



Paducah Gaseous Diffusion Plant  
Citizens Advisory Board

February 15, 2007

## Revised Agenda for the February Board Meeting

**Chair**  
Allen Burnett

**Chair-Elect**  
Janet Miller

**Board Members**

John Anderson  
Judy Clayton  
Shirley Lanier  
Bobby Lee  
Elton Priddy  
John Russell, Ph.D.  
Jim Smart, Ph.D.  
James Tidwell

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

Mitch Hicks  
*DOE Federal Coordinator*

Jon Maybriar  
*Division of Waste  
Management*

David Williams  
*Environmental Protection  
Agency*

Mike Hardin  
*Fish and Wildlife Resources*

Dr. John Volpe  
*Radiation Health Branch*

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**5:30**

Informal discussion

**6:00**

Call to order, introductions  
Review of agenda  
Approval of January minutes

**DDFO's Comments**

-- 15 minutes

**Federal Coordinator Comments**

-- 5 minutes

**Liaison Comments**

-- 10 minutes

**Review of Action Items**

-- 5 minutes

**Public comments and questions**

-- 10 minutes

**Presentations**

- Assessment of Radiation in Surface Water – Dr. Volpe

-- 30 minutes

**Subcommittee Reports**

-- 15 minutes

- Waste Disposition/Water Quality Subcommittee
- Community Outreach Subcommittee
- Long Range Strategy/Stewardship Subcommittee
- Executive Committee

Chairs Meeting Top Three Issues

**Public comments and questions**

-- 10 minutes

**Administrative Issues**

-- 15 minutes

- Motions
- Review of Work Plan
- Review Next Agenda

**Final Comments**

**Adjourn**

*Break Taken As Appropriate*



# PADUCAH GASEOUS DIFFUSION PLANT CITIZENS ADVISORY BOARD

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## **Paducah Gaseous Diffusion Plant Citizens Advisory Board Meeting Minutes February 15, 2007**

The Citizens Advisory Board (CAB) met at the CAB office in Paducah, Kentucky, February 15, 2007, at 6 p.m.

**Board members present:** John Anderson, Allen Burnett, Judy Clayton, Shirley Lanier, Bobby Lee, Jim Smart, and Elton Priddy

**Board members absent:** Janet Miller, John Russell and James Tidwell

**Board Liaisons and related regulatory agency employees:** Brian Begley, Bill Clark, Jon Maybriar, Edward Winner, Kentucky Division of Waste Management (KDWM); Tim Kreher, Kentucky Department of Fish and Wildlife Resources (KDFWR); David Williams, Environmental Protection Agency (EPA); John Volpe, Kentucky Radiation Health Branch (RHB)

**Deputy Designated Federal Official:** Reinhard Knerr

**DOE Federal Coordinator:** Mitch Hicks

**U.S. Department of Energy (DOE) related employees:** David Ashburn, Rich Bonczek, Tracey Brindley, Yvette Cantrell, Steve Cherry, Pete Coutts, Paul Corpstein, Kim Crenshaw, Paul Gagnon, Bruce Gardner, Michael Gerle, Pat Gourieux, Matt LaBarge, Steve Manning, Dave Massey, Jerry Mayes, Bill Murphie, Steve Polston, Eric Roberts, Scott Smith, Joe Tarantino and Barry Tilden

Eight members of the public attended the meeting.

## Agenda

The Board approved the following modifications to the agenda:

- Soil Piles Sampling and Analysis Plan (SAP) presentation is postponed to March
- Volpe will present the RHB's Analysis of Surface Water from eight ISCO samplers
- Chairs Meeting top three issues will be added to the Executive Committee portion of the agenda
- The budget will be removed from the agenda

## Minutes

Mayes asked for modifications to the draft January minutes. **The Board approved the minutes as submitted.**

## Deputy Designated Federal Official

Knerr provided project updates to the Board. The presentation is available on the CAB Website at [www.pgpcab.org](http://www.pgpcab.org).

Murphie discussed *Politics of Cleanup* published by the Energy Communities Alliance. He suggested that a task force be established consisting of DOE, CAB, regulators, and effected stakeholders to review the recommendations in the document for potential applicability to the Paducah site. The document can be downloaded at [www.energyca.org](http://www.energyca.org). Murphie said DOE could provide a representative to set up the task force. Burnett asked staff to forward the link to all CAB members. Knerr said he would provide a copy of the document to the regulators.

## Liaison Comments

### Kentucky Division of Waste Management

- KDWM has invoked informal dispute on the Community Relations Plan (CRP). The outstanding issue is the degree of public involvement on major modifications to the Federal Facility Agreement (FFA). The state wants the public to have the ability to comment on documents in draft form instead of waiting until the documents have been finalized. Burnett requested the state's comments on the CRP. Maybriar said he would check with management to see if comments could be shared with the CAB from a legal standpoint. Comments will be provided at the next meeting or an answer why the comments cannot be provided to the CAB. Lee asked when the issues would be resolved on the CRP. Maybriar said according to the FFA, there is a 30-day period for informal dispute and that can be extended in 15-day increments. If there is no headway, it will be moved to formal dispute. The 30 days is up the first week in March.

- Comments have been submitted to DOE on the C-400 60% Remedial Design Report.
- Kentucky is reviewing the 2007 Site Management Plan (SMP) and comments could be submitted to DOE within the next couple of weeks.
- DOE has asked for a quick turnaround on the Soil Piles SAP. The state may have comments submitted to DOE by next week.

### **Environmental Protection Agency**

- A conditional concurrence letter has been issued on the CRP with the revision of public comments for all major modifications.
- Comments were submitted to DOE on the C-400 60% Remedial Design Report.
- EPA has requested that the latest updates on the Soil/Rubble Piles be added to the SMP. Williams said the EPA has some issues on the Soil Piles SAP with requirements for notifications regarding Solid Waste Management Units (SWMUs) and Areas of Concerns (AOCs). These issues are being discussed.
- DOE has submitted responses to the comments for the Southwest Plume Site Investigation/Risk Assessment.

### **Kentucky Fish and Wildlife Resources**

Kreher said he had attended a meeting with the U.S. Army Corps of Engineers (USACE). Since the former KOW area was utilized by the Department of Defense during WWII, USACE retains responsibility for contamination issues for that area. USACE has conducted many investigations over the years at the former Kentucky Ordnance Works (KOW) site and has hired an independent contractor to come on site next week and look at potential rad issues. A public meeting is scheduled for late March to comment on plans to address a gravel pit that was used for KOW debris. The main issue for the surface is arsenic and the subsurface is metals, primarily lead. Murphie asked what rads are associated with the gravel pit. Kreher said all sampling has been done except for rad. Murphie asked if there were any investigations beyond the pit. Kreher said the entire site was investigated in the mid-nineties and there were six major AOCs for the site.

Maybriar said KDWM is not in charge of overseeing the KOW. Nathan Hancock, State Superfund Group, is the state person in charge of this area. All information on the soil piles has been sent to Hancock and forwarded to USACE. KDWM is only involved with KOW issues associated with a SWMU, an AOC related to the FFA, or Resource Conservation and Recovery Act permit under the cleanup.

## **Radiation Health Branch**

Volpe said the RHB has received eight new ISCO samplers to be installed when the weather is warmer. The RHB has received the Soil Piles SAP for review.

## **Action Items**

Burnett said in order to formalize the action closure process the CAB Office must receive formal evidence for closure of an action item.

Maybriar said the Agreement in Principle data was given to Lee during the Waste Disposition/Water Quality subcommittee meeting. Lee requested a summary of the data at the March subcommittee meeting. Burnett requested that in the future all information be sent to the CAB Office for distribution.

Maybriar said the language for the signage along the creek to meet environmental indicators has been suspended until all of the soil piles have been characterized. It was agreed to close this action item and move it to the Waste/Water subcommittee meeting agenda.

## **Public Comment**

Vander Boegh asked if the volume of the waste pile on the east side of plant was 7000 cubic yards, when the area was excavated and how the volume was calculated. Coutts said a civil survey was done on the piles to get a volume estimate. Vander Boegh said this was the first time he had heard about USACE's AOCs. He asked if that gravel pit was one of the locations that was provided to DOE during the findings of the soil/rubble piles. Kreher said the pit has been identified at the site for fifteen years. Maybriar said USACE documents on cleaning up the KOW area are public documents and have been available for a number of years. He said when the state received Vander Boegh's map, KDWM tried to cross-reference the areas on the map with DOE's AOCs or SWMUs and USACE's AOCs. According to Vander Boegh's points on the map, the areas did not seem to be under the KOW investigation by USACE. KDWM attempted to identify the areas on the map and it seemed to be the five ponds area. Those ponds may have been gravel pits years ago. Vander Boegh said Williams had mentioned at the last meeting about polychlorinated biphenyls (PCB) in the ditches leading to certain areas. The PCB spill area that came out of C-337 area could be the source of detects. Williams said PCBs have been a problem on the east side of the plant since the site was built. Vander Boegh said there were depositions on buried materials by the workers given to DOE in 2000. He asked if Williams would be interested in reviewing those. Williams said yes.

Chris Naas, 25-year Paducah plant worker, read a testimony as a heavy equipment operator directed to bury waste materials at many locations both within the main security fence and outside the plant site, on government owned lands. He said inappropriate actions have taken

place over the past 30 years at the plant, but in the last few years, things are done in a much safer way than in the past. Naas provided copies on his testimony for all parties interested.

Linda Long, former CAB member and plant neighbor, said she had asked questions in the past about material under the scrap yard. People in the community, as well as plant workers, are aware of actions that have taken place around the plant. That knowledge can be utilized instead of forgotten, not mentioned, or glossed over.

Vicki Jurka, citizen, thanked Naas for his testimony. She said she had contacted liaisons for public health for this National Priorities List (NPL) site and had not received a response. She had contacted DOE, EPA, Agency for Toxic Substances and Disease Registry (ATSDR), and others. Other NPL sites have been entitled to and have received certain funded medical tests. Jurka asked the CAB to provide quality contacts for ATSDR, EPA, DOE, Centers for Disease Control and other agencies with regard to public health testing. Murphie asked whom Jurka contacted at DOE. Jurka said she would provide the information. Williams said he would like to know who at EPA was contacted as well.

## **Presentations**

Volpe provided a presentation of the RHB's analysis of surface water from eight ISCO Samplers. The presentation discussed objectives of the sampling program, sampling and analysis protocol, and the radiation activity of isotopes reported in surface water from 2001 through 2004. Burnett asked if the eight new ISCO samplers were additional samplers or replacement samplers. Volpe said the samplers are replacements. Some of the old samplers have been in place for ten years. The presentation is available on the CAB Website at [www.pgpdcab.org](http://www.pgpdcab.org).

## **Subcommittee Reports**

### **Waste Disposition/Water Quality Subcommittee**

Lee said the majority of the Waste Disposition/Water Quality subcommittee meeting focused on the Remedy Review Report presented by Rich Bonczek, DOE. Williams said the Remedy Review Report is very valuable information on the various remedies for the C-400 project. The subcommittee will review the summary document for discussion at the next meeting. James Rispoli, DOE Assistant Secretary, has requested additional independent reviews during the summer. Murphie said DOE has prepared independent reviews for years; these reviews are not new; just not advertised. The Paducah Site Wide Remedy Review will be placed in the Environmental Information Center for public review.

Smart will review the C-400 60% Remedial Design Report for discussion at the March meeting.

## **Community Outreach**

Gary Long's membership application was sent to DOE Headquarters for approval.

## **Executive Committee**

The Board reviewed the Paducah CAB's top three issues for discussion at the March Chairs Meeting. **The Board approved the issues as modified.**

The Executive Committee is preparing a recommendation for consolidation of all previous investigations into one reference document due to the findings of all of the soil/rubble piles.

Burnett said Bill Tanner, former CAB Chair, was invited to the February Executive Committee meeting to discuss the background of the End State Vision recommendation.

## **Public Comments**

Corrine Whitehead, Coalition for Health Concerns, said she did not see plutonium listed as a rad waste subject in the presentation. Volpe said Plutonium-238 and 239 were listed in the presentation. Whitehead said there is a legal case where the Fernald plant manager stated that the plutonium that contaminated the neighbors came from Paducah and she knows that is a problem in the groundwater and vegetation.

Ruby English, Active Citizens for Truth, asked if the public would be allowed to make comments on the CRP or if only the CAB was allowed to comment. Murphie said the CRP was given to the CAB so it is publicly available.

English asked Volpe for a copy of the presentation on the Radiation Health Branch's analysis of surface water from the eight ISCO Samplers. Volpe said he would check to see if the presentation could be put on Kentucky's Web site.

English asked Volpe whom he is contracted through for DOE. Volpe said he is a private contractor. English said she assumed Volpe is still doing contract work for DOE. Volpe said he was doing work for the state up until 2002 until he retired and then he formed his own company. English asked if Volpe was using previous information and making his own judgments or taking live samples. Volpe said the samples come from the state and he writes the reports. Murphie said Volpe reports to the RHB, not DOE. Volpe said that is correct.

Jurka requested disclosure of potential Conflict of Interest from Board members. She said there are members on the Board that work at the local Community College with ties to DOE money with regard to the University of Kentucky (UK). She made a formal request that CAB members not vote on any issue that have funding from DOE to UK with ties to the Community College. Jurka said ties to the Global Nuclear Energy Project cannot be discussed at the CAB but some of the property in question is part of the UK study on the buy-out.

## **Administrative Issues**

### **Motions**

### **Budget Review**

The Board discussed the recommendation “Utilization of Focus Groups in the Community Relations Plan.” The CAB agreed to table the recommendation.

### **March Agenda**

Budget review will be permanently deleted from the Board agenda. Lee suggested voting on the Bylaws and Operating Procedures early in the meeting under Action Items. The February agenda was approved as modified.

Burnett suggested that the Executive Committee discuss the establishment of a task force to review the *Politics of Cleanup* published by the Energy Communities Alliance.

The meeting adjourned at 8:45 p.m.

# Progress at Paducah

## Paducah Citizens Advisory Board

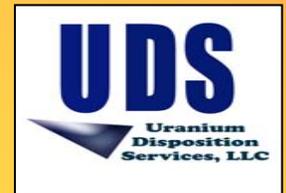


Reinhard Knerr  
Paducah Site Office Lead  
February 15, 2007



# January Highlights

- Soils
- DUF6
- Inactive Facilities
- Burial Grounds
- Northwest Corner Scrap Metal Project



# Soil Piles

- Sampling plan submitted to Kentucky and EPA for review on 2/9/07
- Phased approach to sampling; generic Sampling and Analysis Plan, addenda to cover specific phases
- Fieldwork will begin after regulatory comments addressed; anticipate March start

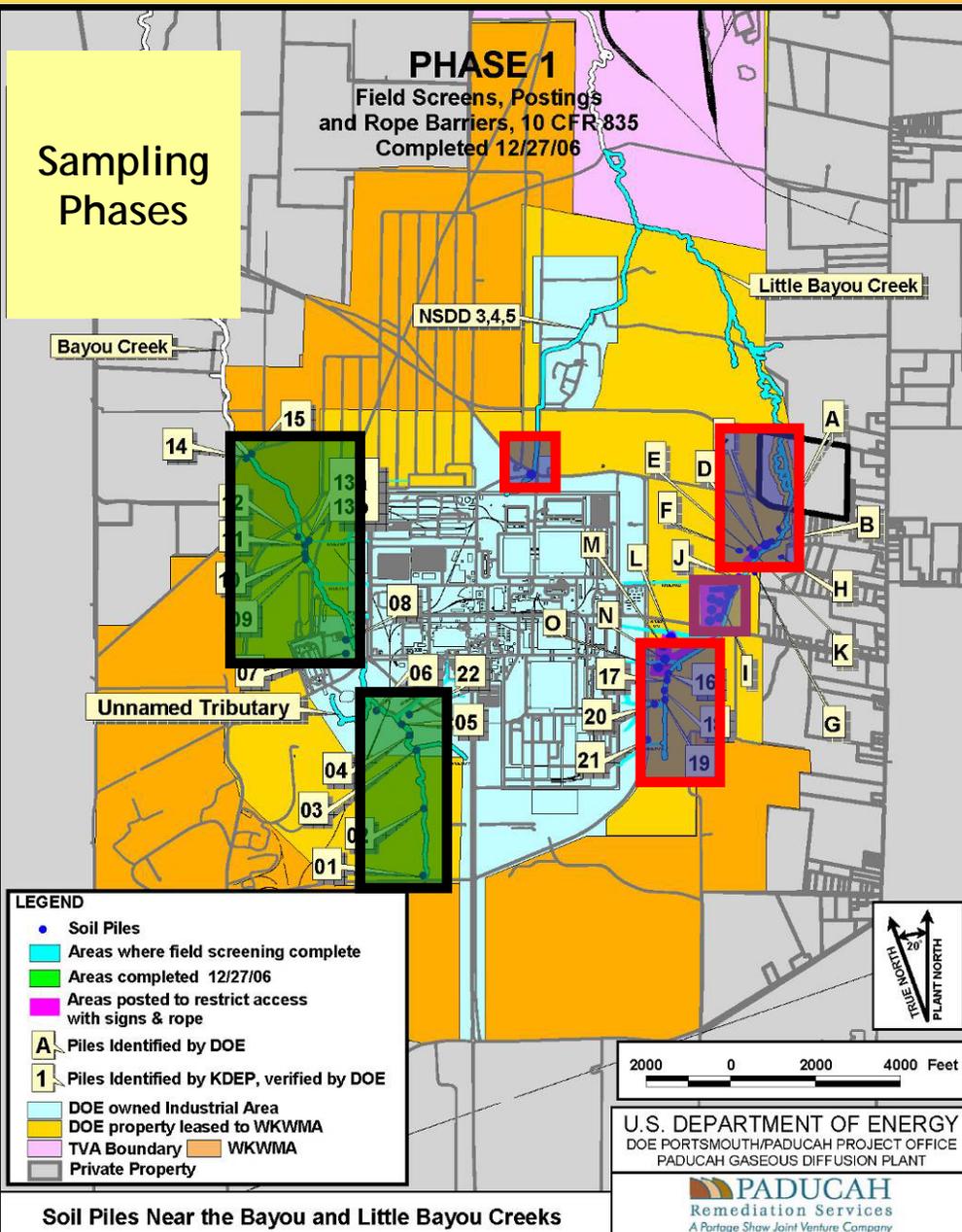


# Soil Piles Sampling

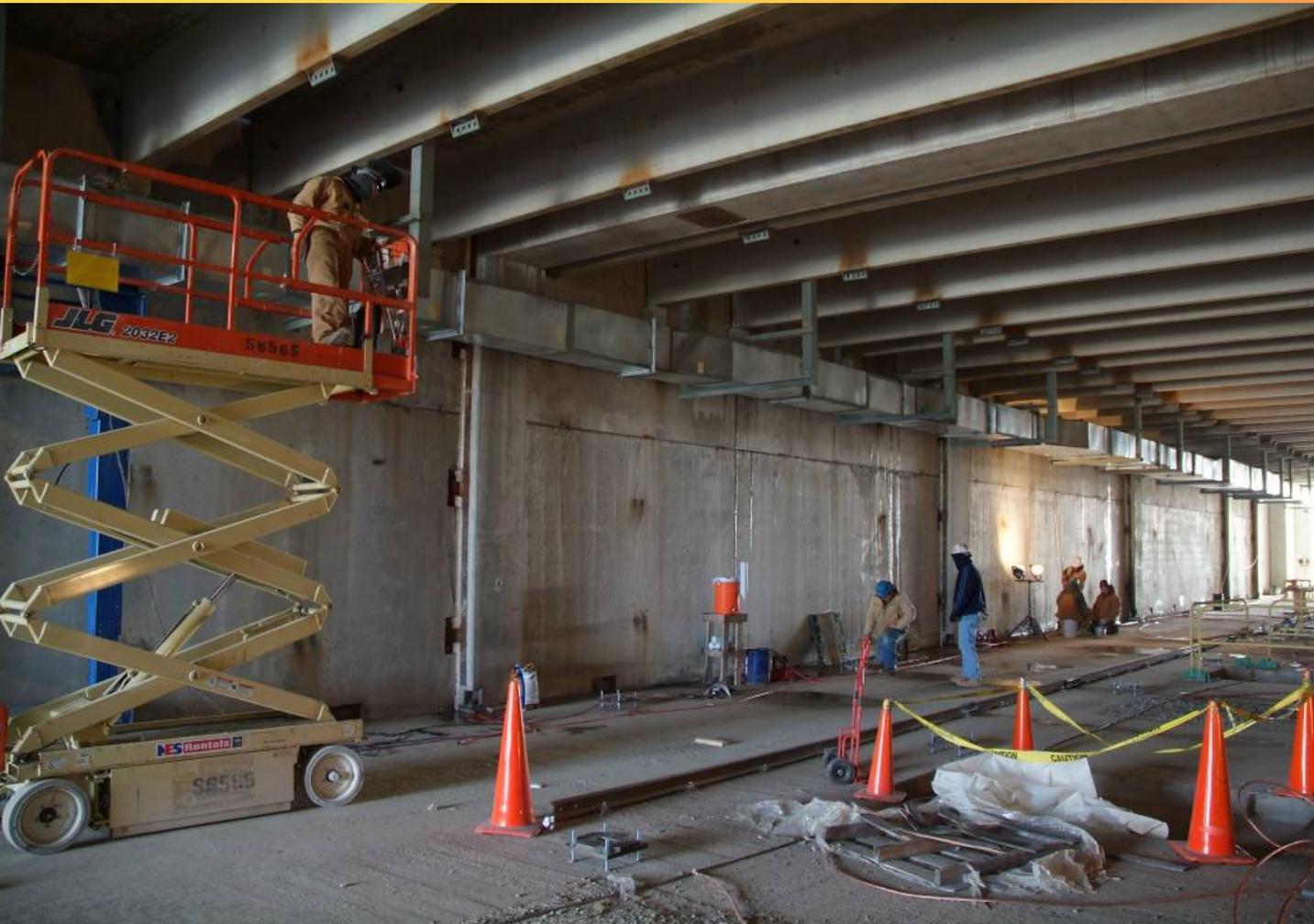
Sampling to be conducted in 3 phases:

1. Pile I - 218 samples taken over 60 days
  - PCBs
  - Rad
  - Volatile Organic Compounds (VOCs)
  - Semi VOCs
  - Metals
2. Little Bayou Creek/NSDD; detailed sampling plan depends on information gathered in Phase I
3. Bayou Creek/unnamed tributary; detailed plan to follow Phase I

-  First phase
-  Second phase
-  Third phase



# DUF6 Conversion Project



- Preparing for additional concrete pours for roof and floors
- Continuing to prepare building for HVAC, equipment installation

Workers install brackets to hang duct work on the top floor of the Conversion Building (left) and on the ground floor (right).

# Inactive Facilities



- West End Smelter
  - Loose material removal underway
- C-405 Incinerator
  - Completed removal of loose equipment, west incinerator

Equipment inside the West End Smelter that must be removed.

# C-410 D&D

Below, switches and buss bars before removal; at right, the same room today.



- Continuing asbestos abatement; removal of pipes, electrical equipment

# Burial Grounds Operable Unit



## Remedial Investigation

- Fieldwork continuing
- On target to complete borings and collection of groundwater and soil samples by May
- Completed geophysical surveys (SWMUs 7, 30 and 145)

Drilling at the S&T landfill site (SWMU 145).

# Scrap Metal Removal



The last train has left

# Energy Communities Alliance

- D.C.-based organization funded by local governments affected by DOE activities
- Run by officials from affected communities
- Published *Politics of Cleanup* in February 2007
- Document contains 15 recommendations



# Energy Communities Alliance Recommendations

- **Recommendation #1: *All Parties Must Collaborate*** – The federal government, local governments, community members, state and federal agencies, and Congress must collaborate when developing the cleanup and future use vision for the site
  - **Recommendation #2: *Know the Rules*** – The law defines the cleanup process and the opportunity to participate in the process
  - **Recommendation #3: *Understand Federal Agencies' Goals*** – The parties must consider the federal government's mission and goals
  - **Recommendation #4: *A Cleanup Contract with Defined Goals Must Be Used*** – Closure contracts, which serve a number of roles, must identify clear milestones, be communicated to all parties, be understood by the parties and be funded annually by Congress
  - **Recommendation #5: *Understand Community Values*** – To properly collaborate, the parties must work to understand the values of the community, and must work to incorporate such values into the planning process
  - **Recommendation #6: *Education Is Essential*** – The parties must take the time to educate each other on the technical and policy issues underlying the cleanup and to commit
  - **Recommendation #7: *Congress Must Make Cleanup a Legislative Priority*** – Federal lawmakers should understand the needs of the parties involved and become intimately involved in cleanup decisions



# Energy Communities Alliance Recommendations

- **Recommendation #8: *Local Presence Facilitates Cleanup*** – The federal entity charged with cleaning up the site and the federal and state regulatory agencies must have a local presence and must address problems resulting from staff turnover that negatively affect cleanup and public involvement efforts
- **Recommendation #9: *Federal Agency Leadership Sets the Tone*** – The federal entity charged with cleaning up a site must establish management policies that challenge the staff to complete the job, and broadly communicate agency policies to affected constituencies and to Congress
- **Recommendation #10: *All Parties Must Take Into Account Post-Cleanup Requirements*** – Cleanup completion typically means that contamination will be left in place; thus, identifying sources of long-term funding and clarifying the roles of the affected parties are essential
- **Recommendation #11: *The Parties Must Build a Working Relationship*** – All parties must take the necessary steps to develop and maintain trust, accountability and openness
- **Recommendation #12: *Be Organized*** – Local governments and the community must be organized and proactive, and strive to speak with one voice
- **Recommendation #13: *Resources Ensure Parties Can Participate*** – The federal government and Congress must provide regulators and communities with the financial resources necessary to organize and retain the staffing resources they need
- **Recommendation #14: *Following the Minimum in the Law Is Not Enough*** – Minimum regulatory requirements are insufficient to support substantive public involvement; the parties must develop public involvement processes that are tailored to site-specific needs, recognizing that process is different from negotiations
- **Recommendation #15: *Engage Each Other Regularly*** – The parties must substantively engage each other throughout the entire cleanup and reuse planning process





DOE Portsmouth/Paducah Project Office

**Assessment of Radiation in Surface Water at the Paducah Gaseous  
Diffusion Plant**

**Radiation Health Branch  
Division of Public Health Protection and Safety  
Department for Public Health  
Cabinet for Health and Family Services**

## Objectives of Sampling Program

The results of analyses for surface water samples from the automatic samplers are assessed to:

1. Ensure radionuclide discharges do not pose risks to public health;
2. Ensure the reliability of quarterly grab-sampling results; and
3. Identify temporal & spatial changes in radionuclide discharges due to past and present plant activities, hydrogeological factors, and meteorological events.

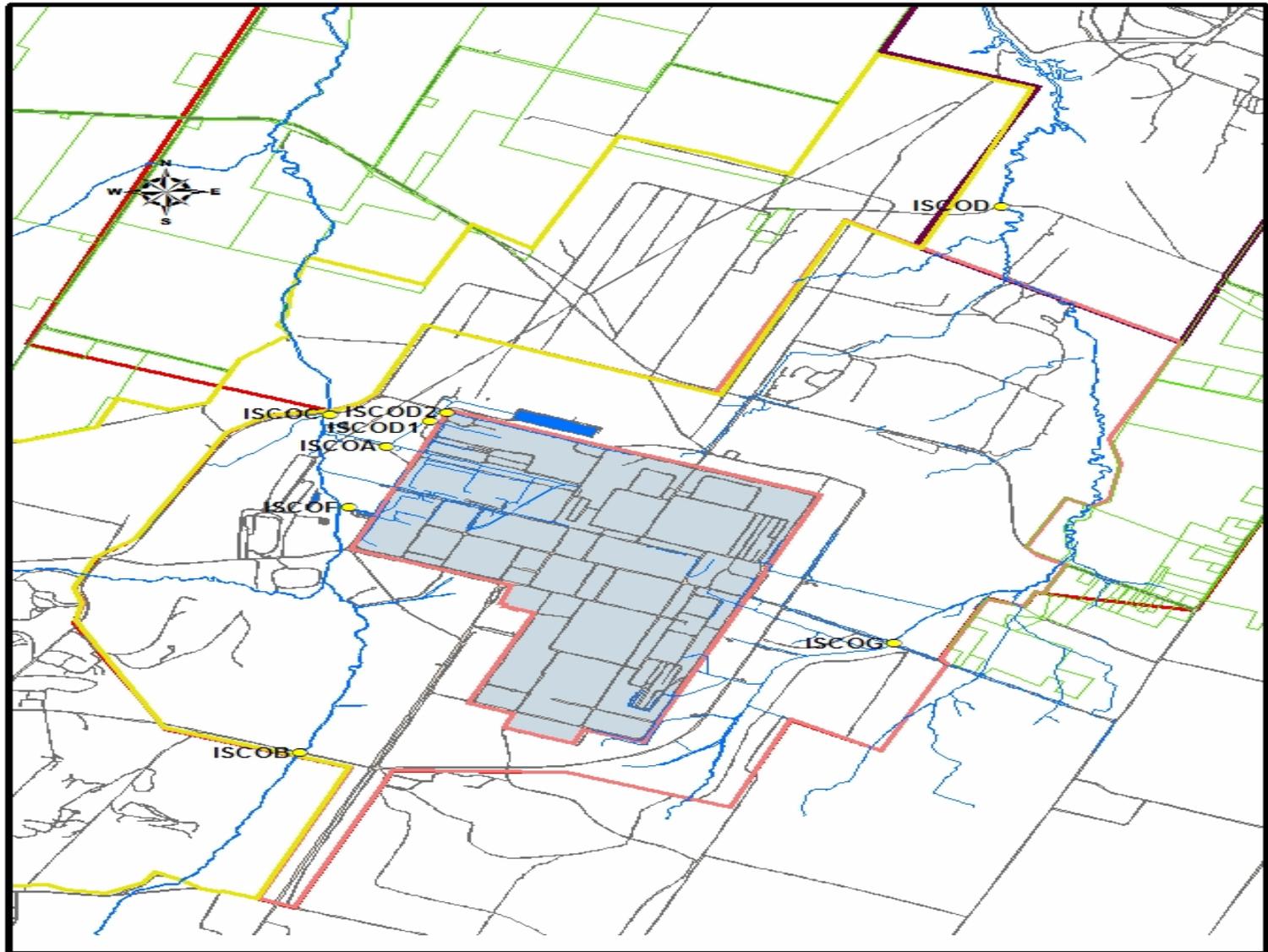
# Sampling, Health and Safety, and Quality Control

- The RHB collects samples and maintains monitoring equipment at the PGDP as outlined in the:
  - ***Field Sampling and Analysis Plan for the PGDP (FSAP, RHB, 2003).***
- Health and safety procedures for activities at PGDP including the collection, handling, and transport of samples are outlined in the:
  - ***Health and Safety Plan for the PGDP (HASP, RHB, 2003).***
- Samples are analyzed as defined in the:
  - ***Laboratory Procedures Manual for the RCL (RCL, 1996).***
- The data is verified by the laboratory and validated by an independent third party to ensure accuracy, precision, reliability, reproducibility, comparability, and completeness of the analytical results as outlined in the:
  - ***Quality Assurance Program Plan for the RCL (RHB, 2003).***

# Sampling and Analysis Protocol

- Each ISCO automated sampler operates continuously to automatically collect four (4) surface water samples per day at 6-hour intervals.
- 
- The sample collection cycle for the ISCO daily-composite samples averages approximately 21 days.
- Sets of daily-composite samples are combined into one 21-day composite sample.
- The 21-day composite sample is filtered and the filtrate is acidified to stabilize the sample.
- The acidified filtrate is analyzed for
  - gross alpha/beta ( $\alpha/\beta$ ) activity,
  - gamma ( $\gamma$ ) activity,
  - technetium-99 ( $^{99}\text{Tc}$ ),
  - uranium-234 ( $^{234}\text{U}$ ), uranium-235 ( $^{235}\text{U}$ ), uranium-238 ( $^{238}\text{U}$ ),
  - plutonium-238 ( $^{238}\text{Pu}$ ), plutonium-239 ( $^{239}\text{Pu}$ ).

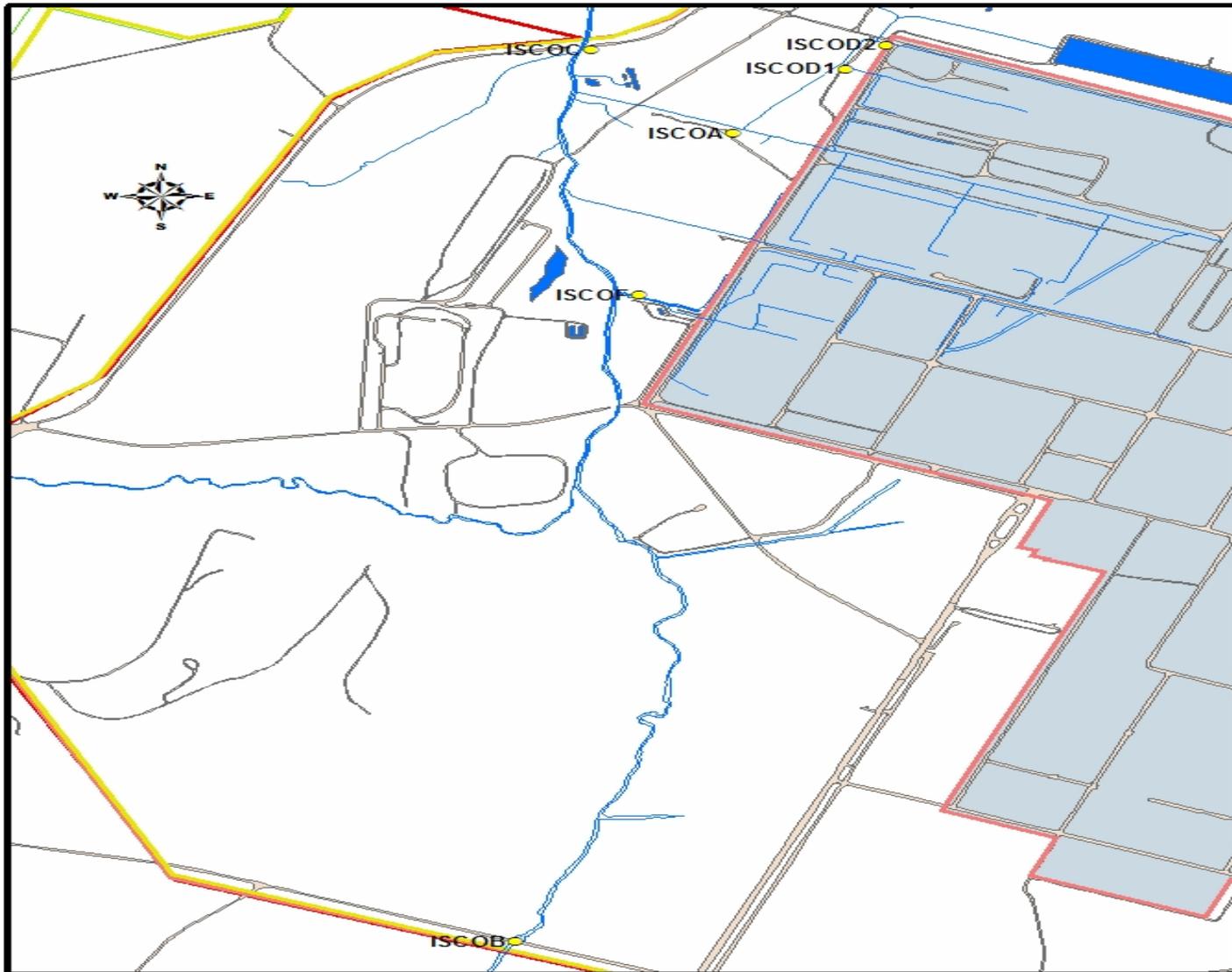
# Automatic Surface Water Sampler Locations



0 0.125 0.25 0.5 0.75 1 Miles

- Residential Areas
- DOE Property
- TVA Property
- Wildlife Management Area
- DOE Fenced Security Area
- Water Policy Area

# Automatic Surface Water Sampler West Side Locations



0 0.05 0.1 0.2 0.3 0.4 Miles

- Residential Areas
- DOE Property
- TVA Property
- Wildlife Management Area
- DOE Fenced Security Area
- Water Policy Area

# Radiation activity of isotopes reported in surface water from 2001 through 2004 for ISCO D2

| Isotope               | Mean Activity<br>ISCO D2 | Release Limits<br>902 KAR 100:019,<br>Section 44(7) | Ratio<br>Mean Activity to<br>Release Limits | Sum of the<br>Fractions<br>Relative to<br>Release Limits |
|-----------------------|--------------------------|---|---|--|
|                       | pCi/l                    | pCi/l   |   |  |
| <b>2001</b>           |                          |   |   |  |
| Soluble Uranium-238   | 58.3                     | 300   | 0.19  | 0.28   |
| Soluble Uranium-235   | 1.7                      | 300   | 0.006                                       |  |
| Soluble Uranium-234   | 23.6                     | 300   | 0.08  |  |
| Technetium-99         | 46.1                     | 60000   | 0.0007                                      |  |
| Soluble Plutonium-239 | 0.01                     | 20  | 0.0005                                      |  |
| Soluble Plutonium-238 | 0.1                      | 20  | 0.005                                       |  |
| <b>2002</b>           |                          |   |   |  |
| Soluble Uranium-238   | 27.3                     | 300   | 0.09  | 0.13   |
| Soluble Uranium-235   | 0.7                      | 300   | 0.002                                       |  |
| Soluble Uranium-234   | 11.2                     | 300   | 0.04  |  |
| Technetium-99         | 12.4                     | 60000   | 0.0002                                      |  |
| Soluble Plutonium-239 | 0.04                     | 20  | 0.002                                       |  |
| Soluble Plutonium-238 | -0.001                   | 20  | -0.00006                                    |  |
| <b>2003</b>           |                          |   |   |  |
| Soluble Uranium-238   | 0.7                      | 300   | 0.002                                       | 0.004  |
| Soluble Uranium-235   | 0.05                     | 300   | 0.0002                                      |  |
| Soluble Uranium-234   | 0.7                      | 300   | 0.002                                       |  |
| Technetium-99         | 8.3                      | 60000   | 0.0001                                      |  |
| Soluble Plutonium-239 | 0.01                     | 20  | 0.0005                                      |  |
| Soluble Plutonium-238 | -0.01                    | 20  | -0.00005                                    |  |
| <b>2004</b>           |                          |   |   |  |
| Soluble Uranium-238   | 0.5                      | 300   | 0.002                                       | 0.02   |
| Soluble Uranium-235   | 0.04                     | 300   | 0.0001                                      |  |
| Soluble Uranium-234   | 0.5                      | 300   | 0.002                                       |  |
| Technetium-99         | 8.2                      | 60000   | 0.0001                                      |  |
| Soluble Plutonium-239 | 0.04                     | 20  | 0.002                                       |  |
| Soluble Plutonium-238 | 0.2                      | 20  | 0.01  |  |

## Radiation activity of isotopes reported in surface water from 2001 through 2004 for ISCO D1

| Isotope               | Mean Activity<br>ISCO D1 | Release Limits<br>902 KAR 100:019,<br>Section 44(7) | Ratio<br>Mean Activity to<br>Release Limits | Sum of the<br>Fractions<br>Relative to<br>Release Limits |
|-----------------------|--------------------------|---|---|--|
|                       | pCi/l                    | pCi/l   |   |  |
| <b>2001</b>           |                          |   |   |  |
| Soluble Uranium-238   | 540.0                    | 300   | 1.8   | 2.98   |
| Soluble Uranium-235   | 22.7                     | 300   | 0.08  |  |
| Soluble Uranium-234   | 315.0                    | 300   | 1.05  |  |
| Technetium-99         | 261.0                    | 60000   | 0.004                                       |  |
| Soluble Plutonium-239 | -0.01                    | 20  | -0.0005                                     |  |
| Soluble Plutonium-238 | 0.9                      | 20  | 0.045                                       |  |
| <b>2002</b>           |                          |   |   |  |
| Soluble Uranium-238   | 159.0                    | 300   | 0.5   | 0.83   |
| Soluble Uranium-235   | 6.2                      | 300   | 0.02  |  |
| Soluble Uranium-234   | 94.0                     | 300   | 0.3   |  |
| Technetium-99         | 74.5                     | 60000   | 0.001                                       |  |
| Soluble Plutonium-239 | 0.2                      | 20  | 0.01  |  |
| Soluble Plutonium-238 | -0.03                    | 20  | -0.0015                                     |  |
| <b>2003</b>           |                          |   |   |  |
| Soluble Uranium-238   | 147.0                    | 300   | 0.49  | 0.80   |
| Soluble Uranium-235   | 8.0                      | 300   | 0.03  |  |
| Soluble Uranium-234   | 87.6                     | 300   | 0.29  |  |
| Technetium-99         | 70.6                     | 60000   | 0.001                                       |  |
| Soluble Plutonium-239 | 0.002                    | 20  | 0.0001                                      |  |
| Soluble Plutonium-238 | -0.2                     | 20  | -0.01                                       |  |
| <b>2004</b>           |                          |   |   |  |
| Soluble Uranium-238   | 142.0                    | 300   | 0.47  | 0.86   |
| Soluble Uranium-235   | 7.1                      | 300   | 0.02  |  |
| Soluble Uranium-234   | 81.6                     | 300   | 0.27  |  |
| Technetium-99         | 63.0                     | 60000   | 0.001                                       |  |
| Soluble Plutonium-239 | 0.3                      | 20  | 0.015                                       |  |
| Soluble Plutonium-238 | 1.6                      | 20  | 0.08  |  |

# Radiation activity of isotopes reported in surface water from 2000 through 2004 for ISCO A

| Isotope               | Mean Activity<br>ISCO A | Release Limits<br>902 KAR 100:019,<br>Section 44(7) | Ratio<br>Mean Activity to<br>Release Limits | Sum of the<br>Fractions<br>Relative to<br>Release Limits |
|-----------------------|-------------------------|---|---|--|
|                       | pCi/l                   | pCi/l   |   |  |
| <b>2000</b>           |                         |   |   |  |
| Soluble Uranium-238   | 4.6                     | 300   | 0.0153                                      | 0.028  |
| Soluble Uranium-235   | 0.3                     | 300   | 0.0010                                      |  |
| Soluble Uranium-234   | 2.6                     | 300   | 0.0086                                      |  |
| Technetium-99         | 25.5                    | 60000   | 0.0004                                      |  |
| Soluble Plutonium-239 | -0.03                   | 20  | -0.0015                                     |  |
| Soluble Plutonium-238 | 0.09                    | 20  | 0.0040                                      |  |
| <b>2001</b>           |                         |   |   |  |
| Soluble Uranium-238   | 3.2                     | 300   | 0.0107                                      | 0.022  |
| Soluble Uranium-235   | 0.1                     | 300   | 0.0003                                      |  |
| Soluble Uranium-234   | 1.8                     | 300   | 0.0060                                      |  |
| Technetium-99         | 35.7                    | 60000   | 0.0006                                      |  |
| Soluble Plutonium-239 | 0.002                   | 20  | 0.0001                                      |  |
| Soluble Plutonium-238 | 0.08                    | 20  | 0.0040                                      |  |
| <b>2002</b>           |                         |   |   |  |
| Soluble Uranium-238   | 2.6                     | 300   | 0.0090                                      | 0.018  |
| Soluble Uranium-235   | 0.1                     | 300   | 0.0003                                      |  |
| Soluble Uranium-234   | 1.5                     | 300   | 0.0050                                      |  |
| Technetium-99         | 26.4                    | 60000   | 0.0004                                      |  |
| Soluble Plutonium-239 | 0.03                    | 20  | 0.0020                                      |  |
| Soluble Plutonium-238 | 0.04                    | 20  | 0.0020                                      |  |
| <b>2003</b>           |                         |   |   |  |
| Soluble Uranium-238   | 2.2                     | 300   | 0.0073                                      | 0.012  |
| Soluble Uranium-235   | 0.1                     | 300   | 0.0003                                      |  |
| Soluble Uranium-234   | 1.5                     | 300   | 0.0050                                      |  |
| Technetium-99         | 30.4                    | 60000   | 0.0005                                      |  |
| Soluble Plutonium-239 | 0.008                   | 20  | 0.0004                                      |  |
| Soluble Plutonium-238 | -0.03                   | 20  | -0.0015                                     |  |
| <b>2004</b>           |                         |   |   |  |
| Soluble Uranium-238   | 1.4                     | 300   | 0.0047                                      | 0.015  |
| Soluble Uranium-235   | 0.07                    | 300   | 0.0002                                      |  |
| Soluble Uranium-234   | 1.0                     | 300   | 0.0033                                      |  |
| Technetium-99         | 27.8                    | 60000   | 0.0005                                      |  |
| Soluble Plutonium-239 | 0.03                    | 20  | 0.0015                                      |  |
| Soluble Plutonium-238 | 0.1                     | 20  | 0.0050                                      |  |

## Radiation activity of isotopes reported in surface water from 2002 through 2004 for ISCO F

| Isotope               | Mean Activity<br>ISCO F | Release Limits<br>902 KAR 100:019,<br>Section 44(7) | Ratio<br>Mean Activity to<br>Release Limits | Sum of the<br>Fractions<br>Relative to<br>Release Limits |
|-----------------------|-------------------------|---|---|--|
|                       | pCi/l                   | pCi/l   |   |  |
| <b>2002</b>           |                         |   |   |  |
| Soluble Uranium-238   | 2.2                     | 300   | 0.0073                                      | 0.019  |
| Soluble Uranium-235   | 0.2                     | 300   | 0.0007                                      |  |
| Soluble Uranium-234   | 3.2                     | 300   | 0.0107                                      |  |
| Technetium-99         | 9.4                     | 60000   | 0.0002                                      |  |
| Soluble Plutonium-239 | 0.01                    | 20  | 0.0005                                      |  |
| Soluble Plutonium-238 | -0.003                  | 20  | -0.0002                                     |  |
| <b>2003</b>           |                         |   |   |  |
| Soluble Uranium-238   | 1.4                     | 300   | 0.0047                                      | 0.015  |
| Soluble Uranium-235   | 0.15                    | 300   | 0.0005                                      |  |
| Soluble Uranium-234   | 2.9                     | 300   | 0.0097                                      |  |
| Technetium-99         | 11.9                    | 60000   | 0.0002                                      |  |
| Soluble Plutonium-239 | 0.004                   | 20  | 0.0002                                      |  |
| Soluble Plutonium-238 | 0.001                   | 20  | 0.0001                                      |  |
| <b>2004</b>           |                         |   |   |  |
| Soluble Uranium-238   | 0.9                     | 300   | 0.0030                                      | 0.017  |
| Soluble Uranium-235   | 0.1                     | 300   | 0.0003                                      |  |
| Soluble Uranium-234   | 2.4                     | 300   | 0.0080                                      |  |
| Technetium-99         | 11.6                    | 60000   | 0.0002                                      |  |
| Soluble Plutonium-239 | 0.02                    | 20  | 0.0010                                      |  |
| Soluble Plutonium-238 | 0.1                     | 20  | 0.0050                                      |  |

# Radiation Dose and Risk Assessment for Surface Water

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- Radiation dose and risk assessment for surface water collected by automatic samples B and C in Bayou Creek and automatic samplers D and G in Little Bayou Creek was conducted using:
  - ***RESRAD BASELINE, Version 2.2, 1996, Argonne National Laboratory.***
- Potentially complete exposure pathway for locations was incidental ingestion and dermal contact of surface water while swimming, wading, fishing, etc.

## Summary of Pathway Selections

| Pathway                                       | User Selection |
|---|----------------|
| 1 -- groundshine (R)                          | suppressed     |
| 2 -- inhalation (B)                           | suppressed     |
| 3 -- plant ingestion (B)                      | suppressed     |
| 4 -- meat ingestion (B)                       | suppressed     |
| 5 -- milk ingestion (B)                       | suppressed     |
| 6 -- aquatic foods ingestion (B)              | suppressed     |
| 7 -- drinking water ingestion (B)             | suppressed     |
| 8 -- soil ingestion (B)                       | suppressed     |
| 9 -- radon (R)                                | suppressed     |
| 10 -- incidental water ingestion (B)          | active (R)     |
| 11 -- air immersion (R)                       | suppressed     |
| 12 -- dermal absorption from swimming (C)     | active (R)     |
| 13 -- dermal absorption from shower water (C) | suppressed     |
| 14 -- dermal absorption soil contact (C)      | suppressed     |

Note: (B), (C) and (R) under pathway denotes the applicability for both chemical and radiological, chemical, or radiological risk assessment, respectively.

(B), (C) and (R) under user selection denotes user's choice to conduct both chemical and radiological, chemical, or radiological risk assessment, respectively.

## Parameters for Incidental Water Ingestion

|  |                          |
|--|--------------------------|
| Incidental water intake (swimming)                         | 1.300E-01 liters per day |
| Average Body Weight (Child)                                | 15 Kilograms             |
| Average Body Weight (Adult)                                | 70 Kilograms             |
| Average Life Time  | 70 years                 |
| Contamination fraction for dermal adsorption from swimming | 1                        |
| Exposure frequency for dermal adsorption from swimming     | 7 days per year          |
| Skin surface area available for water contact              | 20000 cm <sup>2</sup>    |
| Duration for Swimming                                      | 0.5 hour per event       |

## Parameters for Dermal Absorption from Swimming

|  |                       |
|--|-----------------------|
| Exposure duration  | 30 years              |
| Average Body Weight (Child)                                | 15 Kilograms          |
| Average Body Weight (Adult)                                | 70 Kilograms          |
| Average Life Time  | 70 years              |
| Contamination fraction for dermal adsorption from swimming | 1                     |
| Exposure frequency for dermal adsorption from swimming     | 7 days per year       |
| Skin surface area available for water contact              | 20000 cm <sup>2</sup> |
| Duration for Swimming                                      | 0.5 hour per event    |

## ***Radiation Dose and Risk for 2004 at ISCOs B, C, D, and G***

| Location | Isotope           | Mean*<br>Activity | Dose      | Risk (From<br>Risk Dose<br>Conversion<br>Factors) | Risk (From Slope<br>Factors) |
|----------|-------------------|-------------------|-----------|---|------------------------------|
|          |                   | pCi/l             | mrem/yr   |   |                              |
| ISCO B   | <sup>238</sup> U  | <b>0.17</b>       | 5.538E-04 | 1.263E-08   | 1.859E-09                    |
|          | <sup>235</sup> U  | <b>0.04</b>       |           |   |                              |
|          | <sup>234</sup> U  | <b>0.19</b>       |           |   |                              |
|          | <sup>99</sup> Tc  | <b>0.94</b>       |           |   |                              |
|          | <sup>239</sup> Pu | <b>0.05</b>       |           |   |                              |
|          | <sup>238</sup> Pu | <b>0.1</b>        |           |   |                              |
| ISCO C   | <sup>238</sup> U  | 1.24              | 1.016E-03 | 2.317E-08   | 4.765E-09                    |
|          | <sup>235</sup> U  | <b>0.07</b>       |           |   |                              |
|          | <sup>234</sup> U  | 1.05              |           |   |                              |
|          | <sup>99</sup> Tc  | 3.59              |           |   |                              |
|          | <sup>239</sup> Pu | <b>0.013</b>      |           |   |                              |
|          | <sup>238</sup> Pu | <b>0.13</b>       |           |   |                              |
| ISCO D   | <sup>238</sup> U  | 1.48              | 1.001E-03 | 2.282E-08   | 4.807E-09                    |
|          | <sup>235</sup> U  | <b>0.06</b>       |           |   |                              |
|          | <sup>234</sup> U  | 0.49              |           |   |                              |
|          | <sup>99</sup> Tc  | 6.94              |           |   |                              |
|          | <sup>239</sup> Pu | <b>0.007</b>      |           |   |                              |
|          | <sup>238</sup> Pu | <b>0.16</b>       |           |   |                              |
| ISCO G   | <sup>238</sup> U  | 2.06              | 8.799E-04 | 2.006E-08   | 5.080E-09                    |
|          | <sup>235</sup> U  | <b>0.07</b>       |           |   |                              |
|          | <sup>234</sup> U  | 0.54              |           |   |                              |
|          | <sup>99</sup> Tc  | 6.32              |           |   |                              |
|          | <sup>239</sup> Pu | <b>-0.061</b>     |           |   |                              |
|          | <sup>238</sup> Pu | <b>0.14</b>       |           |   |                              |

\*Bold mean activity values were calculated using sample population where less than 25% of the samples analyzed had activity values that did not have results exceeding the sample specific detection limit and/or the counting uncertainty was greater than 50% of reported sample values.

# ISCO D1 - Uranium-238 (See Figure 3 For Sample Location)

