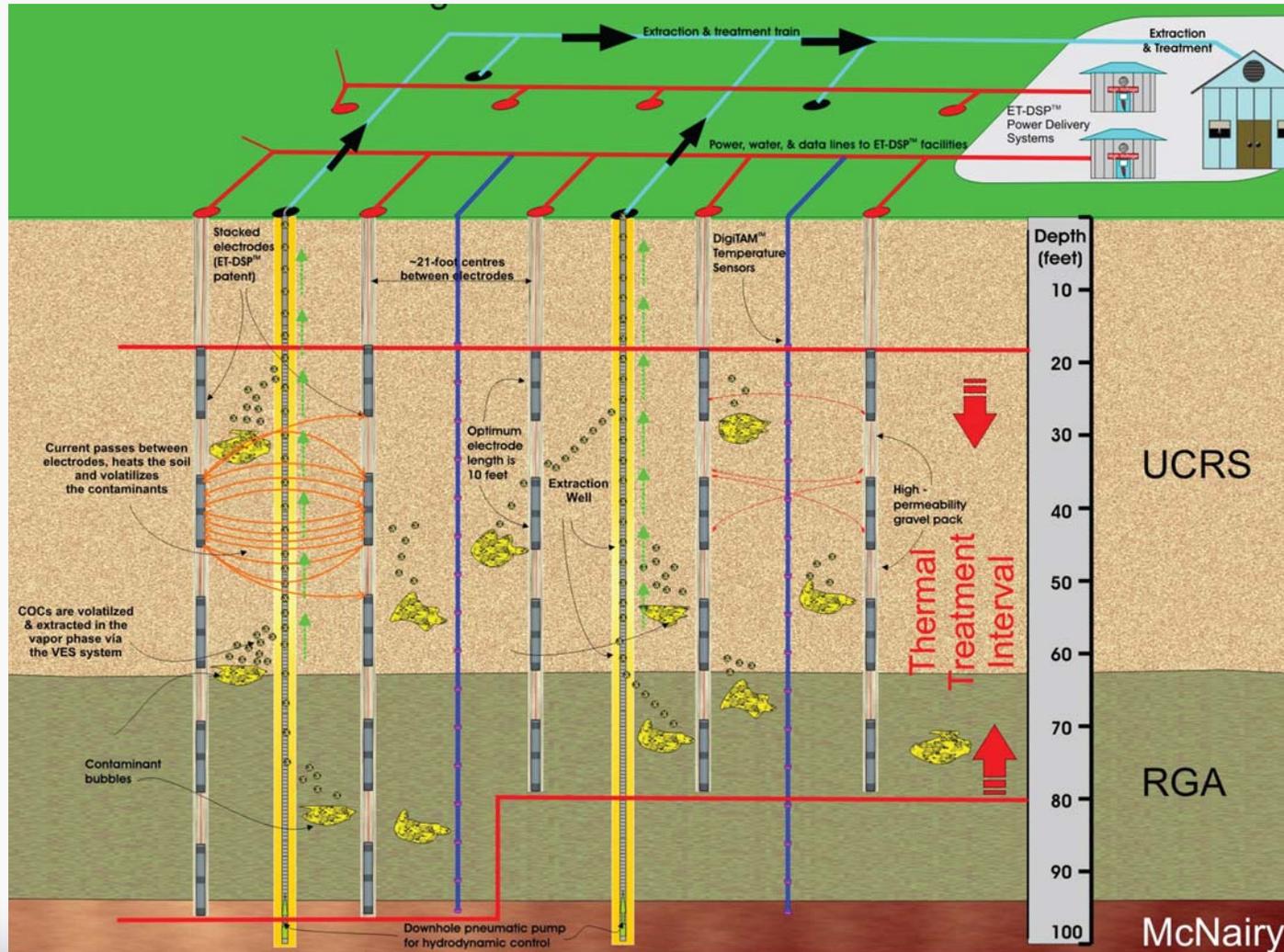


Sludge Pit



# 2009 Look Ahead – Environmental Restoration

## Groundwater Operable Unit



# 2009 Look Ahead – DUF<sub>6</sub>



# *Look Ahead* – DOE Acquisition Process

- Current Remediation (PRS) and Infrastructure contracts (SST)
  - Remediation expires September 2009
  - Infrastructure expires March 2009
- Environmental Remediation Request for Proposal expected to be released October or November 2008
  - 450 jobs
  - \$80-\$120 million annual value
  - Scheduled to start October 2009
- Infrastructure Request for Proposal will follow December 2008
  - 75 jobs
  - \$12-\$15 million annual value
  - Scheduled to start April 2010





**DOE Portsmouth/Paducah Project Office**

# Solving Cleanup Challenges Through Risk Reduction

## Green Remediation

Briefing for the  
Paducah Citizens  
Advisory Board  
October 16, 2008



*EM* Environmental Management

safety ❖ performance ❖ cleanup ❖ closure

# Green Remediation

Green remediation is the practice of considering all environmental effects of remedy implementation and incorporating options to maximize net environmental benefit of cleanup actions.

From "Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites," USEPA, EPA 542-R-08-002



# Core Elements of Green Remediation

## Six core elements

1. Energy
2. Air
3. Water
4. Land and ecosystems
5. Materials and waste
6. Stewardship



From "Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites," USEPA, EPA 542-R-08-002



# Green Remediation Objectives

- Achieve remedial action goals
- Support use and reuse of remediated parcels
- Reduce total pollutant and waste burdens on the environment
- Minimize degradation or enhance ecology of the site
- Minimize impacts to water quality
- Conserve natural resources
- Increase sustainability of site cleanups

From "Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites," USEPA, EPA 542-R-08-002



# Examples of Green Remediation

- Bioremediation
- Phytoremediation
- Passive treatments
- Recovery and reuse of contaminants

From "Green Remediation: Incorporating Sustainable Environmental Practices into Remediation of Contaminated Sites," USEPA, EPA 542-R-08-002



# Green Remediation in Paducah

Green Remediation Evaluations at the Paducah Gaseous Diffusion Plant			
Technology	Technology Description	Green Core Elements	PGDP Evaluation Results
Permeable Treatment Zone	Small cuttings of iron are mixed with a carrying agent and injected into the subsurface in a linear pattern to create a "wall" where they interact with TCE and reductively dechlorinate the contaminant and "capture" Tc-99.	Energy - Passive	Performed treatability study for the technology in 2001. Due to injection methods and geologic conditions, the iron and carrying agent did not flow into the subsurface, but came back to the surface by migrating around packer systems and annular space. Systems also tend to plug over time and require remedial maintenance.
Bioremediation Enhancement of PCBs	Utilizes injection of bacteria and nutrients to enhance the natural degradation of the PCBs in the sediments.	Energy – Passive	PGDP supplied nutrients and bacteria to PCB-containing ditch sediments to destroy PCBs (Outfall 011). An area of Outfall 012 also was lined with coconut husks to further enhance the rate of PCB destruction.
Engineered Wetlands	Wetlands are constructed as a flow thru filter to contain metals migrating from source areas.	Passive after placement	USEC and DOE are constructing a wetland in Outfall 013 to filter metals migrating from cylinder yards.
Solvent Recovery	C-400 Project is going to condense TCE vapors and recycle the solvent to the degree possible.	Air, Material and Waste, and Stewardship	The action will utilize recycling of the reclaimed solvent to the degree possible. It will minimize waste generation since the solvent will not require oxidation and scrubbing resulting in the generation of additional waste materials.
Direct Anerobic Reductive Dechlorination (Bioremediation)	A biological reaction in which bacteria replace chlorine atoms with hydrogen atoms on a chlorinated hydrocarbon (e.g., TCE→ <i>cis</i> -1, 2-DCE→vinyl chloride). Requires an environment with no oxygen.	Energy - Passive and Land and Ecosystems	Evaluated in GWOU FS in 2001. The RGA is an aquifer containing much oxygen, which must be removed to create the proper environment (i.e., anaerobic conditions). This environment must be maintained by providing food (e.g., lactate, vegetable oil, etc.) for the bacteria. The process is fast, but can result in producing degradation compounds that are more toxic than TCE. Also, cannot be used to address DNAPL.



# Other Green Remediation Technology

<b>Other Green Remediation Technologies</b>			
<b>Technology (Applicable Site)</b>	<b>Technology Description</b>	<b>Green Core Elements</b>	<b>Considerations for Application</b>
Biobarrier (No Identified User)	Bacteria and nutrients are injected into the subsurface in specific areas. Over time, this creates large quantities of biomass that reduce hydraulic conductivity, thereby slowing or stopping contaminant migration.	Energy - Passive	Considered for a treatability study at PGDP, but was canceled due to inability to control flow and contaminant migration direction. May have limited impact in destroying or reducing contaminant levels.
Phytoremediation (Oak Ridge & Portsmouth)	Utilizes plants to remove, transfer, stabilize, or destroy contaminants in soil, sediment, and groundwater.	Energy – Passive, Land and Ecosystem, and Long-Term Stewardship	May be suitable for some areas of the Soil or Surface Water OUs. Groundwater is generally too deep at PGDP for use near the plant. May have some capability near Little Bayou Creek TCE groundwater seeps, but still will be very limited due to RGA thickness (30 ft). May bioaccumulate some radiological components. Does not operate when plants are not growing, such as in winter.
Passive Vapor Extraction/Baro-Balls/BioVenting (Sandia)	Utilizes borings to allow VOC contaminant vapor extraction through changes in atmospheric pressure. BaroBall valves may be used to prevent high atmospheric pressure from entering the subsurface thru the borings.	Energy - Passive	The vadose zone at PDGP is tight. Vacuum pumps utilized in soil gas testing encountered difficulty in extracting vapor. Remediation time frame would be expected to be similar to that for natural attenuation.



# Other Green Remediation Technology

<b>Other Green Remediation Technologies (Continued)</b>			
<b>Technology (Applicable Site)</b>	<b>Technology Description</b>	<b>Green Core Elements</b>	<b>Considerations for Application</b>
Biowall (Multiple DOD Sites)	Biowalls are used to intercept and treat contaminated groundwater. Sections of the aquifer are trenched and replaced with mulch or compost, which provides food to bacteria and creates an anaerobic condition leading to anaerobic degradation. Biowalls also can be created with fluids such as vegetable oil.	Energy – Passive	Special considerations needed for PGDP include the total depth of the RGA (100 ft) and insuring that in-place permeability of mulch meets or exceeds that of native RGA materials.
Nano-Particle Injection (NASA – Cape Canaveral)	Nano-particles ( $10^{-9}$ meter) of zero-valent iron emulsions are injected into the aquifer and flow with the groundwater and reductively dechlorinate the TCE.	Energy – Passive	Special considerations needed for PGDP include the groundwater velocity of RGA water for retention time, migration of treatment materials outside of VOC impacted area, potentially negative impacts to land and ecosystems due to the particle size ( $10^{-9}$ meter) of treatment elements.
Geo-Siphon (Savannah River)	Utilizes siphon action to accelerate flow of contaminated water through reactive media to a discharge point. A large diameter well containing a treatment media is constructed. The natural head difference between the cell and discharge point to operate siphon.	Energy - Passive	PGDP hydrogeologic conditions provide the best applicable locations near Little Bayou Creek and Ohio River. May be applicable to the RGA seeps. Thickness of the RGA groundwater contaminant zone; minimal elevation differences between the creek, Ohio River, and RGA; and the need to place the siphon in the Ohio River floodplain may be limiting factors.



# Other Green Remediation Technology

## Other Green Remediation Technologies (Continued)

Technology (Applicable Site)	Technology Description	Green Core Elements	Considerations for Application
Aerobic Oxidation (Cometabolic) (Savannah River, DOD, & Others)	Biological breakdown of TCE during which TCE is "cometabolized" by an enzyme produced by bacteria in the presence of oxygen. Results in the production of nontoxic degradation products.	Energy - Passive and Land and Ecosystems	Currently being studied by the KRCEE-led TCE Degradation Project Team. Process is slower than anaerobic, but uses the natural RGA conditions. May require enhancements to be effective. DNAPL toxicity may negatively impact the bacteria.



# Conclusions and Path Forward

- DOE actions taken under CERCLA are designed to be consistent with green remediation principles
- DOE will incorporate reporting of green remediation aspects of remedial actions as part of the its ongoing pollution prevention reporting



# For More Information

More information on bioremediation and other green technologies can be found on these sites:

- <http://www.frtr.gov/> (Federal Remediation Technologies Roundtable)
- <http://www.itrcweb.org/> (Interstate Technology and Regulatory Council)
- <http://clu.in.org/greenremediation> (EPA Technology Innovation Program)
- [www.brownfieldstsc.org](http://www.brownfieldstsc.org) (EPA Brownfields Land and Revitalization Technology Support Center)



# Scenario Planning: Future Uses for the PGDP Site

Presented by Bobby Ann Lee  
October 2008

# Scenario Planning Process\*

1. *Assemble a team*
2. *Select a Timeframe*
3. *Identify Trends and Uncertainties*
4. Scenarios : Facilitator, CAB & Select Stakeholders
5. Identify Trend Indicators: Facilitator & CAB
6. Identify Key Success Factors: Facilitator & CAB
7. Identify Core Competencies: Facilitator & CAB

\*from eCornell University Scenario Planning course, Michael J. Hostetler, Author

# CAB Discussion at Annual Retreat – September 2008

1. *Assemble a team:*
  - 6-8 people recommended
2. *Select a Timeframe for the Scenarios:*
  - 20 years from now at the PGDP site

# CAB: August - September

## 3. *Identify Trends and Uncertainties*

<b>Political</b>	<b>Economic</b>
<b>Cultural</b>	<b>Demographic</b>
<b>Technological</b>	<b>Other</b>

- Trends are factors that influence the site and have a known pattern
- Uncertainties are important factors, but their direction is unclear

# Political Trends

- ▶ **Local economic development –tax base and job creation<sup>1</sup>**
- ▶ **Public participation in environmental decision-making for better effectiveness<sup>2</sup>**



<sup>1</sup>City of Paducah, <http://paducahky.gov/paducah/strategic-plan-paducah>

<sup>2</sup>United Nations, <http://www.millenniumassessment.org/en/index>

# Economic Trends

- ▶ **Cost Analysis of Government Activities**
  - decreasing DOE-EM budget past three years<sup>3</sup>
- ▶ **High cost of Environmental Clean-Up<sup>3</sup>**



<sup>3</sup>Dept. of Energy, <http://www.mbe.doe.gov/crOrg/cf30.htm>

# Cultural Trends

- ▶ **Increased public awareness of environmental issues**
- ▶ **Lack of confidence in government agencies and risk analysis**

# Demographic Trends

- **Census data for Paducah: No growth<sup>4</sup>**
- **Increased energy and natural resources demand<sup>5</sup>**

U.S. Census Bureau

<sup>4</sup>Census Bureau, <http://quickfacts.census.gov/qfd/states/21/21145.html>

<sup>5</sup>National Science Foundation, [http://www.nsf.gov/geo/ere/ereweb/acere\\_synthesis\\_rpt.cfm](http://www.nsf.gov/geo/ere/ereweb/acere_synthesis_rpt.cfm)

# Technological Trends

- **Advances in environmental clean-up methodology<sup>6</sup>**
- **Advances in the nuclear power industry<sup>7</sup>**

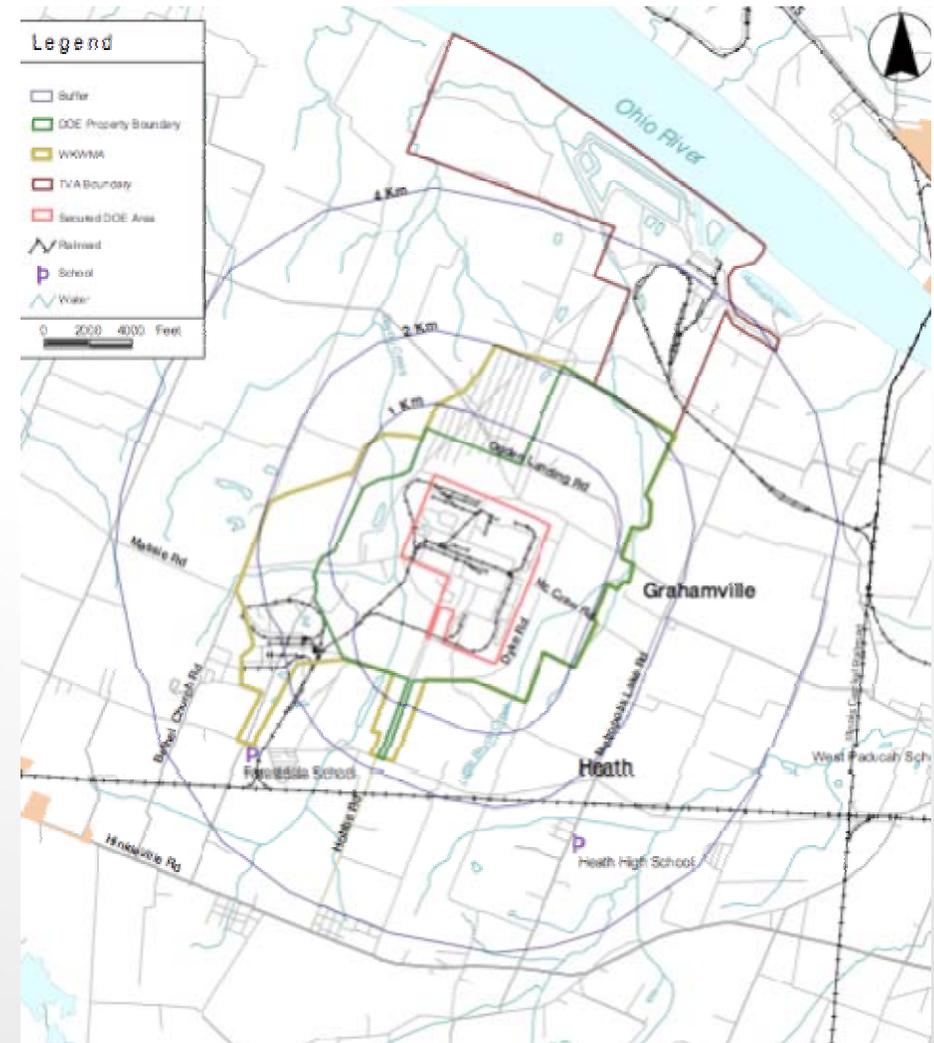


<sup>6</sup>Office Science Technical Info., ([http://www.osti.gov/bridge/product.biblio.jsp?osti\\_id=7441](http://www.osti.gov/bridge/product.biblio.jsp?osti_id=7441))

<sup>7</sup>Zink, John C. "DOE rises to nuclear waste challenges." Power Engineering. May 2003: 16[1]

# Tracking Trends & Uncertainties

- ▶ Changes in trends and uncertainties may have significant impact on future uses of the site
- ▶ Trend indicators will need to be identified and then monitored



# Political Uncertainties

U1. Will the transition in government administrations increase funding for environmental clean-up activities at DOE?

U2. Will regulators and stakeholders agree with DOE clean-up strategies and decision-making?

# Economic Uncertainties

U3. Will rising costs of energy increase funding for environmental management activities at DOE?

U4. Will local communities be able to attract organizations (business/government) to the remediated site to maintain jobs and tax base?

# Cultural Uncertainties

U5. Will a more diverse group of stakeholders play a proactive role in environmental management decision-making?

U6. Will clean-up strategies remediate contamination to levels acceptable by the local community?

# Demographic Uncertainties

U7. Will D& D at the site increase job opportunities and population in Paducah?

U8. Will the Paducah strategic plan to increase tourism increase industrial and/or recreational use of the site?

# Technological Uncertainties

U9. Will new generation nuclear technology be expanded and increase funding for environmental management at the site?

U10. Will innovations in other energy technologies increase funding for environmental management at the site?

# Matrix to Determine Independent Uncertainties

	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10
U1	If yes	0	0	+	?	?	?	+	?	?
U2		If yes	-	+	+	+	-	+	+	+
U3			If yes	+	?	+	+	+	+	+
U4				If yes	+	+	+	+	+	+
U5					If yes	+	+	+	+	+
U6						If yes	+	+	+	+
U7							If yes	+	+	+
U8								If yes	+	+
U9									If yes	+
U10										If yes

+ Positive correlation

0 No correlation

- Negative correlation

? Unclear correlation

# Independent Uncertainties

		Will local communities be able to attract organizations to the remediated site ?	
Will DOE funding for environmental clean-up activities change?		Reactive Participation	Proactive Participation
	Increase Funding	S1	S2
	Decrease Funding	S3	S4

## LONG-RANGE STEWARDSHIP SUBCOMMITTEE

Month	Subject	Topic
October 2008	Scenario Planning/End State	Tabulate trends and uncertainties for Scenario Planning
December 2008	Scenario Planning CAB Team and Facilitator	Develop plan to hold stakeholder meetings for next 6 months
February 2009	Framework for the Four Potential Scenarios	Site Tour D&D Buildings
April 2009	Initiate Stakeholder Meetings	Develop full descriptions of the four scenarios
June 2009	Continue Stakeholder meetings	Develop full descriptions of the four scenarios
August 2009	Continue Stakeholder meetings	Develop full descriptions of the four scenarios

# Scenario Planning Process\*

1. *Assemble a team*
2. *Select a Timeframe*
3. *Identify Trends and Uncertainties*
4. Scenarios : Facilitator, CAB & Select Stakeholders
5. Identify Trend Indicators: Facilitator & CAB
6. Identify Key Success Factors: Facilitator & CAB
7. Identify Core Competencies: Facilitator & CAB

\*from eCornell University Scenario Planning course, Michael J. Hostetler, Author