PADUCAH GASEOUS DIFFUSION PLANT
SITE SPECIFIC ADVISORY BOARD

Chartered under the Federal Advisory Committee Act

CO-CHAIRS
Mark Donham
Route 1
Brookport, Illinois 62910
mandk@midwest.net

Vicki Jones
1131 Hamburg Road
Kevil, Kentucky 42053
jonesvw@ornl.gov

BOARD MEMBERS
Nola Courtney
14299 Wickliffe Road
Kevil, Kentucky 42053

Tommy Fletcher
5420 Tuck Road
Paducah, Kentucky 42001

David Fuller
670 Springwell Lane
Paducah, Kentucky 42001

Rev. W.G. Harvey, Sr.
1429 Reed Avenue
Paducah, Kentucky 42001

William L. Kressenberg
2517 Jefferson Street
Paducah, Kentucky 42001

Ronald Lamb
10990 Ogden Landing Road
Kevil, Kentucky 42053
CHCE@LDD.net

Linda Long
10625 Ogden Landing Road
Kevil, Kentucky 42053

Ray McLennan
2931 Mayfield Road
Paducah, Kentucky 42001

Connie J. Sykes
705 N. 24th Street
Paducah, Kentucky 42001

Bill Tanner
6072 Rosebud Road
Metropolis, Illinois 62960

Rev. Gregory Waldrop
701 Broadway
Paducah, Kentucky 42001

Meeting Minutes

July 17, 1997

The July 17, 1997, Site Specific Advisory Board (SSAB) meeting took place at Heath High School at 6:00 p.m.

The following board members were present: Nola Courtney, Mark Donham, Vicki Jones, Ronald Lamb, Linda Long, Ray McLennan, Bill Tanner, and Gregory Waldrop. Ex Officio members present were: Wayne Davis and Tuss Taylor. Facilitator Present: Steve Kay. Also present were: Todd Adams, Carlos Alvarado, Jeannie Brandstetter, Raul Castañeda, Mike Clark, Dave Dollins, Jeff Douthitt, Teresa Fields, Shelley Hawkins, Dennis Hill, Debora Jolly, Jim LaForest, Jimmy Massey, Brad Montgomery, Ben Morehead, Craig Rhodes, and Phil Smith.

The agenda was modified to include a standing item called information to allow for the distribution of handouts, the National Dialogue was added, Wayne Davis's Information was added, and the Accelerated Cleanup Plan review was postponed until August.

The first item on the agenda was the distribution by Vicki Jones of some information on a workshop on the National Dialogue. The tentative dates for the workshop are September 6-7. It is supposed to be held in the Knoxville, Tennessee area. There is no limit at this time for the number of people from each site.

The minutes from the June 19, 1997, meeting were approved by consensus.

Wayne Davis of the Kentucky Department of Fish and Wildlife Resources (KDFWR) presented the SSAB with a letter informing them of some recent findings that were of concern. In the past year three animals (two red-tailed hawks and a bobcat) were found on the West Kentucky Wildlife Management Area (WKWMA) next to the Paducah Gaseous Diffusion Plant (PGDP) which were found to have some level of polychlorinated biphenyls (PCBs) in either the blood or liver. No PCBs have been found in the deer sampled by DOE or KDFWR or the coyote sampled by the KDFWR in 1996. KDFWR is concerned about these findings. The Department of Energy (DOE) has already funded a study (which is in progress) to look at small mammals which is a part of the food source for the bobcat and the red-tailed hawk. Ronnie Lamb asked about the amount of PCBs used at the plant. Jimmy Massey stated that he would give the board a number at the next meeting. Ronnie asked if there had been a small animal study done in the past. Jimmy stated that he did not think there had been a similar one done in the past. Jimmy requested additional data from KDFWR on the Quality Assurance/Quality Control (QA/QC), sampling procedures, and analytical methods. Wayne stated that there had been a test done for mercury in the WKWMA in the past because of the Kentucky Ordnance Works. Clemson University is doing a study for DOE on small mammals. Vicki Jones stated that DOE tests deer, fish, and etc. to see how the plant effects the environment. Mark Donham asked about bald eagles. Wayne stated that they are usually only in the Wildlife area in the winter as visitors. The results of the study will be presented in the future.

The second item on the agenda was the Northeast Plume. Dave Dollins stated that the package being presented was to answer some questions on the Northeast Plume and is a review of the Record of Decision that was signed. Debora Jolly presented handouts and discussed the information. Mark Donham asked where the background wells are located. Jimmy Massey stated that he would find out where the wells are located and get that information to the board. This action is an interim action. It will take three to five years to evaluate. This agreement was agreed on two years ago. Steve Kay asked if there was any additional information he wanted from additional sources (sources other than site operators). Mark stated that he had expressed concerns at the public meetings. He feels that contamination is being spread through the air by atmospheric desposition. Steve Kay asked if the board was interested in getting specific information from outside sources. Mark stated that he would put together a proposal on getting specific information. Dave stated that DOE has tried to provide the board with all the information available. He also stated that DOE is not trying to say everything is okay. Bill Tanner stated that he had run a lab that tested water and he found no problems with the data. Tuss Taylor stated that the he had a handout that coincided with this data. He presented the board with a letter from Robert Daniell, Kentucky Department for Environmental Protection (KDEP), stating that KDEP believes that existing safeguards that were designed into the Northeast treatment system to indicate releases of radionuclides are sufficient for early detection. The Kentucky Division of Waste Management (KDWM) intends to re-elevate potential impacts to human health and the environment and identify the source(s) of the gross alpha and beta. Mark asked if this project was worth the money and is it accomplishing what it should. Preliminary data will be available after the first year. It will take 2-3 years to get the best data. The data is constantly evaluated. Linda Long stated that she felt the whole pump and treat project was a big waste of money. Craig Rhodes asked if any wells are monitored in Illinois. Municipal water supply wells are located in Metropolis were sampled. The intent is to slow down the plume. The question was asked about the amount of water treated each day. Mr. Massey stated they would get the board that data.

The next item on the agenda was the Environmental Management and Enrichment Facilities (EMEF) updates. Mark asked about the Waste Area Grouping (WAG) 6 Workplan and asked what had been accomplished. Dave Dollins stated that they had been in the field 2 weeks. There will be a quarterly Federal Facility Agreement (FFA) report. Once the field investigation is complete there will be a report in December. Mark stated that this workplan is extremely important. The goal is to try to characterize the problems around C-400. Mark asked what would happen to the main contracts now held by Lockheed Martin Energy Systems, Inc. (LMES) when another contractor is selected. Jimmy Massey stated the contracts will be given to the next contractor on site. There will be a new contractor in place April 1998. The final Request For Proposal (RFP) went out today. Current Lockheed Martin employees will be given preference for hiring. The intent is to maintain continuity. Tuss Taylor asked what would happen to DOE and Carlos stated that the last time there was a change of contractors everything in DOE stayed basically the same.

The Community Relations Plan was the next thing on the agenda. Dennis Hill gave copies to the board. The plan goes out officially on Monday, July 21, 1997. There will be 2 additional meetings for the board to have time to comment. There will only be 3 iterations of this document. This is a planning document that will be continually updated. Steve Kay reminded the board that they have 2 roles - public (self) and as board members. It was asked if the Environmental Advisory Committee (EAC) and Neigborhood Council are still active. Dennis Hill stated that the EAC would probably be disbanded with the new contract. The Neighborhood Council is still active and seeking new members. Mark asked about the status of the FFA. Dave stated there were several comments received and they are being responded to. DOE hopes to have something by Wednesday. The community relations plan will be back on the agenda next month.

The next item on the agenda was the Draft Work Plan. Steve Kay stated that the best thing to do would be to set priorities. The first item was WAG 6. The next items were WAG 22, SWMU 2, SWMUs 9 and 11. Ronnie Lamb asked if the SSAB will have any input on DOE's budget. Carlos stated that DOE would like to have someone come and talk about the plant's priorities in September. There was some discussion on having someone come to talk to the board in January from Whitfield's office. Vicki Jones will make contact. Carlos stated that he had sent Don Beck the action items from the teleconference. There will be another conference call on Tuesday night July 22, 1997, at the LMES building in Kevil. Carlos will get the ex-officio's the call in number. Gregory Waldrop asked about Vortec. Carlos stated that by next month there should be a resolution for the next step forward in Vortec. It will be on next month's agenda. Gregory asked about the media contact that was discussed at the first Al Alm conference call. Dennis Hill stated that he had not been able to arrange a meeting yet.

Tuss Taylor asked about the meeting location and was told that this could be discussed at the next meeting. The SSAB meeting location of the cafteria has been changed two of the three times that we have met at Heath High School. Carlos suggested that the board might consider a different location since the funding is available. A list will go out with the minutes.

The next meeting will be held on August 21, 1997, at the Heath High School at 6:00 p.m. The meeting was adjourned.

Tentative Agenda for the August 21, 1997, meeting:

Minutes
Information (Handouts)
EMEF Project Updates
Overview of the WAG 6 Work Plan
WAG 22 RI Report - Summary overview of SWMUs 7 and 30
A presentation on Budget Prioritization
Review of the Accelerated Cleanup Plan
Review of the Community Relations Plan
Update on Vortec
Review of the SSAB Draft Work Plan

Action Items

Jimmy Massey will give the board a number on the amount of PCBs used in the plant in the past.
Jimmy Massey will provide the board with the location of the Northeast Plume background wells.
Jimmy Massey will provide the board with numbers on the amount of water treated each day from the Northeast Plume.
Vicki Jones will contact someone from Whitfields office to come to talk to the board in January.
Jeannie Brandstetter will supply a list of meeting places to the SSAB.

PADUCAH GASEOUS DIFFUSION PLANT
SITE SPECIFIC ADVISORY BOARD

Chartered under the Federal Advisory Committee Act

CO-CHAIRS
Mark Donham
Route 1
Brookport, Illinois 62910
mandk@midwest.net

Vicki Jones
1131 Hamburg Road
Kevil, Kentucky 42053
jonesvw@oml.gov

BOARD MEMBERS
Nola Courtney
14299 Wickliffe Road
Kevil, Kentucky 42053

Tommy Fletcher
5420 Tuck Road
Paducah, Kentucky 42001

David Fuller
670 Springwell Lane
Paducah, Kentucky 42001

Rev. W.G. Harvey, Sr.
1429 Reed Avenue
Paducah, Kentucky 42001

William L. Kressenberg
2517 Jefferson Street
Paducah, Kentucky 42001

Ronald Lamb
10990 Ogden Landing Road
Kevil, Kentucky 42053
CHCE@LDD.net

Linda Long
10625 Ogden Landing Road
Kevil, Kentucky 42053

Connie J. Sykes
705 N. 24th Street
Paducah, Kentucky 42001

Rev. Gregory Waldrop
701 Broadway
Paducah, Kentucky 42001

MEMORANDUM
SITE SPECIFIC ADVISORY BOARD

TO: SSAB Members
Ex Officio Members

FROM: Mark Donham
Vicki Jones

DATE: July 1, 1997

SUBJECT: MEETING REMINDER

The next SSAB meeting will be July 17, 1997, at 6:00 p.m. in the Heath High School. The following is the tentative agenda and action items:

Tentative Agenda

Minutes
Discussion on the Northeast Plume
EMEF Project Updates
Review of the Accelerated Cleanup Plan (formerly the 10 Year Plan)
Review of the Community Relations Plan
Update on the SSAB Draft Work Plan

Action Items

Tuss Taylor will review the monitoring well data on the northeast plume
WAG 23 Risk Assessment to be provided to Board - DOE
Copy of Northeast Plume well data to Board - DOE
Copy of Northeast Plume presentation handouts to Board - DOE

PADUCAH GASEOUS DIFFUSION PLANT SITE SPECIFIC ADVISORY BOARD
U.S. DEPARTMENT OF ENERGY
ENVIRONMENTAL MANAGEMENT & ENRICHMENT FACILITIES
PROJECT UPDATE
JULY 17, 1997

ENVIRONMENTAL RESTORATION

Northwest Plume Interim Remedial Action Pilot Plant

More than 181 million gallons of water have been treated at the Northwest Plume Groundwater Treatment Facility since operations began Sept. 1, 1995. The facility operates to contain a high contamination zone of the degreaser trichloroethylene and the man-made radionuclide technetium-99.

July activities include collection of quarterly air samples from the system's carbon columns, with oversight by Kentucky Agreement in Principle personnel activities include continued remedial operations (water extraction and treatment) and routine operation and maintenance of facility. The facility has been in operation 96 percent of the time from August '96 to December '96.

Northeast Plume Interim Containment System

The Northeast Plume project involves the installation of extraction wells in the northeast quadrant of DOE property with an underground pipeline running to the existing PGDP cooling towers as part of a newly completed treatment system.

This regional gravel aquifer's contamination comes solely from the degreaser trichloroethylene.

Routine operations began in March 1997, with more than 31 million gallons of groundwater treated to date.

Lasagna demonstration

The Lasagna soil remediation technology now being tested at PGDP works by using buried electrodes to move water through contaminated soil. Applied current drives the water an inch a day from a positive to a negative electrode. Along the way, the water picks up contaminants from the soil which are removed by treatment zones containing iron filings.

Phase IIA installation was completed in August 1996 and the process was operational through Feb. 26, 1997, with post-demonstration sampling completed the week of March 3, 1997.

DOE EM-50 has granted the Lasagna consortium another extension of the Phase IIA project and the system will operate until August 1997.

If full-scale remediation is undertaken, the remediation will be funded by EM-40 (the office of the Deputy Assistant Secretary for Environmental Restoration), which funds the remainder of Paducah's Environmental Restoration and Waste Management program. A Proposed Plan and Record of Decision schedule with a final ROD targeted for October 1997 has been postponed due to the extension of the test. An overview of the schedule will be provided to the SSAB when finalized.

Waste Area Groups 1 & 7/C-746-K Landfill, Kentucky Ordnance Works

WAG 1 consists of a fire training area, the plant sewage treatment facility and a known trichloroethylene spill site inside the PGDP security fence. WAG 7 consists of five underground storage tanks at the plant water treatment facility, and an inactive sanitary landfill outside the security fence. Three SWMUs are connected with the former Kentucky Ordnance Works (KOW) and are located on the DOE reservation. They are the KOW sewage treatment facility, a known Toluene spill site and a burn area.

The current proposed plan includes continued controlled access, groundwater monitoring and deed restrictions in the preferred alternative.

EPA review of the Record of Decision has extended the ROD signing date beyond projected milestones. DOE expects to sign the ROD in early October 1997, with regulator signings projected for November 1997.

Waste Area Group 3/burial grounds
WAG 3 is composed of three burial grounds within the PGDP security fence. The FY 97 scope of this project include the development of a work plan scoping document and work plan. The draft scoping document was submitted to the regulators on March 27, 1997.

A Data Quality Objectives meeting with regulators was held June 17.

Waste Area Group 6/Trichloroethylene spill site
The C-400 TCE spill site is a major source of TCE in the groundwater and soil. The Industrial Hydrogeologic Study focused on piping, utilities and building foundations in the C-400 building area to determine how these man-made structures and systems influence groundwater infiltration and flow.

The data from this investigation was used to prepare a WAG 6 Remedial Investigation Work Plan, which was submitted to the regulatory agencies in August, 1996. The plan focuses on contaminant distribution and movement. A Treatability Study Program Plan to identify needed treatability studies to collect data necessary to remediate contaminants expected to be found during the investigation is being developed, and was submitted to the regulatory agencies by Nov. 26, 1996.

To date, 16 of 207 borings are have been completed. Field work has predominantly been in thw SWMU 26 area and the east side of the C-400 building site evaluation area. Civil and geophysical surveying in support of excavation permits has begun.

Based on conversations with the EPA and Kentucky Division for Waste Management , contaminated groundwater is not within the scope of the Feasibility Study, based on an assumption that a regional groundwater containment system will be approved and installed.

Waste Area Groups 9 & 11
WAGs 9 & 11 are composed of seven below ground liquid containment vessels.

The scope of work for this project includes development of an SAP, field sampling and development of a Site Evaluation Report. Historical analytical data was transmitted electronically to the Kentucky Division for Waste Management, and the data assessment report completed and delivered to DOE and KDEP.

A new schedule has been established for the Site Evaluation, including field work in August and September 1997.

Waste Area Group 17/Rubble piles
The piles of concrete rubble that make up Waste Area Grouping 17 have been investigated for contamination. The rubble, derived from demolition of sidewalks, parking lots and other concrete structures at PGDP during the 1970s, was used as construction material in the Ballard County Wildlife Management area, McCracken County Wildlife Management Area and on Department of Energy property.

A small amount of contaminated material was removed from SWMU 124 in 1996. After further

sampling, an additional removal action at this SWMU was planned for April 1997. Following that removal action, the state's Radiation Control Branch verified that no further action was needed at SWMU 124, and has issued a letter to that effect.

Waste Area Group 22/Burial grounds
This project includes the investigation of burial grounds in the northwest corner of the plant (SWMUs 7 & 30) and in the west-central portion of the plant (SWMU 2). Original plans included installation of a cap at SWMU 2, the C-749 Uranium Burial Ground, but investigation activities have determined that the buried material was saturated in the water table, indicating a cap would have limited effect.

A Data Summary Report, summarizing and evaluating data collected during investigation activities, is being prepared and was provided to the regulatory agencies in February.

The development of a Remedial Investigation Report is ongoing at SWMUs 7 & 30 (the C-747-A Uranium Burial Ground and C-747-A Burn Area). This RI report is to be submitted to the regulatory agencies in July 1997, with comments due October 1997.

Waste Area Group 23/Polychlorinated Biphenyls (PCBs) Spill Sites
Past use of PCBs and subsequent accidental spills and leaks of oils that contain PCBs caused surface soil contamination at several Solid Waste Management Units inside the PGDP security fence.

The preferred option in the original Proposed Plan was the excavation and treatment of the soil containing PCBs greater than 25 ppm using a thermal treatment technology known as vitrification. This process destroys organics, such as PCBs, and produces a glass which will bind any radioactive compounds.

The DOE is now seeking public comment on an Engineering Evaluation/Cost Analysis Summary (EE/CA Summary) for the cleanup of PCB sites. The summary describes the Non-Time-Critical Removal Action that DOE is considering to clean up the PCB contamination. DOE is proposing the excavation and temporary on-site storage of the contaminated soil. The focus of this removal action is the elimination of potential risk to workers from contact with contaminated soil. The final disposition of the contaminated soil would be determined at a later date, consistent with applicable laws and regulations, including appropriate public participation.

A 30-day public comment period on the EE/CA Summary ended July 1, 1997. Following incorporation of public comments, DOE will issue an Action Memorandum for the selected action on Sept. 8, 1997. The EPA approval date for the Action Memo is scheduled for Sept. 30, 1997.

Waste Area Group 27/Potential trichloroethylene sources
WAG 27 consists of potential or known sources of TCE on the west side of the Paducah Gaseous Diffusion Plant. A second draft Remedial Investigation/Feasibility Study Work Plan is being developed for submittal to regulatory agencies on June 2, 1997.

The Remedial Investigation/Feasibility Study was transmitted to regulators June 30, 1997. Appendix H of this document is the first draft Sampling and Analysis Plan for the C-720 building. Comments on the C-720 portion were requested back from regulators by early August 1997. An estimated for 1998 field work is now being prepared.

Vortec Vitrification Project
Litigation involving the Vortec project has been tentatively settled. More information will be made available when details are finalized.

Federal Facility Agreement (FFA)
Under CERCLA, a Federal Facility Agreement is required between the state, EPA and DOE to set forth guidelines on how the site cleanup is to be managed.

The FFA has been approved by DOE, state and federal regulators and has been issued for public comment.

Comments received prior to the June 20 close of the public comment period are being considered.

Drum Mountain Scrap Removal
Drum Mountain must be moved from its present location before Oct. 1, 1998 to support Remedial Action activities at the Northwest Corner burial yards. Planning for this project consists of identifying the most cost-efficient method of packaging the wastestream.

After it is packaged, the waste will be loaded and transported off-site to Envirocare of Utah, the facility selected to receive the waste.

This approach will require $6.9 million in Fiscal Year 1998 not presently identified. DOE and LMES need to locate funding in the Oak Ridge program.

Team members are writing the statement of work that will be submitted along with the sole source justification.

EMEF COMMUNITY RELATIONS PLAN OVERVIEW

1. Scope: Community relations/outreach/involvement activities for EMEF Program for Department of Energy at Paducah Site, with emphasis on Remedial Actions and management of wastes generated through those actions.

2. Purpose: Present general information about the site and enhance and facilitate community involvement in DOE activities at the site. Primary document under the Federal Facilities Agreement; required by CERCLA.

3. Major components: Overview of plan, site description, EMEF program description, community background, community interviews, community relations activities.

4. Schedule:

July 21, 1997 --	Ad in Paducah Sun announcing availability and beginning of public comment period.
July 22-Sept. 26 --	Public comment period
Sept. 27-Oct. 16 --	Resolve comments
Oct. 17-31 --	Reproduce final draft
Nov. 3-5 --	Announce availabilty of final document; distribute to selected stakeholders.

Schedule allows for two SSAB meetings (not including July 17) for board to comment on plan. Schedule is tentative and may be adjusted if circumstances dictate. For instance, if comments can be resolved in less time and/or production can be expedited, final document may be released sooner.

MARK DONHAM CONFERENCE CALL
June 25, 1997

On June 25, 1997, a conference call was held with Mark Donham. Also present were Dennis Hill, Dave Dollins, Debora Jolly, Vicki Jones, and Teresa Fields. Mark was informed by Dave Dollins that the meeting was being tape recorded for the record. Debora Jolly apologized to Mark for missing the Site Specific Advisory Board (SSAB) meeting and stated that she hoped that Mark did not let that be a reflection on the Department of Energy (DOE).

Mark's first question was about the levels in the monitoring well (MW) reports that he had received from Debora Jolly. His first question was about MW-284. Mark stated the levels for the gross alpha on June 4, 1996, exceeded the maximum contaminant level (MCL). Mark stated that the reason given to him for the Northeast Plume stripping this water with no pollution control was that the plant is only stripping organics. He felt that it appeared from the data that trichloroethylene (TCE) was not the only contaminant in the plume. Debora stated that the numbers he was talking about did exceed the drinking water standard. Debora stated that she had monitoring well reports that showed essentially no levels prior to and after that date. Debora stated that these reports would be handed out at the next meeting. She stated that there is a lot of variability because they are at such low numbers. By DOE order they are required to report anything they see. She stated that this is not a consistent trend. Mark asked if there is continuous monitoring on the steam coming out of the plume. Debora stated that there is not. Mark stated that these spots (high levels) go out through the cooling tower. Debora said that there may be very short duration periods where we do put out something other than TCE, some naturally occurring material that is in the plume. She stated that she questioned whether this is actually a "real" occurrence. Debora stated that she had some other information on what additional dose you would receive from the gross alpha number that they were looking at. If you were to stand within 200 yards of the cooling tower continuously for a year you would only be adding 1/millionth of the amount that you would get being the closest neighbor to the plant. Mark stated that his concern was that one single alpha particle could attach to a particulate and could get into the soil and into the food chain. Debora stated that she had no data stating that any plume of significant particulates are contained in the plume and are carried any significant distances. Mark asked if what Debora was saying was that there was nothing to worry about and that everything is just fine. Debora stated that the numbers he was looking at are numbers, that analytically by methods that we use, are not of concern. She questioned if the numbers were even real. Mark asked what the goal was for using these cooling towers, what are we hoping to accomplish. Debora stated that the goal for the Northeast Plume is to use the cooling towers to remove the TCE from the groundwater. Mark asked if this was a long term action. Debora stated that this is an Interim Remedial Action. The long term action has not been determined. Dave Dollins stated that the goal is to reduce the high concentration portion of the plume and will probably not be used more than 3-5 years. He stated that only time will tell what kind of "dent" will be made in the groundwater.

Mark's next questions were on MW-291. Mark asked about the gross beta on June 13, 1996. He stated the levels were much higher than some of the other levels. Mark stated that he felt that this showed that there were peaks. Debora stated that their is random variability in the environment and in the method. Mark asked if we could insure that there is not any radioactive particles coming out of the steam from the cooling towers. Debora stated that she could not absolutely, positively state there are not any radioactive particles coming out of the cooling towers steam (mist).

Mark then asked about the soil borings. Mark stated that there were very high levels for gross alpha and gross beta. He asked if Debora was saying that this was strictly from naturally occurring sources. Debora answered that there are many naturally occurring sources that would produce gross alpha levels in soil. Mark asked if she had some documents on that. Debora stated that she didn't have anything in front of her to say yes or no. Mark stated that he felt that the data showed that there are small peaks of contamination. Debora stated that what he was seeing was naturally occurring radiation in the soil and water and not contamination from the plant.

Mark stated that there is a document "Summary of Alternatives for Remediation of Offsite Contamination" (DOE/OR-1013) that he felt that all of the board should get, even if the board had to pay for reproduction. He stated that there are maps in the document showing the Tc-99 plume and levels of 10 pCi/L going past Dykes road. He asked about the monitoring wells and where they are drawing the water from. Debora stated that part of the package she would be sending to him would show where the monitoring wells are located. Mark asked how often the data is collected. Debora stated that the data is collected quarterly. Debora stated that in the Operations and Maintenance (O&M) plan for the Northeast Plume states that when we see Tc-99 at two times the detection level (about 50 pCi/L) in the early detection wells, then we are going to take action. That way there will be no levels in the monitoring wells. Mark is concerned about the source and that it is not the only source. He is concerned that we keep any additions down. He asked about the DOE as low as reasonably achievable (ALARA) standard. Dave stated that the Northwest Plume is an example of trying to keep the levels down. Mark felt that by releasing any levels without any attempt at containment was not trying to achieve ALARA.

Dave stated that he felt that what he was seeing was actually "static". He assured Mark that if DOE felt that there was a problem then there would be immediate action taken. Vicki asked if his concern was from the total dose from the plant. Mark stated from the plant and organics. Vicki told Mark that last year from the rad portion the dose was 1.08 mRem. The DOE guide allows up to 100 mRem from all sources. Mark stated that he didn't know the steps used to calculate that. Vicki stated she could get him some information on that.

Mark stated that he was told that this went out for public comment. He asked if there was actually an official public comment period. Dennis Hill stated that he checked the file and there was an official public comment period for the proposed plan. Dennis stated that at this time that we are looking into sending out postcards (at the very least) to the SSAB and a mailing list of interested parties stating that a document is going out for public comment. Mark stated that he talked to another person that stated that she had written to Carol Mosely-Braun asking that she be put on a mailing list for the plant. The lady had received a letter from her with a letter from Al Alm attached stating that she was on the mailing list. Mark stated that we could work on this through the Community Relations Plan.

Mark had asked Carlos Alvarado if a categorical exclusion was issued on this project and was told there was not one. He wanted to know how we considered our NEPA obligations on this project. Dave stated that on the Northwest Plume NEPA values were run through everyone including our own NEPA people. Mark asked if there was any documentation. Dave stated that the NEPA values were probably incorporated at the Feasibility Study stage. Dave stated that this is normally the way that it is done. Debora stated that she would get Mark an answer on that question. Mark

asked if he could get the latest MW data. Debora stated that the MW data, presentation data and how NEPA was handled on the Northeast Plume information would be sent to Mark as soon as possible. Dennis will get him the dates on the comment period for the Northeast Plume. Mark stated that he felt that there are data gaps because their is not continuous monitoring on the Cooling Towers. Mark felt that it would be wise to work toward filling those data gaps. Debora stated that the stated information would be sent to Mark. Dave stated that he felt that the Northeast Plume should be a topic of discussion in the July SSAB meeting.

POTENTIAL MEETING SITES
PADUCAH GASEOUS DIFFUSION PLANT
SITE SPECIFIC ADVISORY BOARD

West Kentucky Vocational School
Contact: Janett Blythe, 554-4991
Cost: none
Limitations: SSAB may occasionally be bumped for class activities with little or no notice

Jaycee Civic Center, 2800 Park Avenue
Contact: Kathy Wyatt, 444-8533
Cost: $225
Limitations: subject to scheduling availability

Parks & Recreation Dept., 1400 H.C. Mathis
Contact: Kathy Wyatt, 444-8533
Cost: $10 per hour
Limitations: Security is a hitch during the summer months, because no classes are held there during the week at night.

Paducah Tilghman High School, 2400 Washington
Contact: Dennis Jackson, assistant principal, 444-5657
Cost: none
Limitations: subject to availability

Heath High School
Contact: Barbara McGinty, 488-3126
Cost: none
Limitations: should be available most dates; just need to let them know so the janitor will know we will be in the building

Executive Inn, 1 Executive Blvd.
Contact: Karen Fawn, 443-8000
Cost: $100 (McKinley Room - seating for 75)
Limitations: reservations/subject to availability

Quality Inn, Irvin Cobb Drive
Contact: Bonnie Payne, 443-8751
Cost: $125 (to seat up to 125 people - will deal on price)
Limitation: Reservations in advance

DOE Site Office
Contact: Teresa Fields, Missy Howell
Cost: none
Limitations: conference room not conducive to comfort for meetings over 25-30 people

Information Age Park
Contact: Everett Fair
Cost: Minimum $100
Limitations: scheduling/availability; smaller rooms not conducive to comfort for meetings over 25-30 people

FISH & WILDLIFE COMMISSION
Mike Boatwright, Paducah
George E. Warren, Sebree
Tony Brown, Brandenburg
Charles E. Bale, Hodgenville
Dr. James R. Rich, Taylor Mill
Ben Frank Brown, Richmond
Doug Hensley, Hazard
Dr. Roland L. Burns, Rush
David H. Godby, Somerset

01 97 001607

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF FISH AND WILDLIFE RESOURCES
C. THOMAS BENNETT, COMMISSIONER

MEMORANDUM

TO: SSAB Members and Ex-officio members

FROM: Wayne L. Davis, Kentucky Department of Fish and Wildlife Resources, Ex-officio Member

DATE: July 17, 1997

SUBJECT: PCB's found in terrestrial organisms

The Kentucky Department of Fish and Wildlife Resources (KDFWR) would like to inform you of some recent findings that are of concern to our agency. During the past year there has been an opportunity to sample three (3) animals that were found dead on the West Kentucky Wildlife Management Area next to the Paducah Gaseous Diffusion Plant. Those animals were a red-tailed hawk, bobcat, and coyote. In addition, a blood sample was taken from a young red-tailed hawk and sampled. Three of the four samples came back with some level of PCB's (aroclor 1260) in either the blood or liver. The animals and the test results are as follows:

Species	Age	Date	Sample	PCB (Aroclor 1260)
Red-tailed hawk	Juvenile	Summer 1996	Liver	5.25ppm
Red-tailed hawk	Juvenile	Summer 1997	Blood	0.70ppm(Preliminary)
Bobcat	Juvenile	Nov. 15, 1997	Liver	2.21ppm
Coyote	Adult	Nov. 2, 1996	Liver	Not Detected
Coyote	Adult	Nov. 2, 1996	Fat	Not Detected

KDFWR's concern regarding these samples is these are species in which it was not anticipated there would be any accumulation of PCB's since they or their food items should not be exposed to this substance. The question is how are these species being exposed to PCB's and are these results just anomalies or is there a more widespread contamination?

Positive news is that deer have been sampled from the West Kentucky Wildlife Management Area for several years and no PCB's have been found in those samples of muscle, fat, bone, and liver. Additionally, research has just been started to collect small mammal samples from areas outside the security fence to test for PCB's and other contaminants. Hopefully, these results will be available soon and can help answer some of the questions raised by these other results.

Agency for Toxic Substances and Disease Registry

Public Health Statement

Uranium

ATSDR Public Health Statement, December 1990

This Statement was prepared to give you information about uranium and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,177 sites on its National Priorities List (NPL). Uranium has been found above background levels at 26 of these sites. However, we do not know how many of the 1,177 NPL sites have been evaluated for uranium. As EPA evaluates more sites, the number of sites at which uranium is found may change. The information is important for you because uranium may cause harmful health effects and because these sites are potential or actual sources of human exposure to uranium.

When a radioactive chemical is released from a large area such as an industrial plant, or from a container such as a drum or bottle, it enters the environment as a radioactive chemical emission. This emission, which is also called a release, does not always lead to exposure. You are exposed only when you come into contact with the radioactive chemical. You can come into contact with it in the environment through breathing air, eating, drinking, or smoking substances containing the radioactive chemical. Exposure may also result from skin contact with the radioactive chemical alone, or with a substance containing it. Exposure can also occur by being near radioactive chemicals in concentrations that may be found at hazardous waste sites or at industrial accidents.

If you are exposed to a hazardous substance such as uranium, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, life style, and state of health.

What is uranium?

Natural uranium is a silver-colored metal that is radioactive. Small amounts of uranium are present in rocks, soil, water, plants, and animals and contribute to the weak background radiation from these sources. Soil commonly contains variable amounts, but the average is about 2 parts uranium per million parts of soil (2 ppm). This is equivalent to a tablespoon of uranium in a truckload of dirt. Fertilizers made from phosphate rocks contain higher amounts of uranium than natural soils. Some rocks and minerals in underground and open pit mines also contain uranium in a more concentrated form. After these rocks are mined, uranium is extracted and chemically converted into uranium dioxide or other usable forms. The

remaining rock from which uranium has been extracted is called depleted ore or mill tailings.

Natural uranium is composed of three forms (called isotopes) of uranium: uranium-234, uranium-235, and uranium- 238. The amount of uranium-238 in natural uranium is more than 99%. Uranium-235 is present at just 0.72%, in natural uranium, but it is more radioactive (and therefore more hazardous) than uranium-238. Uranium-235 is used in nuclear bombs and nuclear reactors. An industrial process by which the percent of uranium-235 is concentrated is called enrichment, and the uranium obtained this way is called enriched uranium. Uranium-234 is even less abundant than uranium-235, so it can be ignored for most practical purposes.

Uranium-238 is not stable but breaks down into two parts. This process of breaking down is called decay. The decay of uranium-238 produces a small part called "alpha" radiation and a large part called the decay product. The breakdown of uranium-238 to its decay products happens very slowly. In fact, it takes about 4.5 billion years for one-half of the uranium-238 to break down (4.5 billion years is the half-life of uranium-238). Thorium, the decay product of uranium, is also not stable, and it continues to decay until stable lead is formed. During the decay processes, the parent uranium-238, its decay products, and their subsequent decay products release a series of new elements and radiation, including such elements as radium and radon, alpha and beta particles, and gamma radiation. Alpha particles cannot pass through human skin, whereas, gamma radiation passes through more easily.

Because of the slow rate of decay, the total amount of natural uranium in the earth stays almost the same, but it can be moved from place to place through natural processes or by human activities. When rocks are broken up by water or wind, uranium becomes a part of the soil. When it rains, the soil containing uranium can go into rivers and lakes. Mining, milling, manufacturing, and other human activities also move uranium around natural environments.

We use uranium mainly in nuclear power plants and nuclear weapons. Very small amounts are used in making some ceramics, light bulbs, photographic chemicals, and household products.

How might I be exposed to uranium?

Since uranium is found nearly everywhere, you can be exposed to it in the air, water, food and soil. We know, roughly, the average amounts of uranium in food (0.08 to 70 micrograms per kilogram [ug/kg]) and drinking water (0.4 to 1.4 micrograms per liter [ug/L]; 1 microgram = 1/1,000,000th of 1 gram). Most people in the United States take in some uranium with their food every day. Root vegetables, such as beets and potatoes, tend to have a little more uranium than other foods. In a few places, the concentration of uranium is higher in the water than in the food. People in these areas take in more uranium from their drinking water than from their foods. Your daily intake of uranium may be greater than average if you live near uranium mines or processing plants or an uncontrolled waste site containing uranium, eat food grown in contaminated soil, or drink water that contains unusually high levels of uranium. Normally, very little of the uranium in lakes, rivers, or oceans gets into the fish or seafood we eat. The amount in air is usually so small that it can be safely ignored.

However, people who work at factories that process uranium, work with phosphate fertilizers, or live near uranium mines have a greater chance of being exposed to uranium in the air than most other people. Larger-than- normal amounts of uranium might also enter the environment from accidental discharges from uranium processing plants.

How can uranium enter and leave my body?

If you were to breathe in uranium dust, most of it would leave the lungs when you cough or breathe out. However, you might swallow some of the uranium you breathe in as your body removes the uranium from your lungs. Some of the uranium in your lungs will enter your blood, pass through the kidneys, and be eliminated in the urine within a few days. A small amount may stay in your lungs for years.

Since uranium is present all over the earth, everyone normally eats or drinks a small amount of uranium daily. When it enters your body this way, about 99% of it leaves within a few days in your feces and never enters your blood. A small amount of uranium (about 1%) will enter the blood. Most of this will pass through the kidney and be eliminated in the urine in a few days. A small amount goes to your bones and may stay in your bones for years. A very small amount, about 1/5000th of the weight of an aspirin tablet, is found in most people, mainly in their bones.

Although uranium is radioactive, the type of radiation it gives off cannot go through your skin, so natural uranium that is outside the body is not hazardous. When uranium gets inside your body, after breathing it in, eating or drinking it, or through cuts in your skin, radiation and chemical toxicity are of concern to health.

How can uranium affect my health?

We do not know for certain if natural uranium is dangerous to human health, although evidence of kidney effects were seen in people who work in uranium mines. Animals have developed kidney disease after they have been exposed to large amounts of natural uranium in the food, in the drinking water, in the air, or on the skin.

There is always a concern about getting cancer from any radioactive material. Natural uranium has very low levels of radioactivity and has not definitely been shown to cause cancer in humans or animals. Nevertheless, it is possible that you could develop cancer from swallowing or breathing large amounts of natural uranium because the greater your exposure to a radioactive material, the greater your chance of developing cancer. This is particularly true for enriched uranium that has been made more radioactive. Cancer may develop many years after swallowing or breathing a radioactive material. Just being near natural uranium is of very little danger to your health because most of the radiation given off by uranium cannot go through your skin.

We do not know if natural uranium causes reproductive effects or birth defects in humans, but animal studies suggest that uranium may affect reproduction and the developing fetus.

What levels of exposure have resulted in harmful health effects?

Small amounts of uranium are always in your body and these amounts are not known to affect your health. Some uranium miners have developed lung cancer. This cancer is not from the uranium itself, but from the high levels of radioactive radon gas, which is formed when uranium decays.

Animals that ate food, drank water, or breathed air that had high levels of uranium dust have developed kidney damage. The extent of kidney damage depends on how much uranium gets into their bodies and on the chemical form to which the animals are exposed. Animals can eat or breathe large amounts of some forms of uranium without having any health problems at all.

Tables 1-1, 1-2, 1-3, and 1-4 show the relationship between uranium and known health effects.

Is there a medical test to determine whether I have been exposed to uranium?

There are medical tests that can be performed to determine the amount of uranium in your urine and feces. If you are exposed to a larger- than-normal amount of uranium, some uranium may appear in your urine and feces. Since most uranium leaves the body in the feces within a few days, the amount in the feces only shows whether you have been exposed to a larger amount than normal within the last week or so. Uranium can be found in your urine for up to several months after exposure. The amount of uranium in your urine and feces does not always accurately show how much uranium you were exposed to.

Since uranium is known to cause kidney damage in humans and animals, urine tests can be used to see if you have kidney damage that may have been caused by exposure to uranium. Some of these tests include measuring the amount of protein, sugar, or enzymes in the urine, or detecting the presence of damaged kidney cells in the urine. These tests, however, are not specific for uranium and are only useful to determine if kidney damage has occurred.

If you breathe large amounts of radioactive uranium, the amount of radioactivity in your body can be measured by a special test. This test is only useful if you have been exposed to certain types of uranium that stay in the lungs for a long time, or to enriched uranium that is more radioactive than normal.

What recommendations has the federal government made to protect human health?

EPA states that long-term exposure to 0.003 milligrams of uranium/kilogram of body weight/day in the food or drinking water is safe for humans. This value is for compounds of uranium that dissolve easily in water. EPA requires industries to report discharges of more than 0.1 curie for most uranium isotopes, including uranium- 238, and to report spills of 100 pounds or more of two uranium compounds, uranyl nitrate and uranyl acetate. Uranium levels in the workplace are regulated by the Occupational Safety and Health Administration (OSHA) and recommended by the National Institute for Occupational Safety and Health (NIOSH). Both organizations set the occupational exposure limit for an 8-hour workday, 40-hour workweek at 50 micrograms per cubic meter (ug/m3) for uranium compounds that dissolve easily in water. The limits for compounds that do not dissolve easily in water are 200 ug/m3 (OSHA) and 250 ug/m3 (NIOSH).

Where can I get more information?

If you have any more questions or concerns not covered here, please contact your state health or environmental department or:

```
Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, E-29
Atlanta, Georgia 30333
```

This agency can also give you information on the location of the nearest occupational and environmental health clinics. Such clinics specialize in recognizing, evaluating, and treating illnesses that result from

exposure to hazardous substances.

LOCKHEED MARTIN

LTR.ER-NEPA/95-040

MARTIN MARIETTA ENERGY SYSTEMS, INC.

761 VETERANS AVENUE
KEVIL KENTUCKY 42053

June 28, 1995

Mr. Jimmie C. Hodges
Paducah Site Manager
Department of Energy
Post Office Box 1410
Paducah, Kentucky 42002-1410

Dear Mr. Hodges:

Documentation of National Environmental Policy Act (NEPA) Values Review for the Northeast Plume Interim Remedial Measure (IRM) at the Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky

This letter has been prepared to document the NEPA values review for the referenced Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) documentation prepared for the Northeast Plume IRM at PGDP, located near Paducah, Kentucky. CERCLA documentation, consisting of the Technical Memorandum (DOE/OR/06-1318&D0 and D1), the Proposed Remedial Action Plan (DOE/OR/06-1319&D3), and the Record of Decision (ROD) (DOE/OR/06-1356&D0 and D1) was reviewed to determine the adequacy of NEPA values included in the documentation. The review took place in accordance with the objectives stated in the June 13, 1994, Department of Energy (DOE) Secretarial Policy on NEPA, "where DOE, hereafter, will rely on the CERCLA process for review of actions to be taken under CERCLA and will address NEPA values and public involvement procedures," as specified in the policy.

Based on the reviews conducted and the incorporation of comments, we believe it is appropriate to consider that NEPA values have been sufficiently incorporated into the Technical Memorandum, Proposed Plan, and ROD. This recommendation and request for your acknowledgement is made based on reviews conducted by the PGDP NEPA Compliance Coordinator, Mr. B. A. Bowers (for location-specific applicable or relevant and appropriate requirements [ARARs] accuracy), and the Environmental Restoration Division NEPA Coordinator, Ms. L. T. Cusick, for an overview of ARARs as well as the balance of NEPA values.

This NEPA values review and the request for concurrence should be maintained in one file and will serve to substantiate that the CERCLA documentation prepared for the action adequately addresses NEPA values in accordance with the DOE Secretarial Policy on NEPA. This is not intended to be a NEPA "determination" as NEPA documentation is not required for CERCLA actions per the Policy, but a memorandum to substantiate that the document has been reviewed for NEPA values and has been found to be adequate.

Please indicate your concurrence on the attached page and return a signed copy to me. If you have questions, please contact Lesley Cusick at 615-576-4026.

Sincerely,

Jimmy C. Massey, Site Manager
Environmental Management and Enrichment Facilities

JCM:LTC:bsg

Enclosures (3)

cc: B. A. Bowers
K. S. Branscom, Systematic Management Services
L. B. Cobb
K. W. Cook
L. T. Cusick
M. F. P. DeLozier
P. A. Gourieux
E. F. Johnstone
P. W. Phillips, DOE-ORO
J. G. Rogers
G. Summers, Jacobs Engineering Group

cc/enc: PGDP KEVIL DMC - RC

Recommendation on Incorporation of NEPA Values into CERCLA Documents

Documentation: Technical Memorandum for Interim Remedial Measure at the Northeast Plume, Proposed Remedial Action Plan for Interim Remedial Measures at the Northeast Plume, and Record of Decision for Interim Remedial Measure at the Northeast Plume, Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Based on the intent of the Secretarial Policy on NEPA, I consider that NEPA values information in the above-referenced documentation is complete based on the actions as described in the documentation. No further NEPA values review is necessary for the proposed action unless implementation differs from that agreed to in the recently signed Record of Decision, which has already been reviewed.

Jimmie C. Hodges — 7-5-95

Jimmie C. Hodges, Site Manager — Date
Paducah DOE Site Office

Date: June 2, 1995

To: E. F. Johnstone

c: L. T. Cusick, D. R. Guminski, J. E. Lamb, B. J. Montgomery, and PGDP KEVIL DMC-RC

From: B. A. Bowers, Kevil (5057) BAB

Subject: **Review of "Record of Decision for Interim Remedial Action at the Northeast Plume, Paducah Gaseous Diffusion Plant, Paducah, Kentucky" (DOE/OR/06-1356 & D1)**

The CERCLA documentation referenced above was reviewed in accordance with the June 13, 1994, Secretarial Policy Statement ("Policy") on NEPA. As stated in Section II E of the Policy, DOE will now rely on the CERCLA process for review of actions to be taken under CERCLA (i.e., the action will be reviewed under the guidelines of 40 CFR 300 [the National Contingency Plan]). As the Site NEPA Compliance Coordinator for LMES, it is my responsibility to review CERCLA documents to ensure that certain issues once considered during the NEPA process are addressed under CERCLA, as intended by the Policy. This review focuses on location-specific ARARs related to environmentally sensitive resources.

Location-specific ARARs are appropriately identified in the document. My comments on the DO version were adequately addressed and the document incorporates the necessary information to confirm that the proposed interim action will comply with all location-specific ARARs.

One statement in the document requires follow-up in the remedial design phase. With regards to compliance with the Endangered Species Act ARARs, the document states (p. 30), "No impacts to any of these species or their habitats are anticipated at this time. If it becomes apparent that impacts to any of these species or their habitats are unavoidable, . . . " Criteria needs to be established for determining whether federally-listed species or their habitats could be impacted. This could be based on information (e.g., habitat) reported in Volume III of COE's "Environmental Investigations at the Paducah Gaseous Diffusion Plant and Surrounding Area McCracken County, Kentucky" (May 1994).

If you should have any questions or require additional information, please call me at Extension 5057.

BAB:sel

Agency for Toxic Substances and Disease Registry

Public Health Statement

Trichloroethylene

ATSDR Public Health Statement, October 1989

What is trichloroethylene?

Trichloroethylene is a colorless liquid at room temperature with an odor similar to ether or chloroform. It is a man-made chemical that does not occur naturally in the environment. Trichloroethylene is mainly used as a solvent to remove grease from metal parts. It is used as a solvent in other ways, too, and is used as a chemical (building block) to make other chemicals.

How might I be exposed to trichloroethylene?

The two main sources of human exposure to trichloroethylene are the environment and the workplace. Trichloroethylene has been found in at least 460 of 1179 hazardous waste sites on the National Priorities List (NPL). Background levels of trichloroethylene can be found in the outdoor air we breathe (30 to 460 parts of trichloroethylene per trillion parts of air) and in many lakes, streams, and underground water used as sources of tap water for homes and businesses. Various federal and state surveys indicate that between 9 and 34% of the water supply sources in the United States may be contaminated with trichloroethylene. Water supplies that are contaminated typically contain an average of 1 to 2 parts of trichloroethylene per billion parts of water or less. An important source of environmental release of trichloroethylene is evaporation to the atmosphere from work done to remove grease from metal. In addition, at places where wastes are disposed, trichloroethylene is released to the air by evaporation and to underground water when it passes through the soil.

Trichloroethylene can also be released into the environment through:

- Evaporation from adhesive glues, paints, coatings, and other chemicals;
- Release of trichloroethylene and chemicals containing it, when it is made;
- Air-cleaning processes at publicly owned waste treatment plants that receive wastewater containing trichloroethylene; and
- Burning of community and hazardous waste.

Some consumer products that may contain trichloroethylene are:

- Typewriter correction fluids, paint removers and paint strippers, adhesive glues, spot removers, cleaning fluids for rugs, and metal cleaners.

How does trichloroethylene get into my body?

Trichloroethylene can enter the body when a person breathes air or drinks water containing it. Trichloroethylene can also enter the body through the skin when it comes in contact with it.

How can trichloroethylene affect my health?

Dizziness, headache, slowed reaction time, sleepiness, and facial numbness have occurred in workers breathing trichloroethylene or in people who use trichloroethylene-containing products in small, poorly ventilated areas. These effects on the central nervous system have also been seen in people who drank several ounces of undiluted trichloroethylene. Irritation of the eyes, nose, and throat can also occur under these conditions. More severe effects on the central nervous system, such as unconsciousness and possibly death, can occur from drinking or breathing higher levels of trichloroethylene. In general, the less severe central nervous system effects that result from one or several exposures to trichloroethylene disappear when exposure ends.

Some health effects may persist in persons following long-term exposure to trichloroethylene. This information is based largely on animal studies. For example, studies in animals show that ingesting or breathing levels of trichloroethylene that are higher than typical environmental levels can produce nervous system changes; liver and kidney damage; effects on the blood; tumors of the liver, kidney, lung, and male sex organs; and possibly cancer of the tissues that form the white blood cells (leukemia). Results of a few studies in pregnant animals exposed to trichloroethylene in air or in food showed effects on unborn animals or on newborns. Drinking alcohol can make people more susceptible to liver and kidney injury from trichloroethylene.

At present, information is not sufficient to determine whether cancer or the effects on the unborn seen in animals following exposure to trichloroethylene may also occur in humans. The International Agency for Research on Cancer has determined that trichloroethylene is not classifiable as to its carcinogenicity to humans.

Is there a medical test to determine if I have been exposed to trichloroethylene?

Recent or ongoing exposures to trichloroethylene can be determined by measuring trichloroethylene in the breath. Another way of determining whether exposure to trichloroethylene has occurred is by measuring a number of breakdown products (metabolites) of trichloroethylene in the urine or blood. Neither of these tests is routinely available at your doctor's office. Because one of the breakdown products, trichloroacetic acid, is removed very slowly from the body, it can be measured in the urine for up to about 1 week following trichloroethylene exposure. It must be noted, however, that exposure to other chemicals can produce the same breakdown products in the urine and blood. Therefore, these methods cannot tell you if you have been exposed only to trichloroethylene.

What levels of exposure have resulted in harmful health effects?

The graphs on the following pages show the link between exposure to trichloroethylene and known health effects. In the first set of graphs, labeled "Health effects from breathing trichloroethylene," (Fig. 1.1), exposure is measured in parts of trichloroethylene per million parts of air (ppm). In the second set of graphs, the same relationship is represented for the known "Health effects from ingesting trichloroethylene" (Fig. 1.2). Exposures are measured in milligrams of trichloroethylene per kilogram of body weight per day (mg/kg/day). In all graphs, effects in animals are shown on the left side and effects in humans are shown on the right.

The first column in Figs. 1.1 and 1.2, labeled "Short-Term Exposure," refers to known health effects in laboratory animals and humans from exposure to trichloroethylene for 2 weeks or less. The column labeled "Long-Term Exposure" refers to trichloroethylene exposures of longer than 2 weeks. The levels marked on the graphs as "minimal risk for effects other than cancer" reflect estimates of levels of exposure at which no adverse effects are expected to occur. These levels are based on information on animals.

Toxic Effects Other Than Cancer--Figure 1.1 shows that short-term and long-term exposures to air containing about 50 ppm or more of trichloroethylene have produced harmful effects in both animals and humans. Figure 1.2 shows that ingesting (drinking) the equivalent of 240 mg (less than a spoonful) of trichloroethylene per kg of body weight (kg = 2.2 pounds) for 2 weeks produced effects in the liver of animals. Drinking similar amounts over longer periods of time caused effects on unborn animals and the kidney as well as on the liver.

Cancer--From available information on animals, the Environmental Protection Agency (EPA) has estimated that breathing air containing 1 ppm trichloroethylene every day for 70 years may place as many as 93 persons in a population of 10,000 (or 93,000 persons in a population of 10,000,000) at risk of developing cancer. EPA has also estimated that drinking water containing 1 ppm trichloroethylene every day over a lifetime may place as many as 3 persons in a population of 10,000 (or 3,200 persons in a population of 10,000,000) at risk of developing cancer. It should be noted that these risk levels for humans are plausible upper-limit estimates based on information obtained from animal studies. Actual risk levels are unlikely to be higher and may be lower.

What recommendations has the federal government made to protect human health?

EPA has established a drinking water standard of 5 parts of trichloroethylene per billion parts of water (ppb). This level became effective on January 9, 1989, and applies to community water systems and those which serve the same 25 or more persons for at least 6 months.

Trichloroethylene levels in the workplace are regulated by the Occupational Safety and Health Administration (OSHA). The occupational exposure limit for an 8-hour workday, 40-hour workweek is an average concentration of 50 ppm in air. The 15-minute average exposure, which should not be exceeded at any time during a workday, is 200 ppm. The OSHA standards do not take into consideration the cancer-causing potential of trichloroethylene. EPA requires industry to report spills of 1,000 pounds or more of trichloroethylene. It has been proposed that this level be reduced to 100 pounds.

Where can I get more information?

If you have more questions or concerns, please contact your state health or environmental department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, E-29
Atlanta, Georgia 30333

Agency for Toxic Substances and Disease Registry

Public Health Statement

PCBs

ATSDR Public Health Statement, June 1989

What are PCBs?

The abbreviation PCB refers to polychlorinated biphenyls. PCBs are a family of man-made chemicals that contain 209 individual compounds with varying toxicity. Commercial formulations of PCBs enter the environment as mixtures consisting of a variety of PCBs and impurities. Because of the complex nature associated with evaluating the health effects of PCBs, this document will address only seven selected classes of PCBs, which include 35% of all of the different PCBs and 98% of PCBs sold in the United States since 1970. Some commercial PCB mixtures are known in the United States by their industrial trade name, Aroclor. Because of their insulating and nonflammable properties, PCBs have been used widely as coolants and lubricants in transformers, capacitors, and other electrical equipment. The manufacture of PCBs stopped in the United States in October 1977 because of evidence that PCBs accumulate in the environment and may cause health hazards for humans.

How might I be exposed to PCBs?

Although PCBs are no longer manufactured, human exposure still occurs. Many older transformers and capacitors still contain fluids that contain PCBs. The useful lifetime of many of these transformers can be 30 years or more.

The two main sources of human exposure to PCBs are environmental and occupational. PCBs are very persistent chemicals that are widely distributed throughout the entire environment. PCBs have been found in at least 216 of 1177 hazardous waste sites on the National Priorities List (NPL). Background levels of PCBs can be found in the outdoor air, on soil surfaces, and in water. Eating contaminated fish can be a major source of PCB exposure to humans. These PCBs originate in contaminated water, sediment, PCB-laden particulates, and in fish that have eaten PCB-contaminated prey. Although PCBs found in fish are generally concentrated in nonedible portions, the amounts in edible portions are high enough to make consumption a major source of exposure for humans. Compared with the intake of PCBs through eating contaminated fish, exposure through breathing outdoor air containing PCBs is small. Most of the PCBs in outdoor air may be present because of an environmental cycling process. PCBs in water, or on soil surfaces, evaporate and are then returned to earth by rainfall or settling of dust particles. Reevaporation repeats the cycle. Once in the air, PCBs can be carried long distances; they have been found in snow and seawater in the Antarctic. In addition, contaminated indoor air may be a major source of human exposure

to PCBs, particularly in buildings that contain PCB-containing devices.

PCBs can be released into the environment from:

- poorly maintained toxic waste sites that contain PCBs,
- illegal or improper dumping of PCB wastes, such as transformer fluids,
- leaks or fugitive emissions from electrical transformers containing PCBs, and
- disposal of PCB-containing consumer products into municipal landfills rather than into landfills designed to hold hazardous wastes.

Consumer products that may contain PCBs are:

- old fluorescent lighting fixtures and
- electrical devices or appliances containing PCB capacitors made before PCB use was stopped.

Occupational exposure to PCBs can occur during:

- repair or maintenance of PCB transformers,
- accidents or spills involving PCB transformers,
- disposal of PCB materials, and
- contact at hazardous waste sites.

How do PCBs get into my body?

PCBs enter the body through contaminated food and air and through skin contact. The most common route of exposure is by eating fish and shellfish from PCB-contaminated water. Exposure from drinking water is minimal. It is known that nearly everyone has PCBs in their bodies, including infants who drink breast milk containing PCBs.

How do PCBs affect my health?

Although PCBs have not been manufactured in the United States since October 1977, their diminishing but continued presence in certain commercial applications and trade have resulted in low-level exposure to the general population. Prior to 1977, certain occupational settings had, and may still have, higher levels of human exposure. Animal experiments have shown that some PCB mixtures produce adverse health effects that include liver damage, skin irritations, reproductive and developmental effects, and cancer. Therefore, it is prudent to consider that there may be health hazards for humans.

The U.S. Department of Health and Human Services has determined that PCBs may reasonably be anticipated to be carcinogens. Human studies to date show that irritations, such as acnelike lesions and rashes, can occur in PCB-exposed workers. Other studies of people with occupational exposure suggest that PCBs might cause liver cancer. Reproductive and developmental effects may also be related to

occupational exposure and eating of contaminated fish. While the role of PCBs in producing cancer, reproductive, and developmental effects in humans cannot be clearly delineated, the suggestive evidence provides an additional basis for public health concern about humans who may be exposed to PCBs. The complexity of relating the specific mixtures for which data are available to exposures in the general population has resulted in a tendency to regard all PCBs as having a similar health hazard potential, although this assumption may not be true.

Is there a medical test to determine if I have been exposed to PCBs?

There are tests to determine PCBs in the blood, body fat, and breast milk. These tests are not routine clinical tests, but they can detect PCBs in members of the general population as well as in workers with occupational exposure to PCBs. Although these tests indicate if one has been exposed to PCBs, they do not predict potential health effects. Blood tests are the easiest, safest, and, perhaps, the best method for detecting recent large exposures. It should be recognized that nearly everyone has been exposed to PCBs because they are found throughout the environment and that nearly all persons are likely to have detectable levels of PCBs in their blood, fat, and breast milk.

What levels of exposure have resulted in harmful health effects?

Figures 1.1, 1.2, and 1.3 on the following pages show the relationship between exposure to PCBs and known health effects. Other PCBs may have different toxic properties. In the first set of graphs, labeled "Health effects from breathing PCBs," exposure is measured in milligrams of PCBs per cubic meter of air (mg/m3). In the second and third sets of graphs, the same relationship is represented for the known "Health effects from ingesting PCBs" and "Health effects from skin contact with PCBs." Exposures are measured in milligrams of PCBs per kilogram of body weight per day (mg/kg/day). It should be noted that health effects observed by one route of exposure may be relevant to other routes of exposure.

In all graphs, effects in animals are shown on the left side, effects in humans on the right. The first column on the graphs, labeled short-term, refers to known health effects from exposure to PCBs for 2 weeks or less. The columns labeled long-term refer to PCB exposures of longer than 2 weeks. The levels marked on the graphs as anticipated to be associated with minimal risk of developing health effects are based on information generated from animal studies; therefore, some uncertainty still exists. Based on evidence that PCBs cause cancer in animals, the Environmental Protection Agency (EPA) considers PCBs to be probable cancer-causing chemicals in humans and has estimated that ingestion of 1 microgram of PCB per kilogram per day for a lifetime would result in 77 additional cases of cancer in a population of 10,000 people or equivalently, 77,000 additional cases of cancer in a population of 10,000,000 people. These risk values are plausible upper-limit estimates. Actual risk levels are unlikely to be higher and may be lower.

What recommendations has the federal government made to protect human health?

For exposure via drinking water, EPA advises that the following concentrations of PCB 1016 are levels at which adverse health effects would not be expected: 0.0035 milligrams PCB 1016 per liter of water for adults and 0.001 milligrams PCB 1016 per liter of water for children.

EPA has also developed guidelines for the concentrations of PCBs in ambient water (e.g., lakes and rivers) and in drinking water that are associated with a risk of developing cancer. The guideline for ambient water is a range, 0.0079 to 0.79 nanograms of PCBs per liter of water, which reflects the increased risk of one person developing cancer in populations of 10,000,000 to 100,000 people. The guideline for drinking water is a range, 0.005 to 0.5 micrograms of PCBs per liter of water, which also reflects the risk of one person developing cancer in populations of 10,000,000 to 100,000 people.

The Food and Drug Administration (FDA) specifies PCB concentration limits of 0.2 to 3 parts per million (milligrams PCB per kilogram of food) in infant foods, eggs, milk (in milk fat), and poultry (fat).

The National Institute for Occupational Safety and Health (NIOSH) recommends an occupational exposure limit for all PCBs of 0.001 milligram of PCBs per cubic meter of air (mg/m3) for a 10-hour workday, 40-hour workweek. The Occupational Safety and Health Administration (OSHA) permissible occupational exposure limits are 0.5 and 1.0 mg/m3 for specific PCBs for an 8-hour workday.

Where can I get more information?

If you have more questions or concerns, please contact your state health or environmental department or:

```
Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, E-29
Atlanta, Georgia  30333
```

Science Corner

The Board of Scientific Counselors of the Agency for Toxic Substances and Disease Registry has approved this document and was involved in its development. The Agency for Toxic Substances and Disease Registry uses this document as guidance for carrying out health studies.

Guidance for ATSDR Health Studies

Division of Health Studies
Agency for Toxic Substances and Disease Registry
U.S. Department of Health and Human Services
Public Health Service

April 1996

Contents

Purpose
Background
Considerations for Proceeding with a Health Study
When Not To Do Health Studies
When To Do Health Studies
How Is the Quality of a Health Study Ensured
References
Table 1. Three scenarios for environmental contaminants and consideration for health studies or other activities
Appendix A. Description of Specific Type-1 and Type-2 Health Studies
Appendix B. Contents of a Health Study Protocol

Purpose

This guidance document presents the process used by the Agency for Toxic Substances and Disease Registry (ATSDR) in considering health studies for communities that might be exposed to hazardous substances. Health studies can be divided into two basic types: those that are primarily exploratory in their approach (Type-1 studies), and those that require rigorous scientific methods to evaluate specific exposure-outcome relationships (Type-2 studies). Specific guidance and criteria are provided for determining when to do a health study, determining what type of study to do, and ensuring that a study is of high quality.

This guidance document provides the following potential benefits:

- Clarification of important differences between the different types of health studies;

- Clarification of important differences between the different types of health studies;
- Consideration of when and what types of health studies are appropriate;
- Identification of standard practices for ensuring high levels of study quality;
- Support for ATSDR's efforts to improve services to communities and enhance scientific knowledge; and
- Useful information for state and local health agencies and other researchers conducting similar health studies.

Background

At the November 1994 ATSDR Board of Scientific Counselors meeting, the quality and appropriateness of ATSDR health studies were reviewed. The Board recommended that ATSDR develop a guidance document with criteria for helping determine when health studies would be appropriate. In addition, the Board recognized that certain types of health studies require a higher level of scientific rigor to ensure validity and reasonable precision in making inferences about cause and effect relationships. Subsequently, a working group of Board members assisted ATSDR in preparing this guidance document. The document is written primarily for ATSDR use. However, it is hoped that this document could be of use to communities, public health agencies, and other researchers.

There are many approaches that might be considered when addressing health concerns or the needs of a community living near a hazardous waste site. As appropriate, these approaches might include different types of health studies or other public health activities. As the lead agency within the Public Health Service responsible for implementing the health-related provisions of Superfund (CERCLA), ATSDR has been charged with assessing the presence and nature of health hazards at specific Superfund sites, helping to prevent or reduce further exposures and the illnesses that might result, and expanding what is known about the health effects of exposure to hazardous substances. In addressing these mandates, ATSDR has developed programs and activities which identify people at health risk, evaluate relationships between exposures and adverse health effects, recommend actions to eliminate exposures, and mitigate adverse health outcomes. These programs and activities include, but are not limited to, public health assessments, health consultations, health advisories, health education activities, exposure investigations, health surveys, case-control and cohort studies, surveillance activities, and exposure registries. Site-specific circumstances (substance, exposure pathway, level of exposure, health outcomes, and population at risk) and existing knowledge of the exposure and health outcome relationship will influence the need for and type of health study that ATSDR might propose. In addition, whether there is adequate characterization of human exposure at a sufficient level to assess health effects should be determined before a health study is considered.

ATSDR is mandated to conduct public health assessments at every site on the National Priorities List and at other locations where petitions are used to request an assessment. The consideration of additional public health activities by ATSDR, in coordination with the community, can lead to health studies or other activities. For many sites, health studies might not be applicable.

There are major differences between the various types of health studies and the level of scientific rigor needed to ensure quality. The Type-1 studies can use a variety of investigational approaches to explore health concerns or potential exposures. The approaches might include descriptive studies, surveillance activities, exploratory data analyses, and exposure investigations. These studies are often conducted to

determine if there is a need for a more definitive study. The Type-2 health studies require a higher level of scientific rigor in order to evaluate specific exposure-outcome relationships; these studies primarily use the case-control or cohort approach. Case-control studies determine differences in exposures and risk factors for two groups of study subjects--persons with a specific illness (cases) and those without the illness (controls). Cohort studies compare the differences in illness occurrence in exposed and unexposed (reference) populations followed over a specified period of time.

Site Assessments

When a site is being assessed by ATSDR, several follow-up health activities might be considered during the public health assessment or other site review processes. The evaluation of site information focuses on the public health hazard ranking of the site, community education needs, presence of hazardous substances, evidence of completed pathways of exposure, population demographics, and community health concerns. There are many situations in which health studies would not be appropriate or recommended for a specific site. In situations in which health studies are determined to be appropriate, further considerations for determining the type of study to be conducted and ensuring its quality are presented (see sections that follow).

There are other reasons for which sites can be considered for health studies. Health studies might be initiated prior to the completion of a public health assessment because of an urgent health threat or exposure situation, or both. The ATSDR research program on priority health conditions might identify specific health outcomes and contaminants or exposures that require additional health studies to assess the relationship between exposure and adverse health effects. Research needs might require multiple communities or regions of the United States to be included in studies of rare health outcomes. In addition, multisite studies might use the same study protocol to conduct studies at several sites that have similar contaminants and human exposure pathways.

Community Involvement

After conducting a public health assessment or health consultation, ATSDR determines whether a health study approach should be considered. When reviewing the options for health studies or other public health activities, ATSDR initiates a process of public involvement and coordination with the appropriate stakeholders, including community representatives, tribal representatives, local and state health agencies, and other state or federal agencies. The purposes of such involvement and coordination are to understand and respond to community needs and health concerns, discuss ATSDR activities and possible options, and promote coordination among the different government agencies. The goal is to have the community and local and state health agencies fully informed and involved early. It is very important to explain to the community the differences between the possible options for health studies or other public health activities. The community also needs explanations of what can be studied scientifically, the limitations of proposed activities, and any other decisions that are to be made. The scientific quality and design issues are ultimately the responsibility of the scientists conducting the studies and ATSDR, which provides oversight. An ongoing mechanism for communication and involvement should be established early by ATSDR. Though this document does not address all of ATSDR's community activities, educational efforts are needed to keep the community informed on exposures, health risks, and proposed activities.

A variety of community involvement activities might be considered, including public meetings or briefings, information dissemination, and media interaction. The type of community involvement activity will depend on the assessment of needs for each site. Most often the community wants its health concerns addressed and more information about the hazardous substances, possible exposures, and potential health outcomes. Before initiating an extensive health study, ATSDR might use a community assistance panel

(CAP) approach. The CAP is composed of 12 to 15 members representing a broad range of community stakeholders. The purpose of the CAP is to ensure communication with communities and encourage involvement and understanding of ATSDR activities. It is critically important for the CAP to understand community needs and health concerns, the studies or evaluations being considered, the options and limitations for studies, and what ATSDR can do. The CAP provides an avenue for the community to be involved in each stage of a health study and to be kept informed on a regular basis.

There are other methods for community involvement and coordination with other governments and agencies. ATSDR works with Native American tribes using appropriate government-to-government relationships and supporting mechanisms to help ensure tribal involvement in health studies or other public health activities affecting their people or land. Under the Federal Advisory Committee Act, ATSDR and the Centers for Disease Control and Prevention have established a limited number of public advisory subcommittees that will address specific Department of Energy sites. In addition, ATSDR coordinates with local and state health agencies, and other state or federal agencies involved with specific sites so that there are ongoing communications and involvement in planning and decision-making activities.

Considerations for Proceeding With a Health Study

Before a health study can be recommended for a particular site, several factors should be considered. The factors are used by ATSDR for setting priorities and are based on published qualitative criteria (1). Each factor should be considered in determining the relative importance and appropriateness of a health study. Each factor is important, but no order of priority has been assigned.

Public Health Significance

Public health significance is a key factor in considering the merits of a proposed health study. Issues for consideration include the hazard ranking of the site, toxicity of the hazardous substance, pathway of human exposure, severity and biological plausibility of the health outcome, need for new information (beyond what is already known or what has already been done), size and susceptibility of the population affected, ability to prevent or mitigate exposure or health outcomes, and relevance to other sites with similar contaminants and exposure pathways.

Community Perspective and Involvement

Community involvement is critical to the success of any proposed health study. Based on an assessment of community needs and concerns, ATSDR will usually initiate a formal community involvement activity. As stated earlier, various community involvement methods can be used for health studies. Issues for consideration include an ability to involve key community stakeholders, an understanding of community health concerns, an understanding of the approach and limitations of proposed activities, and community support for the study being conducted.

Scientific Importance

Scientific importance is closely related to public health significance. Issues for consideration include the ability to provide new knowledge or information about an exposure-outcome relationship, address specific exposures or outcomes that have not been adequately studied, allow new laboratory tests or study methods to be used or evaluated, to generalize to other situations or populations, and provide confirmation or additional support to a preliminary hypothesis or theory.

Ability to Provide Definitive Results

Since health studies can end up with inconclusive findings, it is important to consider how definitive the study might be in providing scientifically useful results related to specific exposure-outcome relationships. Issues for consideration include the ability to obtain appropriate exposure measures, document health outcomes and exposure, use adequate control or comparison populations, obtain community support to improve the participation rate, state clearly the study objectives and specific hypothesis to be tested, have sufficient statistical power to detect predicted effects, obtain data on important potential confounders, and evaluate a dose-response relationship or gradients of exposure.

Resources

Resources are critical to the support, conduct, and completion of any proposed health study. Issues for consideration include the availability of qualified personnel and technical support, an ability to obtain necessary data and health information, an appropriate project time line and budget, proper administration and project management oversight, and availability of sufficient funds to meet the needs of the proposed health study.

Contribution to Program Goals

The contribution to program goals is also important, given the legislative mandates assigned ATSDR under Superfund. As stated earlier, ATSDR program goals include identifying people at health risk, evaluating relationships between exposures and adverse health effects, and intervening to eliminate exposures or mitigate adverse health outcomes. Issues for consideration include how the proposed health study addresses the program goals and complements other ATSDR program activities and priorities.

Authority and Support

It is critically important that local, state, and federal health agencies be involved early in discussions about potential health studies. Issues for consideration include the ability to support or provide technical assistance requested by the local or state health agency, the ability of local and state health agencies to address the community problem and health concerns, and the involvement of appropriate agencies with legislative and regulatory requirements.

When Not To Do Health Studies

Once the seven areas for consideration have been evaluated, the decision to proceed or not proceed with a health study can be made. Generally, Type-1 health studies would not be performed when there is insufficient information or other factors exist that severely limit ATSDR's ability to provide new and useful information on the health or exposure status of the community. Type-2 health studies would not be conducted when there is insufficient information or limited exposure documentation, or when other factors exist that severely affect ATSDR's ability to evaluate specific exposure-outcome relationships. The seven factors for consideration in the previous section cover a wide range of important issues that directly affect the feasibility and value of any health study being considered. These considerations for health studies have to be applied on a case-by-case basis, since information and circumstances differ by site. The next section provides additional guidance on when studies are appropriate and what study attributes are considered necessary. When the additional guidance or attributes are not met, health studies would not be recommended.

When To Do Health Studies

In the majority of situations, environmental contaminant and exposure information for populations living near hazardous waste sites is limited, and health outcome information is frequently incomplete or unknown. In other situations, there are sites with well-documented contaminants and identified potential exposure pathways, as well as sites with environmental data that do not support any human exposure pathways of concern. In Table 1, each of these three scenarios is briefly presented using a decision analysis approach with resultant actions or further considerations.

When the decision to conduct a health study is being considered, several criteria are used to determine the type of health study:

- Characterization of environmental contaminants by type, media, and concentration levels.
- Documented evidence of human exposure at a level of concern.
- Level of current knowledge about the relationship between exposure and specific adverse health outcomes.
- Documented excess of an adverse health outcome, when known.

Further clarification is provided in the following sections on the two different types of health studies (Type-1 and Type-2), and when each should be used. Descriptions of various study approaches by study type are presented in Appendix A. For additional information on scientific methodology and environmental epidemiology, the reader is referred to standard textbooks (2-4).

Clearly, there are important differences between Type-1 and Type-2 health studies in terms of the methods and procedures used to ensure quality. Type-1 health studies are primarily exploratory in that they provide additional information about human health effects or exposures. They are not designed to evaluate specific associations between adverse health outcomes and documented human exposures. However, they might suggest the possibility of an association and the need for an additional health study.

Type-1 Health Studies

Purpose

Type-1 health studies explore or generate hypotheses about exposure-outcome associations and address specific exposures, community health concerns, or specific information needs. Examples of Type-1 health studies follow.

Examples of Study Designs Used in Type-1 Health Studies

Cross-sectional study Survey of a sample of residents to obtain information about current and past health or environmental exposures, or both. These studies can include comparison populations with demographics similar to those of the exposed (target) population.

Other approaches There are other approaches, including pilot investigations, cluster investigations, comprehensive case reviews, surveillance activities, health statistics reviews, exposure registries, and exposure investigations. (See Appendix A for a more complete listing.)

Necessary Attributes

When a Type-1 health study is recommended and considered appropriate, there are several attributes that are considered necessary in order to improve the quality of the study effort:

- A reasonable ability to document and characterize exposure in the target area.
- An adequate study size for the type of study recommended.
- An ability to identify and locate subjects and records.
- Appropriate comparisons for rates of occurrence.
- An ability to control confounding factors and biases (when possible).

Type-2 Health Studies

Purpose

Type-2 health studies are specifically designed to test scientific hypotheses about the association between adverse health outcomes and exposure to hazardous substances in the environment. Examples of Type-2 health studies follow.

Examples of Study Designs Used in Type-2 Health Studies

Case-control study Assesses differences in exposures and risk factors among two study groups--people with a specific illness (cases) and people without the illness (controls). The cases and controls are identified first and then information is collected about past exposures and other risk factors.

Cohort study Assesses the occurrence of specific illnesses among two study groups--one with a defined or documented exposure and one without such an exposure. Both groups are identified and then followed over a specified period of time.

Necessary Attributes

There are several attributes of Type-2 health studies that are considered necessary in order to ensure valid scientific findings:

- An ability to reasonably estimate or document individual exposure.
- An ability to document or validate human health outcomes.
- An adequate study size and statistical power.
- An ability to identify and locate subjects and records.
- Availability of an appropriate control or comparison population.
- An ability to control confounding factors and minimize biases.

- An ability to determine influence of environmental, behavioral, or other factors.

How Is the Quality of a Health Study Ensured?

There are many aspects to ensuring the quality of a health study. Regardless of who conducts the health studyATSDR, a contractor, an awardee of a cooperative agreement, or a granteethe same standard practices are appropriate for both Type-1 and Type-2 health studies. A wide range of quality-related practices include standard ATSDR study procedures, contracts and grants management guidelines, Institutional Review Board procedures, Office of Management and Budget procedures, ATSDR scientific peer review procedures, and ATSDR review and clearance procedures. The reader might also be interested in previously published guidelines for good epidemiology practices (6).

Standard Practices

There are a number of standard practices that health studies must meet to ensure quality. With the few exceptions that are noted, the practices for Type-1 and Type-2 health studies are the same. No order of priority has been assigned.

- The organization conducting the health study must be capable and fully responsible for conducting the health study.
- Personnel conducting the health study must be identified and have appropriate training and experience.
- The facilities and resources must be appropriate for the successful completion of the health study.
- Contractors for the health study must follow written and approved work plans and their work must be carefully reviewed by the sponsoring organization.
- A detailed study protocol must be written following an ATSDR standard outline (see Appendix B), must undergo scientific peer review, and must be approved by ATSDR before any health study begins. By their own design, several Type-1 health study protocols might not need to be as detailed or require scientific peer review.
- As required by law, any health study involving human subjects must be submitted to and approved by an established Institutional Review Board; this review includes the protection of human subjects, consent, and data confidentiality procedures.
- When required, all questionnaires and data collection forms must be reviewed and approved by the Office of Management and Budget.
- Reports of health study findings must undergo scientific peer review and ATSDR approval prior to any public release of information. Certain Type-1 health studies might not require peer review.
- Community involvement and knowledge of the health study are necessary; the involvement process will ensure that the community understands and supports the study focus, design, limitations, and expectations.
- Depending on the community involvement approach, public meetings might be held to present and discuss the study methods and findings. However, final study methods must be scientifically valid in

order to proceed. As appropriate, all draft final reports must undergo open public comment periods and a summary of responses to the comments must be retained as a written document.

- All study reports and related documentation must be kept by ATSDR in the official record; copies of data files must also be retained as part of an archive.
- Any environmental sampling or biological testing must follow existing standards for collection, handling, chain of custody, storage, analysis, and reporting by an approved laboratory(ies); all standard quality control and quality assurance procedures must be followed and documented.

Review Process

For all health studies, a standard review and approval process is already well established and used by ATSDR. The five common steps or phases used in the ATSDR review process follow.

Preliminary Proposals

These proposals are initially developed so that the concepts, approaches, and considerations for proceeding can be fully discussed. These proposals are evaluated using the seven factors for consideration (see earlier section). Approval to proceed is obtained from the appropriate Division Director within ATSDR. Early community involvement and coordination with local and state health agencies begin during this phase.

Detailed Study Protocols

These documents are developed for formal scientific review and approval by ATSDR. All protocols are reviewed and approved within the appropriate division and then sent for scientific peer review (not required for some Type-1 health studies). The principal investigator responds in writing to the reviewer comments and makes appropriate changes to the protocol as necessary. Peer review of the protocol is considered final once the written response to peer reviewer comments is approved by the Associate Administrator for Science, ATSDR. Following peer review, additional community discussions are held on the proposed health study.

Ongoing Health Study Reviews

During the conduct of a health study, there are ongoing opportunities to review and oversee activities throughout the stages of the study. The principal investigator provides frequent updates and assessments of progress and any difficulties to management or the project officer (ATSDR technical staff that oversees grants or cooperative agreements). These reviews ensure that the study follows the protocol, appropriate changes are made, the project remains on a timetable, and enhancements to study quality are made when appropriate.

Draft Final Reports

The final health study reports undergo several reviews and revisions prior to being made public. The draft reports are reviewed for scientific content, completeness, and quality before leaving the appropriate division. The draft final reports are sent out for external scientific peer review. The investigator responds in writing to the peer reviewer comments and makes appropriate changes to the draft final report as necessary. The draft final report is considered final once the written response to peer reviewer comments is approved by the Associate Administrator for Science, ATSDR. Following peer review (when

appropriate), the report is released for a 30-day public comment period. In addition, the affected community is informed and discussions are held on the report findings. At the end of the public comment period, a summary of responses to the public comments will be prepared and retained as part of the written record.

Final Clearance

Agency clearance is required for all documents prepared or supported by ATSDR prior to their release to the public. There is a standard procedure for official approvals from the different review levels within ATSDR (usually the branch, division, and agency). The editorial aspects of the document are finalized before the document is submitted for printing. Investigators are encouraged to submit their findings for publication in peer- reviewed scientific journals.

There are few exceptions to this review process. Health studies that do not address a specific site or community area (for example, a case-control study using cases of a rare disease identified within a large region of the United States) do not require local community involvement or a public comment period.

References

1. Neutra R, Goldman L, Smith D, Satin K, Deane M. Study endpoints, goals, and prioritization for a program in hazardous chemical epidemiology. Arch Environ Health 1988;43:94-9

2. Aldrich TE, Griffith J. Environmental epidemiology and risk assessment. New York: Van Nostrand Reinhold, 1993.

3. Schlesselman JJ. Case-control studies: design, conduct, analysis. New York: Oxford University Press, 1982.

4. Last JM, Wallace RB, editors. Public health and preventive medicine. 13th Ed. Norwalk (CT): Appleton & Lange, 1992.

5. Agency for Toxic Substances and Disease Registry. National exposure registry policy and procedures manual (revised). Atlanta: US Department of Health and Human Services, Public Health Service, 1994.

6. Chemical Manufacturers Association's Epidemiology Task Group. Guidelines for good epidemiology practices for occupational and environmental epidemiologic research. Washington: Chemical Manufacturers Association, 1991.

Table 1. --Three scenarios for environmental contaminants and considerations for health studies or other activities.

I. Contaminants are sufficiently documented by type, media, and concentration. Potential human exposure pathways have been determined and an exposed at-risk population can be identified.	A. There is documented evidence of human exposure at a sufficient level of concern.	1. The association between exposure and health effects is already established.	Provide services that reduce or eliminate exposure, identify or prevent adverse health outcomes, and improve quality of life.
		2. The association between exposure and health effects is not already established.	Consider health studies that provide new knowledge about human health effects and exposures to specific hazardous substances. Studies help identify risk factors or recommend actions to prevent or mitigate adverse health outcomes.

	B. There <u>is no</u> documented evidence of human exposure or exposure at a sufficient level of concern.	1. Consider community health concerns for important or biologically plausible health outcomes.	[*When appropriate*] Provide support to the community that addresses its health concerns and site-specific issues.
			[*Else*] Site will remain under periodic review by ATSDR.
		[*When feasible*] 2. Conduct an exposure investigation to determine if human exposure has occurred at a sufficient level of concern.	If findings are positive and support human exposure....[go to I.A]
			If findings are negative or do not support human exposure....[go to I.B1]
		[*When feasible*] 3. Determine if site information can provide enough source, production, or release data to suggest current or past human exposure.	If there are sufficient data to support human exposure or reconstruct exposure or dose....[go to I.A]
			If the data are insufficient or do not further support exposure....[go to I.B1]

Table 1.--Continued.

II. Documentation of contaminants is incomplete, a complex mixture exists requiring some surrogate measure, or the potential exposure pathways are unknown.	[*When appropriate*] A. Review additional environmental sampling data when they become available or conduct additional focused sampling when indicated (could require EPA or state involvement).	If sampling data better define the contaminants and potential exposure pathway....[go to I]
		If sampling data provide little new information or do not change level of uncertainty....[go to II.B]
	B. Consider community health concerns for important or biologically plausible health outcomes.	[*When appropriate*] Provide support to the community that addresses its health concerns and site-specific issues.
		[*Else*] Site will remain under periodic review by ATSDR.
III. There is sufficient documentation with few contaminants identified and the environmental data do not support any exposure pathways of concern.	Consider community health concerns for important or biologically plausible health outcomes.	[*When appropriate*] Provide support or identify additional support from another agency that can address the needs or concerns of the community.
		[*Else*] Site will remain under periodic review by ATSDR.

APPENDIX A

Description of Specific Type-1 and Type-2 Health Studies

Type-1 Health Studies

Pilot investigations collect additional information to assess the feasibility and value of conducting a full-scale health study. The investigation might include assessments of data completeness and quality, the level of documentation of exposures or health outcomes, methods to identify and track individuals, study

size and statistical power issues, and the adequacy of a control population or comparison.

Cluster investigations evaluate the reported occurrence of a specific disease or condition is above the expected number for a given geographic location and time period. These investigations can be conducted to confirm case reports, determine an unusual disease occurrence, and explore potential risk factors.

Comprehensive case reviews are medical or epidemiological evaluations of the medical status of one or more individuals through medical record reviews, interviews or biomedical testing to determine additional information about their health status or potential for exposure.

Site-specific surveillance is designed to assess the specific occurrence of one or more defined health conditions among a specific population potentially exposed to hazardous substances in the environment. Data collection might include using existing records of health events or records from specific health care providers.

State-based surveillance is similar to site-specific surveillance but incorporates multiple site locations or states. This evaluation approach will primarily use existing records to assess correlations between specific health events and proximity to sites, reporting of health events related to releases of hazardous substances, or other methods to collect and analyze health information.

Health statistics reviews use available health and demographic information to assess the occurrence of specific health effects in defined geographic areas and determine if the rates are elevated. Available information might include death certificates, birth certificates, census data, tumor or disease registries, surveillance data, or other computerized data files. A health statistics review can also be performed in response to a reported cluster of specific diseases or conditions.

Exposure investigations use environmental or biological testing, or both, for the hazardous substance(s) of interest. The biological test might measure the level of the hazardous substance, a metabolite or another marker of exposure in human body fluids or tissues. The purpose of this investigation is to assess individual exposure levels to a specific substance associated with the site. The levels identified should be compared with that of some reference group or with a known standard reference level. Depending on the hazardous substance, the investigation can be used to explore for evidence of past or ongoing exposure.

Disease and symptom prevalence surveys are used to measure and compare the occurrence of self-reported diseases, in some instances using medical records or physical examinations to validate adverse health conditions. Addressing potential health concerns raised by the community, the survey compares an exposed population (target area) with an unexposed population (control area) with similar demographic characteristics. The purpose is to determine the need for further health studies in the target area, provided there are statistically significant excesses that are clinically important. Depending on the contaminants and circumstances, biological testing of exposure or effect, or both, might also be collected as part of the survey.

The **National Exposure Registry** (NER) program contains subregistries of persons exposed to specific hazardous substances who have been identified and are followed for the occurrence of a variety of health outcomes. In order to identify excess rates of illnesses, the NER compares its rate of reported illnesses to national norms; an example is the National Health Interview Survey, with population rates of self-reported specific illnesses or conditions. The purpose of the NER is to aid in assessing long-term health consequences to persons exposed to Superfund-related hazardous substances. The goals of the program include facilitating epidemiologic studies and health surveillance programs, and providing information that assesses the burden of the effects of an exposure or health outcome on a population. (*5*).

Type-2 Health Studies

Case-control studies are designed to collect information and compare differences in exposures and other risk factors in two groups of people: persons with specific illnesses or conditions (cases) and persons without the illnesses or conditions (controls). The controls are selected to represent the population from which the cases were identified. Usually the cases and controls are identified first, and then information is collected about past exposures and other risk factors.

Cohort studies are designed to collect information and compare differences in the occurrence of specific illnesses or conditions in two groups of people: persons with known or documented exposure to hazardous substances and persons not exposed but who have similar population characteristics. Groups of both exposed and nonexposed people are followed over a period of time, and information on the occurrence of specific illnesses or conditions is collected. Cohort studies can be prospective, meaning that individuals involved in the study are followed into the future, or cohorts can be retrospective, meaning that the cohort is reconstructed from historical records and then followed over a specified time period.

Nested case-control studies are another approach that uses both of the study designs previously mentioned. The nested case-control study uses cohort individuals who have developed a specific illness or condition (case) and persons sampled from the cohort who have not developed the illness or condition (control). The case-control method is then used to collect additional information and analyze the differences between these two groups.

APPENDIX B

Contents of a Health Study Protocol
(Based on existing ATSDR practices)

- Title and identification page
- Introduction and overview
- Background
  - Site description
  - Demographics
  - Site characterization
    - On site
    - Off site
  - Contaminants and pathways
  - Community health concerns
  - Literature review
- Purpose
- Study objectives
- Methods
  - Rationale for study design
  - Study description
  - Eligibility criteria
  - Selection of target area and population
  - Selection of comparison area and population
  - Sample size and statistical power estimates
  - Participant selection and definitions
  - Enrollment procedures

    - Location(s) of data and specimen collection
    - Informed consent procedure
    - Questionnaire procedures
    - Interviewer training and methods
    - Collection of biological specimens
    - Additional data collection or sources
    - Chain of custody and shipping
    - Laboratory methods and quality control
    - Privacy protection
    - Findings of immediate significance
    - Follow-up of abnormal lab results
    - Data analysis
        - Data entry, editing, and management
        - Data transformation
        - Data analysis plan and methods
- Study time line
    - Key activities or milestones (can use "study months" if no start date assigned)
- Community involvement and notification
- Interpretation of results
- Limitations of the study
- References
- Tables and figures
- Attachments
    - Data collection forms and questionnaire
    - Study letters of notifications and consent forms
    - Specimen collection and shipping protocol

NOTE: Protocols for health studies might not contain all of the items within this outline. The listing is more comprehensive in order to cover the wide variety of study approaches.

For More Information Contact:

Division of Health Studies
Agency for Toxic Substances and Disease Registry
1600 Clifton Rd., NE
Atlanta, Georgia 30333
USA

Phone: (404) 639-6300

Link to ATSDR Science Corner

ATSDR Home Page

Charlie Xintaras / chx1@cdc.gov

Last Update - November 22, 1996

1:30 - 3:00 **Nuclear Material and Waste Issues on a National Level**
PRESENTERS: TECHNICAL CONSULTANT FROM UNIVERSITY OF CINCINNATI; ???DOE OFFICIAL???
(NOTE: comments are welcome at any point during the presentation)
1. Overview of DOE Complex and status of remediation efforts
2. Types of Waste, Amounts of Waste, Location of Waste
3. Transportation routes and mechanisms
4. Waste treatment, stabilization, and minimization
5. DOE nuclear waste management decisions
    A. Where is waste currently slated to be stored and how will it be transported there
    B. What decisions are yet to be made
6. Budget and time frame issues (2006 plan)

3:00 - 4:00 **Stakeholder comment-question time/ Break**

4:00 - 5:30 **Value-Development: Articulation and Consensus**
PRESENTERS: VALUES CONSULTANTS, PETERSON & GILBERTZ
1. Identifying and articulating environmental values of self, group, and others
2. Identifying and articulating waste management values of self, group, and others
3. Identifying areas of commonality or difference and potential for consensus or "shared perspective"

5:30 - 6:30 Dinner (The discussion of values will informally continue over dinner. I will ask everyone to sit with people from another "site" and "sector" over dinner. This will allow for more processing time of values information)

6:30 - 8:00 **Value-Development: Simulation Exercise**
PRESENTERS: VALUES CONSULTANTS, PETERSON & GILBERTZ
1. Applying values to waste management decision scenarios
2. Assessing if held values match applied values
3. Revisiting view of self, group, and others' environmental and waste management values
4. A first attempt at articulating a "shared-national perspective"

8:00 p.m. Workshop ends for the day

Sunday, September 7, 1997

8:00 - 8:30 Breakfast

8:30 - 9:30 **Value-Development: Culturally Informed & Value Driven Decisions**

PRESENTER: CENTER FOR ENVIRONMENTAL COMMUNICATION STUDIES

1. Value-based decision making: how to translate abstract values into specific directions that decision-makers can use and apply
   - A. Example: Fernald Citizens Task Force's consensus values and discrete decision criteria
   - B. Example: another site's successful application of values to decisions
   - C. Example: another site's successful application of values to decisions
2. Develop list of "expectations for use" or "directions to the decision-makers" to accompany consensus values list. The purpose of this list is to assist decision makers in understanding how to make citizens' values a part of their thinking and decision processes.

9:30 - 10:00 **Stakeholder comment-question time**

10:00 - 11:00 **Round Table Sessions**

(Note: All four roundtables will be run simultaneously. Participants will choose to attend one of the roundtables offered. In an attempt to achieve cross-site and cross-sector diversity at these roundtables, participants will be asked to pre-choose their first and second choice roundtables. They will then be assigned to roundtable groups in a way that will achieve the most diversity. A summary of each discussion will be prepared and mailed to each participant.)

Issue Roundtable: Nuclear Waste Management Policy and Social Justice

1. Community outrage and DOE's legacy of secrecy: getting to involvement and input on decisions
2. Waste policy and communities of color and disenfranchised communities: how are these communities exposed to disproportionate risk?

Issue Roundtable: Nuclear Waste Management Policy and Waste Disposal Options

1. Waste disposition and local communities: on-site or off-site disposal?
2. Moving toward a national view: does waste need to be moved and what is the most equitable solution?
3. What are the limitations on what can be done with nuclear waste?

Issue Roundtable: Nuclear Waste Management Policy and Budget Priorities

1. Federal responsibility and budget realities: how should cleanup be paid for?
2. Risk reduction and remediation costs: How safe is safe enough?

Issue Roundtable: Nuclear Waste Management Policy and Time Frame Priorities

1. How long should cleanup take?
2. The 10-year plan and plan 2006

11:00 - 11:30 **Open Stakeholder Forum**

11:30 - 11:45 Break/ Snack

11:45 - 1:00 **Revisiting the National Dialogue Process**

PRESENTERS: LWVEF AND CENTER FOR ENVIRONMENTAL COMMUNICATION STUDIES REPRESENTATIVE

1. How can the pilot field workshops inform, expand, enhance the National Dialogue?
2. Are values and principles enough?
3. How can we enlarge the scope and diversity of public participation in the National Dialogue?
4. How should DOE utilize public input from the National Dialogue?
5. Recommendations for future workshops

SITE SPECIFIC ADVISORY BOARD PRESENTATION
INTERIM REMEDIAL ACTION FOR THE NORTHEAST PLUME
JULY 17, 1997

RECORD OF DECISION - BACKGROUND

- July - October, 1994: Groundwater Phase IV investigation showed trichloroethylene "hot spots" migrating from multiple source areas toward a populated area. Technetium-99 is found only in low concentrations in wells adjacent to the security fence.
- October, 1994: DOE/EPA/KDEP discussed need for an Interim Corrective Measure base on Phase IV results.
- December, 1994: DOE was directed by EPA/KDEP to submit a work plan to implement an Interim Corrective Measure at the Northeast Plume.
- March, 1995: EPA/KDEP approved the D2 version of the Proposed Plan. Notice of availability was published in the Paducah Sun for the Northeast Plume Proposed Remedial Action Plan and Technical Memorandum.
- April, 1995: Public comment period ended.
- June, 1995: EPA/KDEP approved the proposed use of the cooling towers as an alternate method for stripping of the trichloroethylene.
- June, 1995: EPA/KDEP/DOE signed Record of Decision for the Interim Remedial Action at the Northeast Plume.

SITE SPECIFIC ADVISORY BOARD PRESENTATION
INTERIM REMEDIAL ACTION FOR THE NORTHEAST PLUME
JULY 17, 1997

BASIS FOR RECORD OF DECISION - USE OF COOLING TOWERS

- Groundwater Phase IV Investigation data indicated that the most urgent concern was to mitigate the trichloroethylene migration of the highest concentration volume within the Northeast Plume. Decision balances overall protection of human health and the environment; compliance with applicable or relevant and appropriate requirements; long-term effectiveness; reduction of contaminant toxicity, mobility, or volume; short-term effectiveness; implementability; costs; state acceptance; community acceptance.

- Use of cooling tower represented significant cost savings.

- Phase IV data did not show significant levels of radioactivity in the Northeast Plume.

- Contribution of water from the NE Plume system to the cooling towers, and therefore to any emissions of radioactivity, is small.
  Cooling tower flow - ~11 million gallons per day
  NE Plume flow - ~0.26 million gallons per day (~2% of total)

- Major contributor to radioactivity (gross alpha) in groundwater is typically naturally occurring uranium and radon (exempt under state regulations).

- Uranium and technetium-99 exist in the water as dissolved solids that do not vaporize and travel into the air.

- Studies on cooling tower mist migration (for chromate emissions) have shown that the mist does not carry significant distances from the towers.

- Incremental additional dose from radioactivity from the Northeast Plume water based on a person within 200 yards of the tower for 1 year would be <0.0000000001 mrem.

- The Northeast Plume O&M Plan states that "If ^{99}Tc is detected in MW-255, MW-256, and/or MW-258 at levels two times the detection limit (~50 pCi/L), then the DQOs and associated sampling plan will be reevaluated to investigate the source and impact of the ^{99}Tc."

Relative Doses from Radiation Sources

Source	Dose (mRem)
Cancer therapy	500,000
Surviving the bomb at Hiroshima	25,000
Living in Brazil for one year	7,000
Living in Denver for one year	80
Living in a brick home for one year	45
Living within 10 miles of Three Mile Island	8
A two-week vacation in the mountains	3
Being the closest neighbor to this plant every day for 1 year (1995 data,DOE sources)	1.08
Additional exposure from Tc99 in NE Plume (within 200 yards of cooling tower)[1]	0.000000000013

1 Estimated based on the average Tc-99 in the extraction wells

SITE SPECIFIC ADVISORY BOARD PRESENTATION
INTERIM REMEDIAL ACTION FOR THE NORTHEAST PLUME
JULY 17, 1997

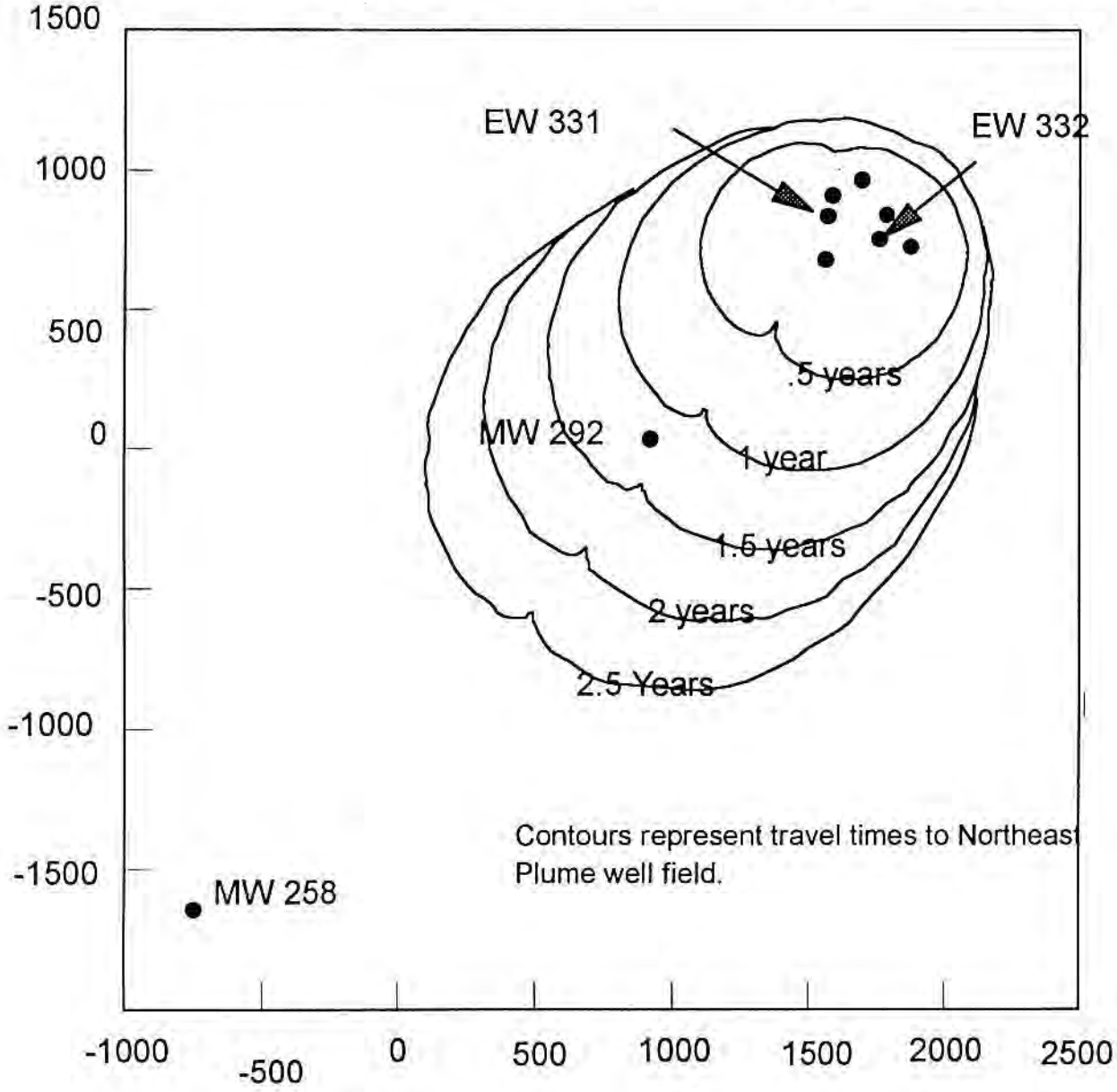
Well	Gross Alpha (pCi/L)			Gross Beta (pCi/L)			Technetium-99 (pCi/L)		
	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average
MW124	0	7.9	3.0	2	152	41	0	21	7.6
MW126	-5	4.7	-0.2	2	19	6.6	0	17	4.8
MW283	-1	3.8	1.4	0	17	6.0	0	12	4.2
MW284	-2.8	27.1	5.1	0	45	11.5	0	25	7.3
MW288	-0.8	4.6	1.2	3	19	10.5	0	11	5.5
MW291	-0.9	10.7	2.7	-1	111	25.8	0	16	4.6
MW293	-2.3	4.4	1.6	-3	18	7.5	0	22	6.2
MW294	-4.6	6.7	1.4	3	53	17.6	0	17	6.3
MW292	-3.3	7.1	2.1	3	159	63	0	20	9.0
MW145	-3.7	3.8	0.7	7	38	20.2	2	21	9.4
MW258	-4.2	2.4	0.6	3	45	20.2	0	10	4.8
MW256	0.9	3.2	1.9	12	24	16	8	46	22.2
MW255	-5.3	1.5	-0.2	0	17	9.0	0	25	14.0
Average of all MW			1.6			19.5			7.1
EW331	NA	NA	NA	NA	NA	NA	1	32	13.1
EW332	NA	NA	NA	NA	NA	NA	0	29	13.0

SITE SPECIFIC ADVISORY BOARD PRESENTATION
INTERIM REMEDIAL ACTION FOR THE NORTHEAST PLUME
JULY 17, 1997

	Drinking Water 401KAR8:550	Surface Water 401KAR5:031	Downstream River Water (Avg.)	NE Plume Monitoring Wells (Avg.)	NE Plume Extraction Wells (Avg.)	Site Background Monitoring Wells (Avg.)
Gross Alpha[1]	15 pCi/L	15 pCi/L	0.3 pCi/L	1.6 pCi/L	NA	2.3 pCi/L
Gross Beta	4 mrem[2]	50 pCi/L	2 pCi/L	19.5 pCi/L	NA	6.3 pCi/L
Technetium-99	900 pCi/L[3]	50 pCi/L	5.25 pCi/L	7.1 pCi/L	13.0 pCi/L	12.1 pCi/L

(1) Excludes radon and uranium
(2) Manmade
(3) Current State Drinking Water Standard Based on US Department of Commerce NBS Handbook 69 as Amended in 1993.

Northeast Plume Capture Zones



CI 97 001608

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

July 16,1997

8 40 JL 18

Paducah Gaseous Diffusion Plant
Site Specific Advisory Board Member

Re: U S Department of Energy, Paducah Gaseous Diffusion Plant:
Northeast Plume Treatment Zone
EPA ID# KY8-890-008-982
McCracken County

Dear Site Specific Advisory Board Member:

I would like to take this opportunity to express my appreciation for your service on the Paducah Gaseous Diffusion Plant , Site Specific Advisory Board (SSAB). I believe as a member of the SSAB you have an extremely important role within the U S Department of Energy Environmental Restoration program. Your contribution to the environmental process has added dimensions and views of the local population. Your views of the these cultural issues are vital in the remedial selections process as well as the final examination of site remediation.

As indicated at the June SSAB meeting, the Division made the commitment to evaluate monitoring data surrounding the PGDP Northeast Plume and the potential for releases (via the cooling towers) of TCE, gross alpha and gross beta that exceeded the MCLs. Please find attached, the Kentucky Division of Waste Management, Agreement In Principle (AIP) assessment of the Northeast Hydraulic containment system. Our models indicate that the Northeast pumping wells field generates a capture zone that may influence contamination and cause it to migrate to the those pumping wells. Please keep in mind that these models used conservative assumptions for groundwater movement. The Division believes that existing safeguards that were designed into the Northeast treatment system to indicate releases of radionuculides are sufficient for early detection. It is the Division's intent to re-elevate potential impacts to human health and the environment and identify the source(s) of the gross alpha and beta.

Printed on Recycled Paper
An Equal Opportunity Employer M/F/D

Should you have any questions relating to the attached materials on the Northeast plume containment system, please let me know or you may contact Tuss Taylor at 502-564-6716.

Sincerely,

Robert H. Daniell, Director
Division of Waste Management

cc: Carlos Alvarado, DOE/PGDP
Myrna Redfield, DOE/PGDP
Jack Stickney, UK/FFOU

UNIVERSITY OF KENTUCKY

Kentucky Water Resources Research Institute

Federal Facilities Oversight Unit
18 Reilly Road
P.O. Box 776
Frankfort, KY 40602
(502) 564-4797 • FAX: (502) 564-5096

MEMORANDUM

To: Tuss Taylor

CC: Jack Stickney

From: Dan Moore

Date: July 9, 1997

Re: Estimates of travel time for contaminants moving from selected wells to the Northeast Plume Hydraulic Containment System wells EW-331 and EW-332.

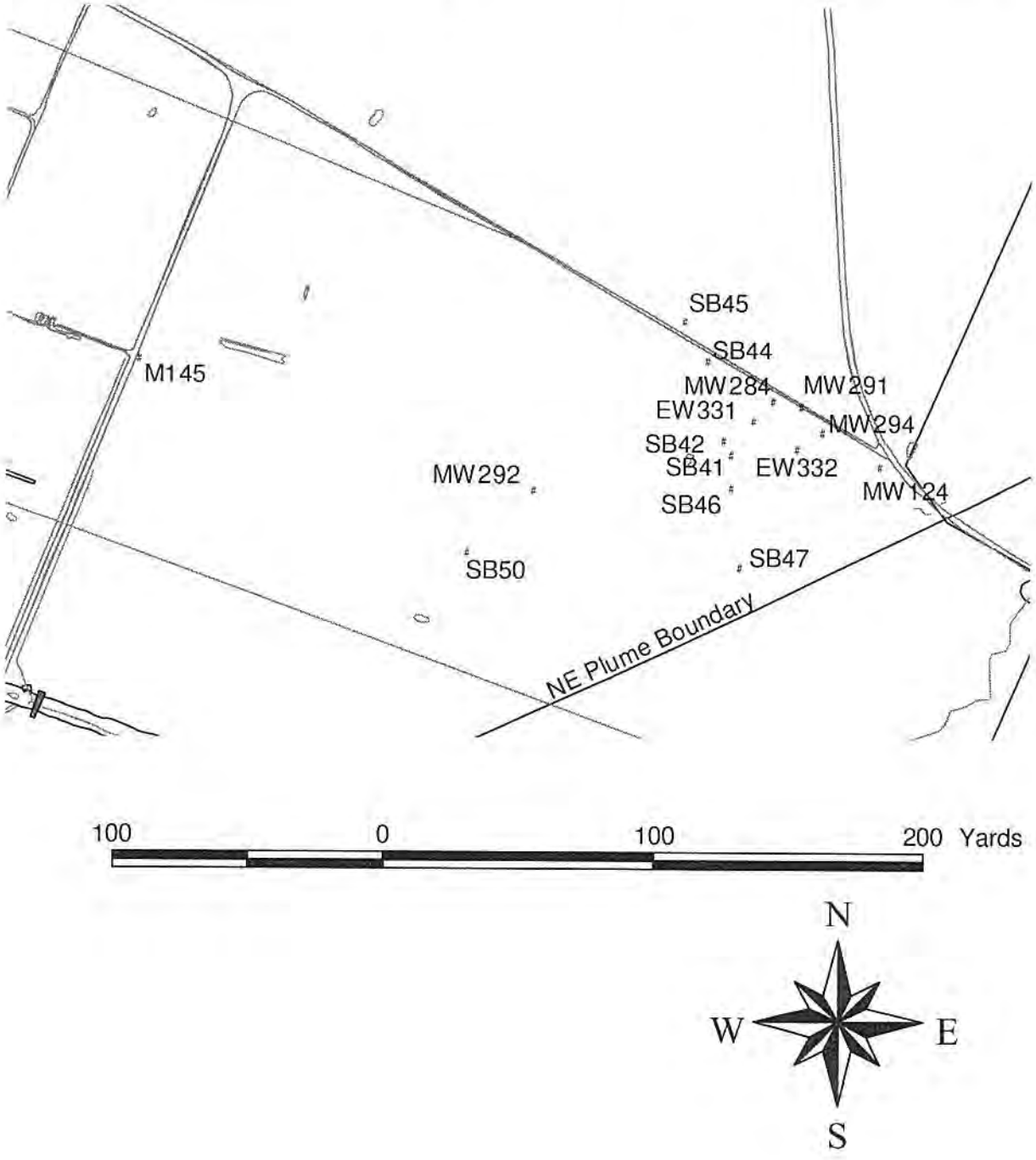
The attached table contains modeled estimates for travel times for conservative contaminants moving from sampled locations to extraction wells EW-331 and EW-332. The estimates were determined through Darcy's Law calculations using modeled groundwater head values and estimated values for hydraulic conductivity and porosity. The travel times were calculated as:

$$t = \frac{n\,d^2}{K\,dh}$$

where n is porosity, d is distance between the well and the nearest extraction well, K is the hydraulic conductivity and dh is the head difference between the well and the extraction well. Porosity was set to a uniform value of 0.3. $K_{McNairy}$ was set to 20 ft/day and K_{RGA} was set to 800 ft/day in the flow model. For the travel time calculations for the McNairy wells (upper McNairy wells were treated as RGA wells) a conservative average K value of 100 ft/day was used. Screen elevations were not available so horizontal distances were used for d values. This is a conservative estimate as actual flow paths (and travel times) will be longer.

Estimates travel times ranged from 361 days for MW-294 to 8881 days for SB-45. These estimates of travel time are probably conservative and should not be considered precise. Travel times could be higher or lower depending on actual hydraulic conductivities, hydraulic gradients, and porosities.

NE Plume Area



Well	Depth	Formation	Highest Gross Alpha (pCi/l)	Highest Gross Beta (pCi/l)	Highest TCE (ug/l)	Nearest Pumping Well	Distance (ft)	Head at Well (ft msl)	Head at Nearest Pumping Well (ft msl)	dHead (ft)	Hydraulic Conductivity (ft/day)	Porosity	Travel Time to nearest pumping well (days)
MW-124		L. RGA		152	1100	EW-332	375	322.18	322.16	0.02	800	0.3	2636.72
MW-145		RGA		38	470	EW-331	1650	322.6	322.22	0.38	800	0.3	2686.68
MW-283	83	L. RGA			1300	EW-331	150	322.22	322.22	0	800	0.3	No flow to extract. well
MW-284	97.5	U. McNairy	22.7	32	1500	EW-331	150	322.22	322.22	0	800	0.3	No flow to extract. well
MW-291	101	U. McNairy	10.7	99	1400	EW-332	250	322.2	322.16	0.04	800	0.3	585.94
MW-294	94	U. McNairy		53	2100	EW-332	170	322.19	322.16	0.03	800	0.3	361.25
SB-50	79	L. RGA	13	92		EW-331	635	322.58	322.22	0.36	800	0.3	420.03
SB-41	158	NcNairy	34	66		EW-331	240	322.53	322.22	0.31	100	0.3	557.42
SB-42	170	NcNairy	30			EW-331	220	322.54	322.22	0.32	100	0.3	453.75
SB-44	170	NcNairy	31	42		EW-331	400	322.43	322.22	0.21	100	0.3	2285.71
SB-45	168	NcNairy	171	177		EW-331	730	322.4	322.22	0.18	100	0.3	8881.67
SB-46	168	NcNairy	56	79		EW-332	480	322.6	322.16	0.44	100	0.3	1570.91
SB-47	168	NcNairy	14	75		EW-332	770	322.66	322.16	0.5	100	0.3	3557.40
Hydraulic conductivity for McNairy Formation modeled at 20 ft/day.													
100 ft/day used as conservative average of RGA and NcNairy conductivities.													
MCL for Gross Alpha = 15 pCi/l													
MCL for Gross Beta = 50 pCi/l													
MCL for TCE = 5 ug/l													

FACT SHEET
NATIONAL ENVIRONMENTAL POLICY ACT
TECHNICAL MEMORANDUM FOR THE INTERIM REMEDIAL ACTION AT THE NORTHEAST PLUME

The Department of Energy's (DOE's) 1994 Secretarial Policy Statement on the National Environmental Policy Act (NEPA) and DOE Order 450.1 states in relevant part:

> Department of Energy CERCLA [Comprehensive Environmental Response, Compensation, and Liability Act] documents will incorporate NEPA values such as analysis of cumulative, off-site, ecological, and socioeconomic impacts, to the extent practicable.

The DOE incorporated NEPA values in its analysis of alternatives and other sections of the *Technical Memorandum for Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/06-1318&D2) pursuant to the 1994 DOE Secretarial policy. The DOE also evaluated and analyzed cumulative impacts for the Northeast Plume Interim Remedial Action in combination with other plant operations and actions in the *Environmental Assessment for the Construction, Operation, and Closure of the Solid Waste Landfill at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/EA-1046). The following table delineates NEPA values and the corresponding Northeast Plume Technical Memorandum citations where these values were incorporated. References used to support the Technical Memorandum are also noted. A complete listing of these references can be found in Chapter 13 of the document. All of these documents are available in the Administrative Record.

NEPA REQUIREMENTS
For the Northeast Plume Interim Remedial Action

NEPA VALUES/CITATION	NORTHEAST PLUME TECHNICAL MEMORANDUM CITATION	DOCUMENTS INCORPORATED BY REFERENCE[1]
Floodplains [Executive Order 11988; 10 C.F.R. § 1022]	• § 2.3.1.6 • § 5.1.3.6 • § 5.1.5.6	• Corps of Engineers Environmental Investigation (COE, 1994) • Phase I Site Investigation (CH2MHILL, 1989)
Wetlands [Executive Order 11990; 10 C.F.R. § 1022; 40 C.F.R. § 1508.27(b)(3)]	• § 2.3.1.6 • Figure 2-4 • Appendix A (ARARs) • § 5.1.3.6 • § 5.1.5.6	• Corps of Engineers Wetland Delineation Manual (COE, 1987) • (COE, 1994)
Threatened, endangered, or candidate species and/or their critical habitat, and other special status (e.g., state-listed) species [16 U.S.C. 1531; 40 C.F.R. § 1508.27(b)(3)]	• § 2.3.1.4 • Figure 2-3 • Figure 2-4 • § 5.1.3.4 • § 5.1.5.4 • Appendix A (ARARs)	• (COE, 1994)
Prime or unique farmland [7 U.S.C. § 4201; 7 C.F.R. § 658; 40 C.F.R. 1508.27(b)(3)]	• § 2.3.1.7 • § 5.1.3.7 • § 5.1.5.7	• Soil Conservation Service Survey (Humphrey, 1976)

NEPA VALUES/CITATION	NORTHEAST PLUME TECHNICAL MEMORANDUM CITATION	DOCUMENTS INCORPORATED BY REFERENCE[1]
State or national parks, forests, conservation areas, or other areas of recreational, ecological, scenic, or aesthetic importance	• § 2.3.1.4	• None
Wild and scenic rivers [16 U.S.C. §1271; 40 C.F.R. §1508.27(b)(3)]	• § 2.3.1.6 • § 5.1.3.6 • § 5.1.5.6	• None
Natural Resources (e.g., timber, range, soils, minerals, fish, wildlife, water bodies, aquifers)	• § 2.3.1.1 • § 2.3.1.2 • § 2.3.1.3 • § 2.3.1.4 • § 2.3.1.6 • § 2.3.1.7 • § 2.3.1.9 • § 2.3.1.10 • § 2.3.3 • § 2.3.3.2 • § 2.4.2 • § 4.1.1 • § 4.2.5 • § 5.1.3.4 • § 5.1.3.1 • § 5.1.3.6 • § 5.1.5.1 • § 5.1.5.4 • § 5.1.5.6 • Appendix A (ARARs)	• Biological Inventory of Jackson Purchase Area (KSNPC, 1991) • Phase III Ground Water Investigation (MMES, 1992) • Northeast Plume Preliminary Characterization Summary (DOE, 1995) • Hydrologic Unit 3 and McNairy Project (McConnell, 1993) • Aquifer Assessment Report (Terran, 1990) • Aquifer Test Program (Terran, 1992) • WAG 22 Feasibility Study (DOE, 1994) • Management Strategy for Surface Water Integrator Unit (MMES, 1993c) • Annual Site Environmental Data for 1993 (CH2MHILL) • (COE, 1994) • (CH2MHILL, 1989) • (Humphrey, 1976)
Property of historic, archaeological, or architectural significance (including sites on or eligible for the National Register of Historic Places and the National Registry of Natural Landmarks) [16 U.S.C. § 470; 36 C.F.R. 800; 40 C.F.R. 1508.27(b)(3)]	• § 2.3.1.5 • § 5.1.3.5 • § 5.1.5.5	• (COE, 1994)
Native Americans' concerns [16 U.S.C. §470; 42 U.S.C. 1996]	• Not applicable	• Not applicable
Minority and low-income populations (including a description of their use and consumption of environmental resources)[Executive Order 12898]	• § 2.3.1.1 • § 5.1.3.1 • § 5.1.3.2 • § 5.1.5.1 • § 5.1.5.2	• Human Health Baseline Risk Assessment for the Northwest Plume (DOE, 1993a) • U.S. Bureau of Labor Statistics (Hayghe, 1992) • Department for Employment Services (Dunning, 1992)
Analysis of short and long term effects [40 C.F.R. § 1508.27(a)]	• § 5.1.3 • § 5.1.5	• Includes documents cited throughout this table
Analysis for both beneficial and adverse impacts [40 C.F.R. § 1508.27(b)(1)]	• Chapter 5-Analysis of Alternatives • Appendix A (ARARs)	• Includes documents cited throughout this table

NEPA VALUES/CITATION	NORTHEAST PLUME TECHNICAL MEMORANDUM CITATION	DOCUMENTS INCORPORATED BY REFERENCE[1]
Analysis for effects on public health and safety [40 C.F.R. § 1508.27(b)(2)	• Chapter 5-Analysis of Alternatives • § 5.1.1 • Appendix A (ARARs)	• Includes documents cited throughout this table
Analysis for disportionately high and adverse human health or environmental effects on minority or low-income communities [Executive Order 12898]	• Not applicable	• Not applicable
Discussion of environmental impacts such as human health effects, effects of accidents, and transportation effects	• § 2.3.1.8 • § 2.3.4.1 • § 2.3.4.2 • § 5.1.3.8 • § 5.1.5.8 • § 5.1.5.9 • § 7.3 • Chapter 8 (Health and Safety) • Appendix A (ARARs)	• Action Memorandum for Water Policy (DOE, 1993c) • Engineering Evaluation/Cost Analysis for Water Policy (DOE, 1993d) • Additional references cited throughout this table • Includes documents cited throughout this table
Discussion of possible effects on the human environment which involve unique or unknown risks [40 C.F.R. § 1508.27(b)(5)]	• Not applicable	• Not applicable
Possible indirect and cumulative impacts identified	• § 2.3.4 • § 2.3.4.1 • § 2.3.4.2 • § 3.1 • § 3.2 • § 4.2.3 • § 4.2.4 • § 4.2.5 • § 5.1.3.8 • § 5.1.5.8 • § 5.1.5.9 • Chapters 7, 8, 9, and 10	• (DOE, 1993a) • (DOE, 1993b) • (DOE, 1993c) • (DOE, 1993d) • (DOE, 1994) • (COE, 1994) • Includes other documents cited throughout this table.
Environmental impacts quantified where possible	• § 2.3.4.1 • § 4.1 • § 4.1.1 • § 4.2.3 • § 4.2.4 • § 4.2.5 • Chapters 5, 9, and 10	• U.S. Geological Survey (USGS, 1988) • MODPATH (Pollock, 1989) • Northwest Plume ROD (DOE, 1993e) • Environmental Assessment for the Construction and Operation of the TSCA Waste Storage Facilities and Mixed Waste Storage Facility (DOE, 1993b) • Environmental Assessment for the Construction and Operation of Waste Storage Facilities (DOE, 1994) • Includes additional references cited throughout this table
Impacts analyzed using graded approach	• Chapter 5 (Nine Criteria)	• See Technical Memorandum for the Northeast Plume

NEPA VALUES/CITATION	NORTHEAST PLUME TECHNICAL MEMORANDUM CITATION	DOCUMENTS INCORPORATED BY REFERENCE[1]
All reasonable foreseeable impacts identified [40 C.F.R. 1502.22]	• Applies to entire document. • Requirement is met	• See Technical Memorandum for the Northeast Plume
If information related to potential impacts is incomplete or unavailable, such information must be indicated as lacking [40 C.F.R. §1502.22]	• Applies to entire document • Requirement is met	• Includes documents cited throughout this table
Mitigative measures appropriate to the potential impacts identified [40 C.F.R. 1500.2(f)]	• Applies to the entire document • Requirement is met	• Includes documents cited throughout this table
"Hard look" taken to determine environmental consequences [Kleppe v. Sierra Club, 427 U.S. 390, 410 (1976)]	• Applies to the entire document. • Requirement is met	• Includes documents cited throughout this table
Document made available to the agencies, states tribes, and the public [10 C.F.R. 1021.301]	• § 5.1.9 • Requirements are met through the CERCLA process	See: • Community Relations Plan for the PGDP • Administrative Record for the Northeast Plume
Stakeholders, including the public, involved to the extent practicable during the preparation of document [CEQ (46 Fed. Reg. 18037); 40 C.F.R. § 1506.6; 40 C.F.R. §1501.4(b); 10 C.F.R. § 1021.301]	• §5.1.9 • Requirements are met through the CERCLA process	See: • Community Relations Plan for the PGDP • Administrative Record for the Northeast Plume
Comments from host states and tribes and, when applicable, the public addressed [10 C.F.R. § 1021.301; DOE Secretarial Policy Statement, Sec. V]	• §5.1.9 • Requirements are met through the CERCLA process	See: • Community Relations Plan for the PGDP • Administrative Record for the Northeast Plume
If Floodplain/Wetlands Assessment is required, public notice issued [10 C.F.R. § 1022.14(b)]	• Not applicable	• Not applicable
Adequate consultation with appropriate agencies to ensure compliance with sensitive resource laws and regulations [16 U.S.C. § 1531; 36 C.F.R. § 800]	• Executive Summary • Chapter 2 • Noted throughout the Technical Memorandum	• Not applicable
Listing of agencies and persons consulted [40 C.F.R. 1508.9(b)]	• Executive Summary • Chapter 2 • Noted throughout the Technical Memorandum	• Not applicable

[1] This reference column is not a complete list of all documents cited in the referenced sections of the Northeast Plume Technical Memorandum. Also, for NEPA values which are referenced in numerous sections of the Technical Memorandum, citations are not necessarily repeated.

COMPLIANCE WITH NEPA FOR CERCLA OR CERCLA/RCRA ACTIONS AT PGDP (UPDATED 2/21/97)

As a result of the June 1994 Secretarial Policy on the National Environmental Policy Act (NEPA), DOE now relies on the CERCLA process, and not a separate NEPA process, to meet environmental objectives for actions taken under CERCLA or CERCLA/RCRA. Section II.E.2. states:

> "Department of Energy CERCLA documents will incorporate NEPA values, such as analysis of cumulative, off-site, ecological, and socioeconomic impacts, to the extent practicable."

Instead of preparing separate NEPA documents (categorical exclusion determinations, environmental assessments, and environmental impact statements), CERCLA documents meet DOE NEPA requirements provided they include "NEPA values." Potential impacts to environmentally sensitive resources are always considered. Sensitive resources at PGDP include wetlands, floodplains, cultural resources, threatened/endangered species and their habitats, and prime farmland. CERCLA decision documents identify Applicable or Relevant and Appropriate Requirements (ARARs) for sensitive resources. Failure to comply with ARARs could result in a noncompliance or notice of violation from a regulator. Other NEPA values to incorporate in CERCLA documents are determined on a case-by-case basis.

Roles and Responsibilities

- Project managers ensure that CERCLA document preparers work with the Site Sensitive Resources Coordinator (Site SRC) early in the process to incorporate appropriate NEPA values.
- Project managers ensure draft CERCLA documents are distributed to the Site SRC for review in accordance with the project managers' standard distribution list.
- The Site SRC reviews draft CERCLA documents to ensure that NEPA values, in particular environmentally sensitive resources, are adequately addressed.
- Project managers ensure that comments provided by the Site SRC are adequately addressed.
- Project managers ensure decision document compliance obligations are met during implementation. The Site SRC assists as needed.
- Project managers provide schedules to the Site SRC for all upcoming CERCLA documents (including D0 drafts).

Who to Contact

Brian Bowers
Site Sensitive Resources Coordinator
441-5057 (phone)
441-5177 (fax)
bowersba (e-mail)

Sources of Information for CERCLA Documents

(updated 2/3/97)

CERCLA Compliance With Other Laws

- DOE, "Secretarial Policy Statement on the National Environmental Policy Act," issued 6/13/94.
- *National Oil and Hazardous Substances Pollution Contingency Plan* (40 CFR 300)
- *CERCLA Compliance with Other Laws Manual* (EPA/540/G-89/009)
- *Compendium of CERCLA ARARs Fact Sheets and Directives* (DOE [CERCLA]-005/109)

Sensitive Resources

- U. S. Army Corps of Engineers, *Environmental Investigations at the Paducah Gaseous Diffusion Plant and Surrounding Area McCracken County, Kentucky* (May 1994) - data available in site geographic information system
- CDM Federal Programs, *Investigation of Sensitive Ecological Resources Inside the Paducah Gaseous Diffusion Plant* (August 19, 1994)
- Radian Corporation, *Floodplain and Wetlands Assessment for Site Investigation Activities at the Paducah Gaseous Diffusion Plant Area of Responsibility* (May 1996)
- *Federal Register* Notice, "Floodplain/Wetlands Involvement for Environmental Restoration and Waste Management Activities at the Department of Energy's Paducah Gaseous Diffusion Plant; Paducah, KY" (58 FR 51812, October 5, 1993)
- Jacobs Engineering Group, *Functions and Values Analysis for the Drainage Area South of Solid Waste Management Units 2 and 3 of Waste Area Group 22 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (August 1995)

THE DOE'S RADIOACTIVELY CONTAMINATED METAL RECYCLING: THE POLICY AND ITS IMPLEMENTATION

BY STEPHEN WARREN AND EDWARD RIZKALLA

THE NEED TO RECYCLE

Millions of tons of potentially recoverable materials has accumulated over the years at U.S. Department of Energy sites and facilities now undergoing environmental restoration. These materials include thousands of tons of scrap metals that can be recycled into new products to conserve natural resources, avoid costly disposal, and reduce environmental impacts. While some recoverable materials can be free-released and possess a significant market value, other materials are radioactively contaminated, either on the surface or in mass, which limits their reuse or recycle in the open market. The existing inventory in scrap piles has been variously estimated to include from 150 000 to 400 000 tons of potentially radioactively contaminated scrap metal. Of this, it is estimated that between 118 000 and 150 000 t is radioactively contaminated carbon steel.

The Environmental Management Program has a responsibility to protect the environment, which includes minimizing the volume of waste requiring disposal. [Waste minimization is also in accordance with Executive Order 12856, "Federal Compliance with Right-to-Know Laws and Pollution Prevention Requirements" (3 August 1993).] The Office of Environmental Management (EM) believes that a key way to minimize waste disposal is to recycle materials that have outlived their original use but that still may be recycled to have economic value. Much of the radioactively contaminated scrap metal that has been or will be generated within the Environmental Management Program is suitable for reuse, but because of the type or distribution of radioactive contamination, it cannot economically be decontaminated for unrestricted release.

The idea for a policy grew from the recognition that the carbon steel scrap pile would continue to grow as DOE's Environmental Management Program decommissions surplus facilities that are no longer required to support the department's mission. The DOE already has decommissioned more than 100 structures under the Environmental Restoration Program, and more than 800 others have been accepted by the Environmental Restoration Program for eventual decommissioning. Amounts of scrap metals to be generated by decommissioning projects are conservatively estimated at more than one million tons. With another 1200 buildings likely to be in the pipeline for eventual decommissioning, the scrap metal inventory, including carbon steel, is expected to increase significantly.

THE RECYCLING POLICY CONCEPT

Initially, the objective of the Recycle 2000 policy under consideration was to set a target: "By the year 2000, 50 percent of the low-level waste disposal containers used by the Environmental Management Program will be fabricated from radioactively contaminated carbon steel." However, as DOE worked with stakeholders, it quickly became clear that significant economic uncertainties were associated with the potential costs of recycling versus the disposal and purchase of disposal containers fabricated from virgin materials. Therefore, it was determined that a numerical target was inappropriate. Instead, DOE would provide an environment in which recycling could be pursued to the extent that it can be economically advantageous.

Current Practices

To provide an environment supportive of recycling, DOE had to identify current practices and then assess what changes may be necessary.

At present, radioactively contaminated scrap metal is primarily managed in one of two ways:

- packaged as low-level waste (LLW) and disposed of via shallow land burial
- stored pending funding availability for packaging and disposal.

The first approach incurs the costs associated with managing this material within the current program budget. The second approach defers these costs and may increase them, as this storage is generally outdoors and the potential exists for the migration of contaminants from the stored radioactively contaminated scrap metal (most of which is carbon steel). In addition, the second approach causes deterioration of the metal, which could make it unsuitable for recycling. Although a number of sites have recycled materials or are actively pursuing recycling, to date most of the radioactively contaminated carbon steel is still being managed in one of these two ways.

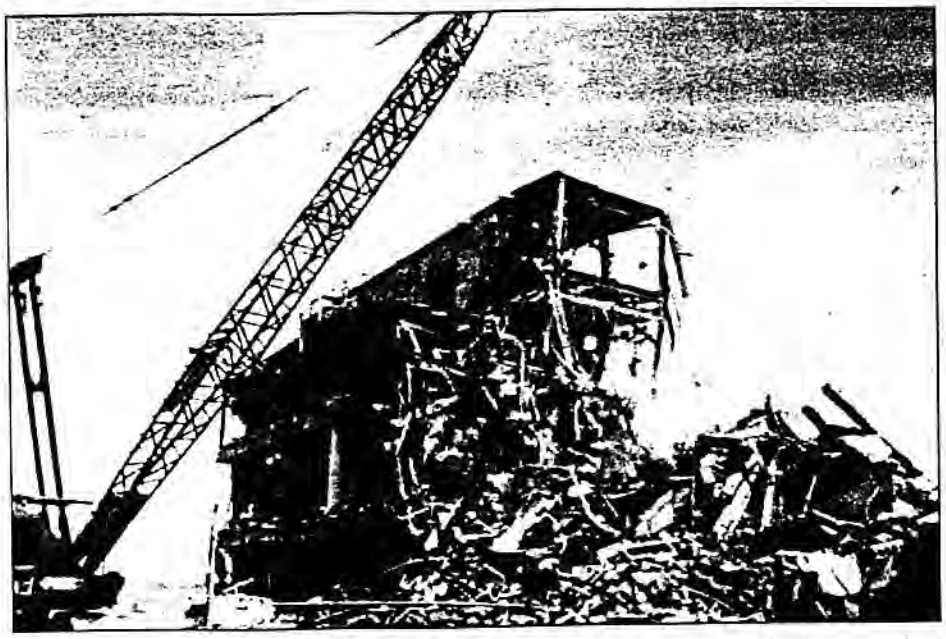


Fig. 1. An example of traditional demolition that generates massive amounts of radioactive waste. Recycling would reduce this waste.

An Innovative Policy Development Approach

The Office of Environmental Restoration explored developing a recycling policy that addresses the large volumes of radioactively contaminated scrap metal. Communications were initiated with key stakeholders (DOE operations offices, management and operating contractors, public interest groups, regulators, labor, and industry) in mid-1994. Based on feedback from this group, a workshop was held in December 1994, where a broader range of stakeholders was asked to identify issues associated with establishing a recycling policy.

As a result of this workshop, stakeholders indicated their support of the recycling concept subject to certain conditions. Specifically, they felt any recycling policy must be

1. protective of public and worker health and safety
2. developed through an open, credible process
3. economic compared to other viable waste disposal options
4. equitable (taking into account equity among sites and states)
5. environmentally responsible, neither compromising cleanup nor adding to existing problems
6. designed not to preclude further recycling initiatives.

Based on these workshop conclusions and a request from workshop participants for more and better information on which to base policy development, DOE committed to conducting analyses of the possible health and safety impacts associated with recycling radioactively contaminated scrap metal, the transportation of this material for recycling, and the cost of recycling. In addition, in response to a workshop recommendation, DOE also committed to developing a standardized LLW disposal container that could be fabricated out of radioactively contaminated scrap metal.

Although initial discussions did not focus on a particular type of radioactively contaminated scrap metal, DOE narrowed the scope to focus exclusively on radioactively contaminated carbon steel (RCCS) because it is abundant throughout the complex, its low market value limits its incentive for decontamination and release, and it is suitable for making the LLW disposal containers in demand with the Environmental Management Program. The department felt that if recycling could be economically feasible for this low-value metal, then it would clearly be feasible for higher value materials.

Three options for managing RCCS were explored with stakeholders:

1. continuing RCCS disposal operations as currently practiced
2. processing RCCS into ingots (a volume-reduced form) for disposal
3. processing RCCS into disposal containers for one-time use within the Environmental Management Program.

In response to the request for more information on which to base a policy, analyses were performed and detailed in the following reports:

1. S. Y. Chen, L. A. Nieves, J. Arnish, S. Folga, "Assessment of Risks and Costs Associated with Transportation of DOE Radioactively-Contaminated Carbon Steel," Argonne National Laboratory (Nov. 1995).
2. M. A. Simek, C. W. Smith, J. L. Legg, D. A. Wollert, "Recycling of DOE Radioactively-Contaminated Carbon Steel: Limiting Concentrations and Risk Evaluation," Oak Ridge National Laboratory, Center for Risk Management (Nov. 1995).
3. "Cost Model for DOE Radioactively-Contaminated Carbon Steel Recycling," S. W. Warren, U. S. Department of Energy; R. S. Moore, R. E. Gant, CACI International (Automated Sciences Group); K. Robertson, The Robertson Group (Nov. 1995).
4. D. Burns, "White Paper—Issues Discussion and Recommended Resolution of Commingling, Production Cost, Mixed Waste, Throughput Assumptions and Background for Recycle 2000 Option 3 (Rev. 2)," Trinity Environmental Systems (Nov. 1995).

The results of these analyses were presented at a second workshop, held in September 1995, after having been reviewed twice in draft form by interested stakeholders prior to being finalized.

Based on these results, stakeholders indicated a strong preference for recycling RCCS. Specifically, they encouraged DOE to establish an RCCS recycling policy with a 2- to 3-year demonstration period followed by a reevaluation of the success and cost of the policy. They further recommended that DOE pursue the processing of RCCS into disposal containers but felt that these disposal containers should be used by waste-generating sites as one-time-use-only packages for LLW disposal at DOE facilities. Stakeholders also wanted to ensure that any processing of the RCCS would be in a facility licensed by the U.S. Nuclear Regulatory Commission or Agreement State (if done by industry) or in compliance with DOE orders. Further, they wanted to ensure that all secondary wastes from the processing would remain the responsibility of the department.

The Policy

The full text of the policy signed by Assistant Secretary Al Alm on 20 September 1996 is as follows:

> I am fully supportive of all efforts to minimize the disposal of metals as waste. We have a tremendous opportunity to accomplish this by the use of disposal containers fabricated from contaminated steel, especially since we not only have a significant demand for disposal containers, but we are the major generator of radioactively-contaminated steel.
>
> Effective immediately, it is the policy of the Office of Environmental Management (EM) that, to the degree that it is economically advantageous and protective of worker and public health, radioactively-contaminated carbon steel (RCCS) either in storage or to be generated should be recycled. This EM policy will be in place for three years from the date of this memorandum, at which time it will be reevaluated. This policy is fully supportive of the various site-specific recycling initiatives underway or planned. More details on implementation of this policy are in the attachments.
>
> Specifically, the policy for radioactively-contaminated materials, including RCCS, generated by the EM Program, shall be: survey, decontaminate as necessary and appropriate (in compliance with DOE Orders), and release for unrestricted use any material that meets the applicable criteria. If decontamination for release for unrestricted use is not economically feasible, then the RCCS that is recycled shall be fabricated into one-time-use containers for disposal of low-level wastes generated by the EM Program, consistent with the attached radiological guidance.
>
> I am looking for a site to aggressively lead the implementation of this policy. The lead site will be responsible for working with all EM sites to manage RCCS from generation to disposition as low-level waste disposal containers, including brokering small-site RCCS and achieving complex-wide economies of scale. I have attached the criteria I will utilize to evaluate your proposals. If your staff have any questions regarding this policy or the attachments, or if you wish to submit an application for the lead site by 14 October 1996, contact Stephen Warren (EM-43, (301) 903-7673).

Stakeholder Input into the Final Policy

As an attachment to the RCCS policy, Assistant Secretary Alm provided additional guidance to environmental management programs at each field site. Specifically, for waste-generating sites, containers fabricated from RCCS should be utilized to the extent practicable. Further, disposal sites should accept waste packaged in disposal containers made from RCCS, provided the waste and packages meet all site-specific waste acceptance criteria. Finally, sites were told that release or processing of any contaminated or previously contaminated metals must be in compliance with applicable requirements, which may include NRC or state licensing requirements.

Stakeholders recognized that initiating recycling operations within the EM program may increase near-term costs in some cases. However, they strongly believed that the benefit to the environment of decreasing the volume of material being disposed of, as well as avoiding the use of clean metal for disposal packages, justified this near-term cost increase. They recognized that implementing this policy may require sites to reallocate existing funding.

Discussions with the metal-recycling industry suggested that the existing capacity for recycling DOE's RCCS into disposal containers is limited. Other analyses indicated that although the industrial infrastructure is not fully in place, recycling into disposal containers can be done cost-effectively. Alm recognized that in the early stages of implementing this policy, the cost of recycling will exceed the cost of disposal; therefore, sites were directed to develop site-specific cost analyses to assess the cost-effectiveness of recycling. Further, sites were told that these analyses should include the cost savings associated with avoiding the disposal of the RCCS as waste because disposal is also a cost to the EM program. Sites were also encouraged to work with their site-specific stakeholders to assess their views on recycling and to determine their level of support for recycling the RCCS into disposal containers in the event it initially costs more than disposal. Such discussions with stakeholders in advance of recycling decisions would enable sites to assess the acceptability to stakeholders of allocating additional site funds to recycling activities.

Stakeholders agreed that based on these analyses, it was clear that recycling (including transportation of RCCS to an industrial location for decontamination, melting, and fabrication into disposal containers, as well as transportation and use of these containers at a DOE generating site) can be done in a manner that protects DOE workers, the public, and the environment. These analyses identified specific contamination levels as suitable for recycling; these levels were provided to the sites with the policy, along with the guidance that they shall be followed in the absence of site-specific guidelines.

At least one site has an existing compliance agreement or has made commitments to stakeholders to dispose of RCCS through on-site bulk disposal. In establishing the recycling policy, the Assistant Secretary recognized that disposal is the appropriate option in this case, as well as for metals that are too deteriorated or too highly contaminated to recycle.

The policy further recognized that there may be some question about the applicability of the National Environmental Policy Act (NEPA) when implementing the RCCS recycling policy. The sites were informed that if the decommissioning decision document is prepared under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and covers the disposition of the metal, then no further

NEPA analysis should be required. If the decommissioning decision document is prepared under CERCLA but does not cover the disposition of the metal or if the decommissioning decision has been made under some authority other than CERCLA, sites should consult their NEPA Compliance Officer to determine the appropriate NEPA review strategy.

Finally, the policy recognized that innovative approaches such as the following may exist to enhance the implementation of this policy:

1. operations offices working together to place orders for disposal containers made from RCCS, thereby enabling vendors to realize economies of scale
2. surveying and segregating metals that either are in storage or are generated at a site to enable the immediate accumulation of an inventory suitable for recycling (consistent with applicable regulatory requirements and commitments)
3. identifying vendors willing to provide recycling services, provided that ownership of the metal (and any resulting wastes) is retained by DOE.

Sites were encouraged to pursue these and other approaches to implement the RCCS recycling policy cost-effectively.

Innovative Approaches To Implementation

To ensure that innovative approaches are identified and pursued, Assistant Secretary Alm selected a "lead site" on 18 November 1996. As shown in the policy itself, sites were invited to submit applications to be the lead site. Three excellent proposals were received from the Chicago Operations Office, a joint submission from the Idaho/Oak Ridge Operations Offices, and the Oak Ridge Operations Office. A team of DOE headquarters personnel representing the Offices of Waste Management, Science and Technology, Site Operations, and Environmental Restoration was convened to evaluate the proposals and make a recommendation to Alm. The reviewers found that each proposal had specific strengths that made selection difficult, but based on the evaluations, Alm selected the Oak Ridge Operations Office proposal. He noted that the selection as the lead site is specific to RCCS and asked the site to prepare a detailed program plan to address working with sites and industry to implement the recycling policy. The Oak Ridge Operations Office was also asked to form a cross-complex team (to include DOE headquarters) to assist with implementation.

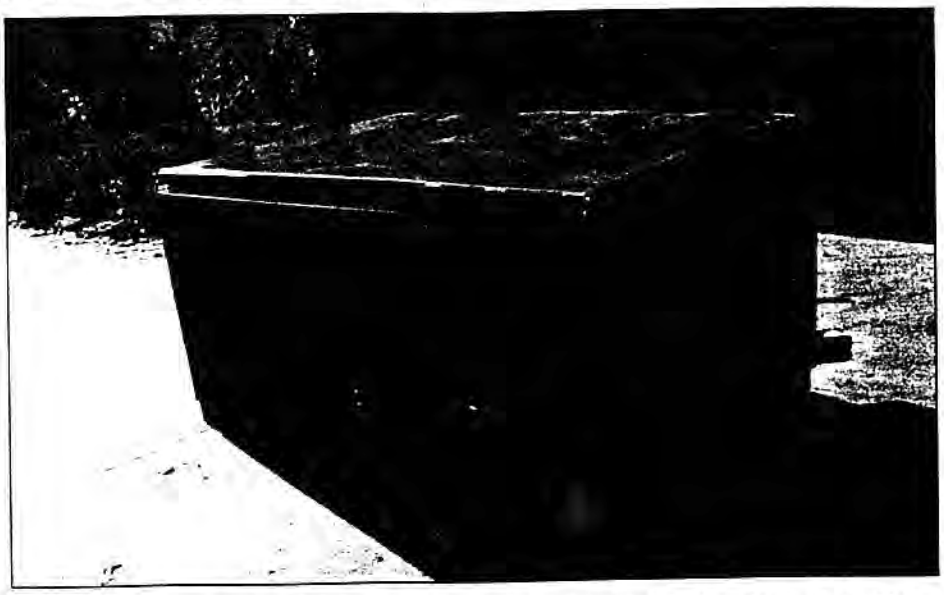


Fig. 2. An external view of the M-100 container with its cover in place. Note the overhead lift lugs at the corners.

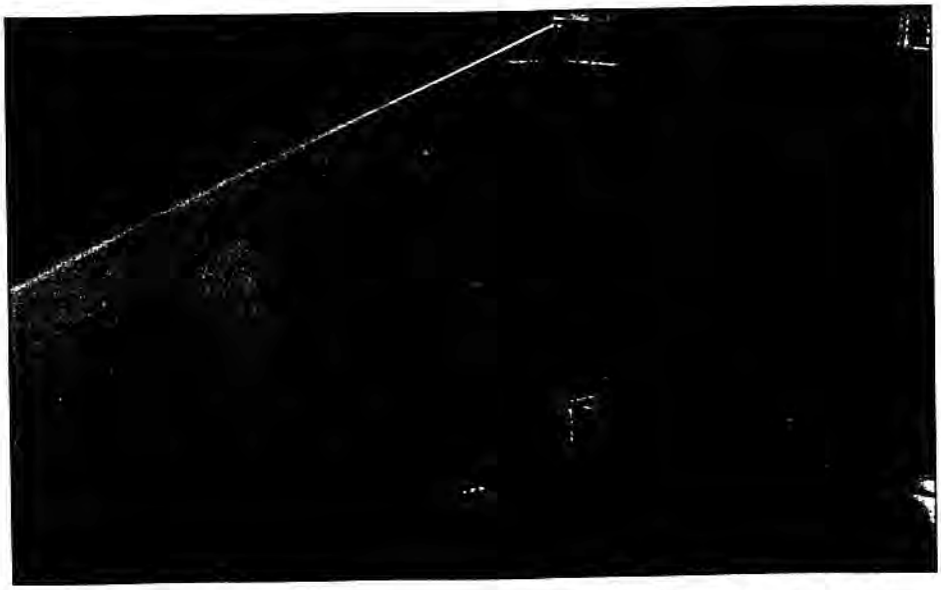


Fig. 3. Latest photograph of the M-100 container, model M-101/7A/12/90, showing the internal strut arrangement

In his memo selecting the lead site, Assistant Secretary Alm specifically noted the metals stored awaiting opportunities to recycle at sites such as Grand Junction, Fernald, and Weldon Spring and the importance of this policy and its implementation to EM. Alm concluded his memo by indicating his interest in receiving Oak Ridge's detailed program plan to see how they will (a) broker between sites (i.e., obtain metal from one site and provide LLW disposal containers to another site), (b) work with industry to create a market for RCCS products (such as LLW disposal containers), and (c) work with the sites to support development of the cost analyses that will be the basis for RCCS recycling.

One site has already developed and documented a process to make informed decisions regarding the responsible management of radioactive scrap metal. This includes a life-cycle cost analysis (in compliance with the recycling policy) as well as an assessment of other factors, including stakeholder concerns. Initial interactions with the public indicated that stakeholders prefer to recycle metals, even if recycling potentially costs more than disposal of these materials.

Other Recycling Initiatives

The Office of Environmental Management is also pursuing several other recy-

cling initiatives. Specifically, the Offices of Waste Management and Environmental Restoration are working with Savannah River site (SRS) personnel to evaluate the potential for using recycled radioactively contaminated stainless steel canisters for the Defense Waste Processing Facility's vitrified high-level waste. The SRS has most of the stainless steel available for recycling. Cost data are being collected so that a comprehensive cost analysis can be developed to determine the economic feasibility of using the recycled stainless steel. The results of this cost analysis will be presented to EM management in mid-January.

The Offices of Waste Management, Environmental Restoration, and Facility Transition are also working together with the SRS to assess the availability, suitability, and feasibility of using SRS stainless steel to fabricate plutonium storage package needs.

It is anticipated that additional opportunities for recycling will be identified as the lead site begins to work closely with all EM sites.

Standardized LLW Disposal Container Development

As part of the policy development, DOE developed a standard container suitable for the disposal of LLW. The department is the largest generator of LLW in the United States (generating nearly 70 percent of the total national volume). In 1993, DOE disposed of more than 50 000 cubic metres of LLW. This waste is packaged in a variety of containers and disposed of via shallow land burial at the Hanford Reservation in Washington State, the Idaho National Engineering Laboratory in Idaho, the Los Alamos National Laboratory in New Mexico, the Nevada Test Site in Nevada, the Oak Ridge Reservation in Tennessee, and the SRS in South Carolina.

In 1995, as a result of stakeholder recommendations from the December 1994 Recycling Policy Workshop, the department initiated an effort to develop a standard container for disposal of DOE's LLW. The objective was to enable DOE to order larger numbers of containers at one time, thereby reducing purchasing costs. Further, DOE anticipated that a standardized container had the potential to reduce costs in two additional ways. First, by enabling new disposal container fabricators to enter the market, competition would be enhanced and prices reduced. Second, by enabling the generating and disposal sites to concentrate on a single container, future storage, loading, and disposal operations would be simplified, different types of equipment required for these operations would be minimized, and operating costs would be reduced.

To ensure that such a container would be used by the different DOE sites, a development team was established. This team included representatives from the major generating and disposal sites. Representatives of the Transportation Management program were also included because another objective was that the container be a 7A Type A transportation package certified by the Department of Transportation (DOT). A key factor in site acceptance and the use of this container was the process of achieving consensus among generators and disposal operations personnel at DOE sites.

The objectives for the standard container development initiative were to

1. design a family of standardized LLW disposal boxes (M-100 series)
2. enhance economies of scale through larger DOE orders of uniformly designed containers
3. improve transportation efficiencies by minimizing the variety of disposal containers used by DOE waste generators
4. minimize void space at disposal sites through the use of standard-size containers
5. reduce uncertainty for vendors regarding the nature of a B-25-type container.

The M-100 container has the following attributes:

1. The M-100 series containers can be easily fabricated, using standard tooling and nonproprietary parts.
2. The M-100 series container design can accommodate both RCCS and commercial fabrication paths.
3. Each M-100 design can use a single gauge or metal thickness for all components (i.e., all 8-gauge or all 12-gauge components).
4. The M-100 series containers can meet waste acceptance criteria for all DOE LLW disposal sites.

The M-100 series of containers is designed so that a fully loaded container can be lifted by forklift or overhead hoist, and the container is suitable as a six 55-gallon drum overpack.

Design of the container was completed in late 1995, and a prototype was fabricated for testing. The full suite of DOT 7A tests will be performed on the container at the Hanford test facility in 1997, completing all design and documentation activities for the containers.

Conclusion

The development and issuance of EM's policy for recycling RCCS has been a successful collaborative effort between DOE and its stakeholders.

The recycling policy provides an environment in which recycling can be pursued. The policy itself cannot force sites to recycle because this decision will be based on an economic analysis with consideration for stakeholder values. But, by establishing an end use for the department's recycled RCCS (LLW disposal containers) and selecting a lead site to broker metal and end products between sites. the EM hopes to cause recycling to be the "disposition mode of choice" for its radioactively contaminated scrap metals.

Acknowledgment

The authors would like to acknowledge the assistance of Julie D'Ambrosia in the recycling policy activity and in the preparation of this article.

Further Information

An additional source of information about recycling in the EM program is available at the following address: http://www.em.doe.gov/recyc/ ; this program page contains the signed Recycle 2000 policy, the signed standardized LLW disposal container policy, information related to the development of the Recycle 2000 policy, and other recycle information. The page also contains an index of downloadable recycle documents and a contact for additional information.

About the Authors

Stephen Warren is the team leader for the Technical, Regulatory, and Policy Integration Team in the U.S. Department of Energy's Office of Environmental Restoration, where he worked with stakeholders to develop the radioactively contaminated carbon steel recycling policy. He is also responsible for coordinating new remedial technologies with the Office of Science and Technology within the DOE's Office of Environmental Management.

Edward Rizkalla is the team leader for the Waste Management Science and Technology Team in the DOE's Office of Waste Management, where he is responsible for ensuring that waste minimization and pollution prevention concepts are incorporated into waste treatment, storage, and disposal activities. He is also responsible for cost-benefit analyses for innovative technologies for DOE's environmental management activities.

RECYCLING *ENTIRE* DOE FACILITIES: THE NATIONAL CONVERSION PILOT PROJECT

BY DENNIS R. FLOYD AND D. ELAINE NIX

INTRODUCTION

The National Conversion Pilot Project (NCPP) is being conducted at the U.S. Department of Energy Rocky Flats Environmental Technology Site (RFETS) in Golden, Colorado, under a cooperative agreement between the DOE and Manufacturing Sciences Corporation (MSC) of Oak Ridge, Tennessee. RFETS is a former nuclear weapons manufacturing site that is now being decommissioned. MSC is in the business of recycling radioactive scrap metal (RSM) such as results from decommissioning such nuclear facilities. Aware that the metalworking facilities at Rocky Flats are still in good working order and could be used to recycle RSM, MSC approached DOE to see if four buildings covering over 200 000 square feet and containing equipment valued at $92 million could be reused for such a purpose. Recognizing the potential, and aware that numerous issues must be resolved before such reuse could be authorized, DOE Secretary Hazel O'Leary personally authorized the NCPP to address these issues, not just for Rocky Flats but for all DOE sites.

The NCPP was authorized to proceed in three distinct stages:

stage I: planning and characterization
stage II: cleanup and refurbishment
stage III: commercial reuse.

Each stage requires separate approval before proceeding to the next. Stage I commenced on 1 April 1994, and stage II was authorized to begin on 1 October 1994. Stage III is currently slated to commence on 1 June 1997, with the lease of the first two buildings. The status of cleanup of the remaining two buildings is currently uncertain pending availability of fiscal year (FY) 1997 funding for this purpose.

ORGANIZATION

It has been recognized from the outset that the stakeholder community surrounding Rocky Flats must fully participate in decisions regarding reuse of the facilities at Rocky Flats for commercial purposes. The project was organized to encourage this participation, as shown in Fig. 2.

The steering committee forms the crux of this organization. It includes single representatives from MSC; DOE; the Colorado Department of Public Health and Environment; the U.S. Environmental Protection Agency (EPA); the Colorado governor's office; Kaiser-Hill, the RFETS contractor; and the Rocky Flats Local Impacts Initiative (RFLII), a community-wide stakeholder organiza-

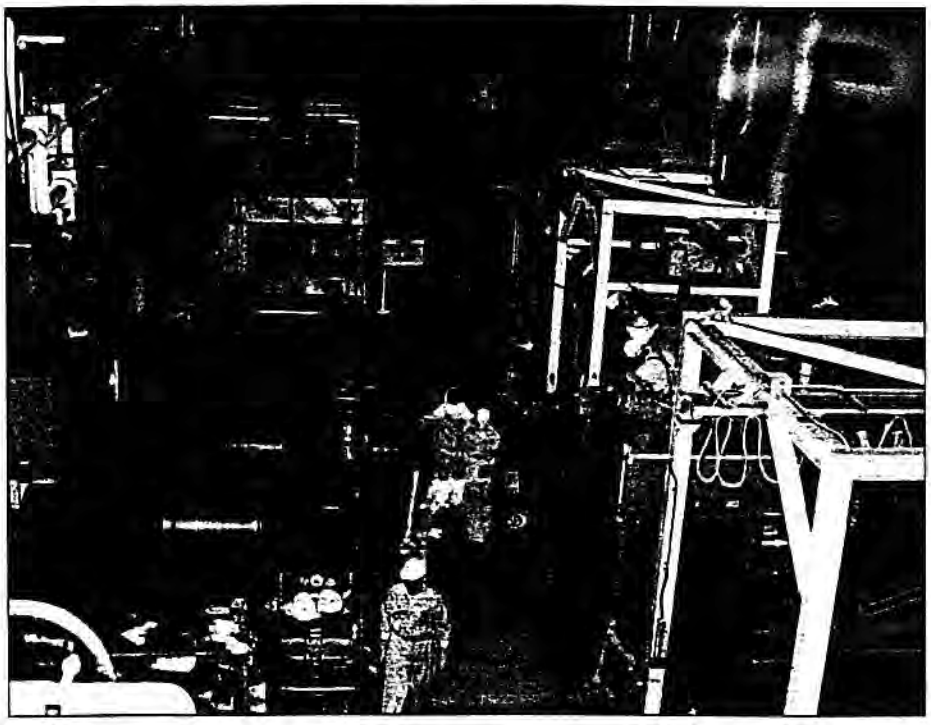


Fig. 1. Panoramic view of a cleanup area at RFETS

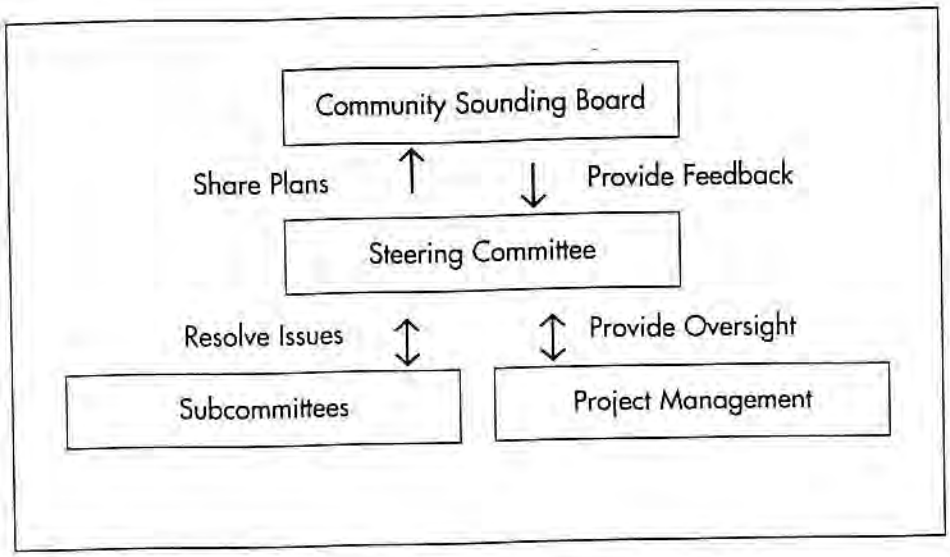


Fig. 2. The NCPP organization

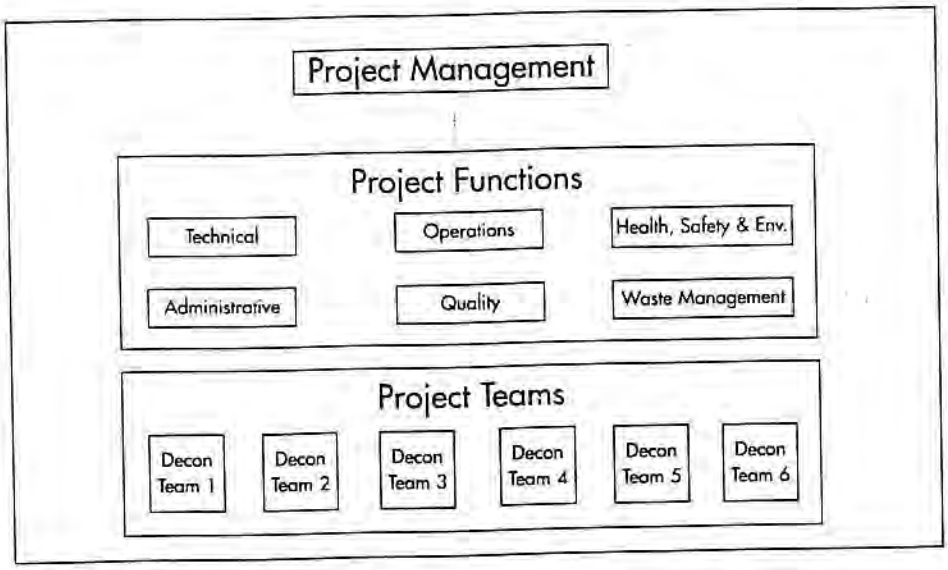


Fig. 3. The NCPP team organization

tion. These seven members meet regularly to guide and oversee the project management. They use subcommittees consisting of specialists from these same organizations to evaluate issues of concern to the public and to propose resolutions of these issues. The community sounding board meets on an ad hoc basis to review major project undertakings and provide the steering committee with early feedback about how the public is likely to respond to the undertakings.

The project is managed via a team concept, as diagrammed in Fig. 3. A typical decontamination (decon) team consists of a team leader and five to six decon workers. One of the decon workers on each team is a radiation control specialist; another specializes in a particular craft, such as sheet metal or electrical equipment; and the remainder are cleanup specialists. The teams are allocated cleanup work based on the mix that that particular activity requires, and sharing of workers among teams is done when a skill needed for a particular task is lacking.

Because the team workers were selected from among a population of former Rocky Flats workers dislocated by the change of the site's mission from nuclear weapons production to one of decommissioning and cleanup, a significant effort has been undertaken by the NCPP to prepare these workers first to clean up and ultimately to manufacture. This effort involves an innovative concept of "additional skilling" brought to the project by British Nuclear Fuels PLC (BNFL) through the principal NCPP subcontractor BNFL Inc., which is the U.S. subsidiary of BNFL. BNFL gained experience with the additional skilling concept during its recent transformation from a government-run organization to a profit-oriented corporation. The concept involves adding additional skills to the core competence of individual workers so that they can effectively perform a variety of tasks as team members. Heavy emphasis is placed on establishing a mission-focused, businesslike culture within the project. The competence enhancement is done by members of the project, not a separate training department. Over 50 different skill units have been prepared by team members and delivered to team members. Testing is done to verify that the competency desired from each unit has been gained, and certificates are provided to the team members to document their achievements.

Results

The NCPP is currently in stage II. The mission of stage II is to safely and successfully (a) rehire and develop workers, (b) clean up facilities, (c) prepare for recycling, and (d) openly share the results. The project is safely and successfully meeting this mission. The following details support this assertion.

Health, safety, and environment

With over 200 000 person-hours (h of hands-on decon work done on the project to date, there have been no environmental releases, no serious injuries, and no personnel exposures. The NCPP management places great importance on safety, and this attitude is conveyed throughout the project team. One of the most important milestones of the project has been the approval by the DOE of the project's radiation protection program, which was prepared according to the requirements of 10 CFR 835.

Staffing

Of the 50 team workers and staff who have been hired for the project, 44 are former Rocky Flats workers. They were drawn from about 600 applicants, each of whom was assessed, which resulted in about 100 personal interviews conducted by MSC personnel. The selection process involved first selecting the team leaders, next creating a pool of about 50 candidates, and then having the team leaders select their team workers from this pool. The team leader has full responsibility for his team, including hiring, work assignments, performance evaluations, pay increases, and overall team results.

Fig. 4. Former nuclear weapons production workers compose 88 percent of the NCPP team members.

Training

The NCPP strives to avoid the "sheep-dip" approach to training, in which all team members receive the same training regardless of whether or not they already have had this training. Instead, each NCPP team member participates in the preparation of his or her own personal competence-enhancement plan, which is tailored to his or her specific job responsibility. Credit is given for documented prior training if proficiency is demonstrated. Each plan consists of team members attending a series of training modules that are provided by experts within the team in that particular area. Thus, training is a project responsibility rather than the responsibility of some outside department.

The team members who perform the training prepare their own training modules. For example, the first module each NCPP team member receives is "cultural" training, which is conducted by the project manager. It includes a thorough discussion of the NCPP mission, a review of the company history and mission, and a section on change that emphasizes the need to change the mind set of the former nuclear weapons plant workers from one of "cost-plus" experience to one of operating in a competitive environment.

To date, over 58 diverse modules have been prepared; these modules cover subjects ranging from fork-truck operations to overhead crane safety to hazardous worker training. Over 1300 person-units of such training have been delivered, which is an average of about 28 modules delivered to each worker. To ensure that the intended result is achieved, each module concludes with a competence verification test. Upon successful completion of the test, a certificate of completion is provided. In this way, each team worker is able to build an impressive portfolio of demonstrated competencies in the decontamination and decommissioning field.

Cleanup

The cleanup activities are being conducted under the permitting authority of an interim measure/interim remedial action (IM/IRA) approved by the EPA and the State of Colorado. Excellent progress is being made with cleaning the facilities to the levels specified in the IM/IRA. Preparation for the cleanup, which included hiring, training, and obtaining all required permits and approvals, took about 11 months. Full-scale cleanup began in September 1995. By December 1996, the first building had been cleaned, and cleanup and refurbishment of the second of the four buildings will be completed in April 1997. Representative examples of the types of cleanup that are under way are shown in Figs. 5 and 6.

All decon work is planned by the team that will actually do the cleanup. This is considered key because it allows the cleanup team to have ownership of the work. The team's work plan is documented in a work package that is reviewed by health, safety, and waste specialists and approved in advance by project management before the work commences. These specialists are constantly present in the work area to provide counsel and to approve work package modifications on the spot. Cleanup methods that are employed range from simple soap-and-water wipedown to surface blasting with carbon dioxide pellets in an enclosed environmental chamber. After considering cost, time, waste minimization, and effectiveness, each team chooses which method to use. We are finding that the technology that is used is far less important than the people who use it and the approaches that they follow when doing the cleanup.

The equipment being cleaned falls into three categories:

1. equipment with no economic value, which consequently is cut into scrap and stored as recycle feed
2. equipment whose resale value exceeds cleanup cost, which consequently is slated to be cleaned and sold
3. equipment needed for reuse, which consequently is cleaned/refurbished.

The four buildings contain about 200 different equipment items, ranging from conventional machine tools, such as mills and lathes, to large specialty equipment, such as casting furnaces, rolling mills, and forming presses.

Process verification

A key part of the NCPP involves verifying that the equipment being refur-

Fig. 5. NCPP workers cleaning uranium oxide from a rolling mill at RFETS

bished is suitable for manufacturing the types of products that might be produced in these facilities. To this end, a concept called "process verification" was authorized by the DOE, the steering committee, and the IM/IRA. An example of a typical product that is being manufactured during stage II is the pipe-shaped transuranic (TRU) waste container. Forming, rolling, spinning, extrusion, machining, and welding equipment housed in the first two buildings being cleaned were used to produce 24 of the TRU containers. These containers were made for the DOE/Rocky Flats Field Office and used in tests at Sandia National Laboratories (SNL) to verify that they are suitable to safely store TRU waste forms at Rocky Flats until they can be shipped to the Waste Isolation Pilot Project in Carlsbad, New Mexico.

These containers also serve as an approved shipping container that enables a tenfold increase in the amount of plutonium allowed in the TRU. The consequence is a tenfold reduction in the number of shipments and the number of containers disposed of. The potential cost-saving implications are so significant that tens of thousands of these containers are expected to be needed. Because these containers become contaminated through contact with the TRU contents, the use of RSM to manufacture them is viewed favorably, as long as the metallurgical characteristics are not degraded by the residual radioactivity remaining in the recycled metal.

Additional examples of waste containers that MSC is manufacturing at its operations in Oak Ridge, Tennessee, are shown in Fig. 7. These containers could also be produced at RFETS if the market demand is adequate.

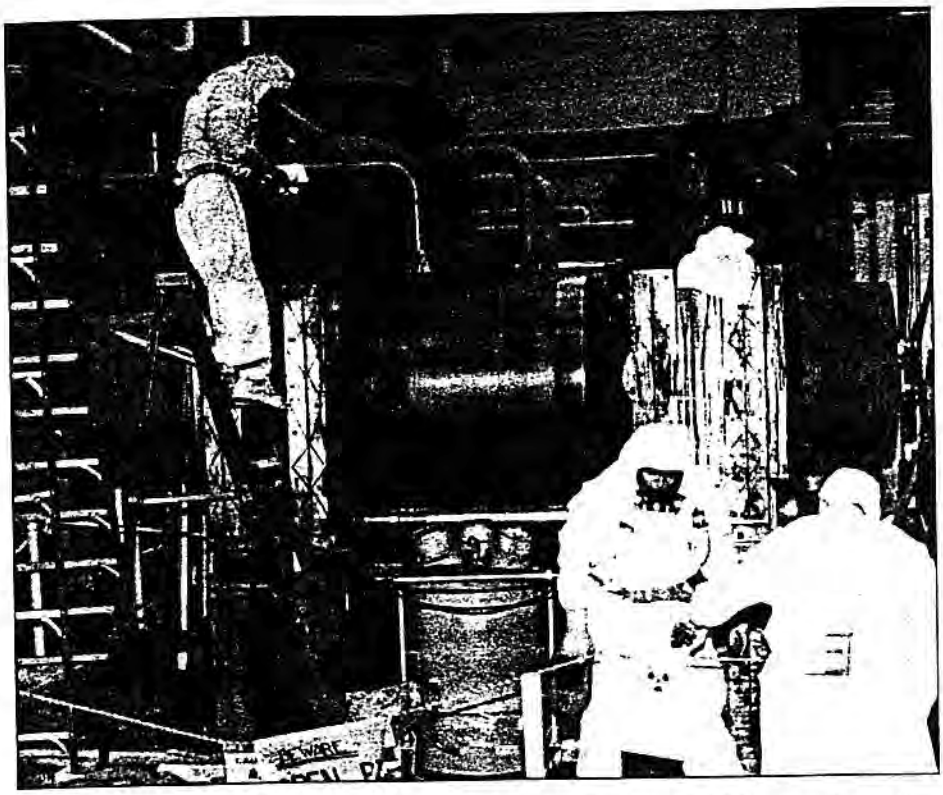


Fig. 6. NCPP team members clean and refurbish the work roll on one of the two rolling mills in Building 883.

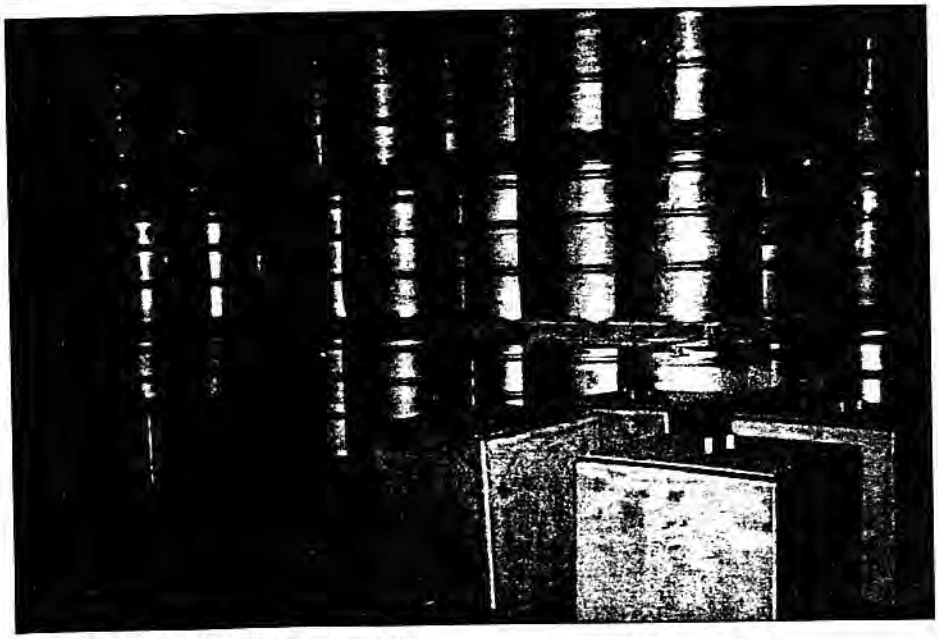


Fig. 7. Typical radioactive waste containers

Discussion

By most, if not all, measures, the NCPP is a major success. Former defense workers have been rehired and retrained to become effective cleanup workers. Contaminated facilities are being decontaminated and refurbished for reuse by processing RSM into restricted-reuse products. Containers for radioactive waste are being produced on a prototype basis to demonstrate that the facilities can be used to manufacture needed products. Regulators and stakeholders are active participants in reviewing, planning, and overseeing the execution of the project. Lessons are being learned, both about cleanup and economic conversion, that have wide applicability to the entire RFETS and to other DOE sites. Specific examples follow.

Plutonium relevance

Although plutonium is not present in the four buildings being cleaned under the NCPP, the cleanup of plutonium is the most pervasive and costly cleanup facing the Rocky Flats site. One of the major benefits of the NCPP is to experience the cleanup of equipment that is nearly identical to that found in the plutonium buildings, but to do so with a much less radioactive contaminant (depleted uranium). Many valuable lessons are being learned that will avert recurrences with plutonium. For example, NCPP workers using carbon dioxide pellets to blast contamination from metal surfaces found that the "blow-back" force of the pellets bouncing off the contaminated surfaces was so great that it

propelled contamination through the triple-layer protection of the workers' clothing. This is the same level of clothing protection used by radiation workers in plutonium areas. The solution was to add a layer of disposable tyvex clothing, which proved impermeable to the carbon dioxide pellets.

Productivity

Another lesson learned concerns productivity. The NCPP workers found that they had been losing far too much productive time during change-out for work breaks and lunch. Consequently, they offered to work four 10-h days and to forego morning and afternoon work breaks in favor of a 1-h lunch period. The result is that only 4 change-outs are required per week compared to 15 previously. This change of schedule is the primary reason that the amount of available time that workers spend in the work area actually doing cleanup is averaging about 95 percent.

Waste management

Possibly the most important lessons learned by the NCPP are in the area of waste management. NCPP workers are proactive in taking steps to reduce waste—steps that range from selecting cleanup techniques to avoid secondary waste to using common sense in applying these techniques. One example is the work done to prevent mixed waste from electronic components. When such components are no longer needed, the normal approach at RFETS has been to discard them as mixed waste without any effort to decontaminate. The NCPP performed a cost analysis and found that it is ten times more cost-effective to hand-separate the hazardous metals from the electronic circuit boards and to discard the nonhazardous remains as low-level radioactive waste. Such techniques have been responsible for reducing the mixed waste by 73 percent below levels predicted during project planning.

Other DOE sites

Part of the stage II mission of the NCPP is to share the lessons learned with other DOE sites. To this end, MSC has provided briefings about the project to DOE officials and contractor representatives at several sites, including Oak Ridge National Laboratory, Fernald, Idaho National Engineering Laboratory, the Nevada Test Site, and SNL. As a result of the more important lessons learned, the following suggestions are being made:

- Work closely with the local community reuse organization (CRO).
- Involve the regulators early and completely.
- Communicate openly and often with the stakeholders.
- Solicit and heed stakeholder advice/concerns.
- Recognize and utilize the skills of the prior workforce.
- Employ imaginative training methods.
- Develop and follow a clearly defined mission.
- Involve the workforce in work planning.
- Encourage responsible waste management practice.
- Follow a project approach.
- Establish a true team environment.
- Foster a market-based culture.

The NCPP also encourages visits to the project site to see the results first hand and to interview the people responsible for achieving the results.

Fig. 8. The NCPP's aggressive waste management program has accomplished significant reductions in waste generated.

Budgetary matters

Budgetary matters have had a significant impact on the project. From project inception, the position of the local stakeholders has been that although they favor the project, they do not consider it sufficiently important to warrant expending RFETS funds that could otherwise be directed at higher priority projects such as plutonium-related cleanup work. Consequently, in authorizing the project, the DOE agreed that it would be funded from headquarters and not from the site.

Initial funding of $11 million was provided from the workforce-restructuring budget managed by the DOE Office of Worker and Community Transition (WT). The reductions in DOE budgets in FY 1996 made it very difficult to reach agreement on continuation of the project despite its good success. WT took the position that since the project had such a large element of cleanup, it should be funded in part by the Office of Environmental Restoration and Waste Management (EM). Ultimately, EM and WT agreed to provide $5 million each in FY 1996 funding, which has enabled the project to continue at least through the cleanup of two of the four buildings. The original project cost forecast was $42 million, but [illegible] reveals that all four buildings can be completed for $28.5 million. This will require $7.5 million in FY 1997 funds.

Risk analysis

Continuing manufacturing operations at Rocky Flats using RSM has raised a local concern about the risk and waste that may derive from importing the feed metal into the state. To understand the risk implications, the NCPP commissioned an analysis of the proposed process. This analysis concluded that the radiation exposure to workers from the processing of RSM is very low—in all cases less than background sources of contamination. The risk to the public around Rocky Flats is substantially lower. The largest risk arises not from the radioactive content of the metal feed but from traffic accidents that might occur while metal or any other feed is being transported to the plant site.

Future Plans

Is economic conversion of DOE sites feasible? This is the question posed by the project mission, and the ultimate answer will be to see if a contractor can reuse these facilities and produce products competitively with firms not located on DOE sites. This is a difficult proposition at DOE sites such as RFETS that were used to process radioactive materials and that therefore require environmental controls that are expensive to operate. The most likely markets will be those that process materials that also require such environmental control, such as radioactively contaminated scrap metals. The cost avoidance realized by not disposing of the metals in expensive low-level waste repositories may provide the economic differential adequate to succeed with the NCPP mission.

The publicly announced and agreed-to plan is to seek a decision from the stakeholder community about proceeding into the reuse stage after all four buildings have been completed. Because the rate of funding has not been adequate to get all four buildings cleaned and refurbished by 30 September 1996, which is the completion date originally set, a modification to the project is needed. The steering committee has agreed to seek public acceptance of reusing the first two buildings independent of when and whether the remaining two buildings are cleaned and readied for reuse. If this is agreed to, the DOE plans to utilize the local CRO, which is the RFLII, to conduct the process whereby these two facilities can be leased to a stage III contractor. This contractor will be selected via a competitive process to ensure that the most promising reuse opportunities are encouraged. Based on this process, the CRO will recommend a stage III contractor with whom the DOE should negotiate a lease and will likely urge the DOE to use the lease proceeds to stimulate additional reuse, possibly by applying these funds to the cleanup of the remaining two buildings.

The first two buildings will be cleaned and ready for reuse by April 1997. The selection of the stage III reuse contractor is expected to be in early 1997. Execution of the lease agreement and authority to proceed with reuse will occur only after general agreement to do so is reached with the stakeholder community and an environmental assessment is completed. Continuation of cleanup of the remaining two buildings of the NCPP will depend on continued funding from the FY 1997 DOE budget.

HARVARD School of Public Health

Radiation Protection Training: A Harvard Tradition of Excellence

☐ **Atmospheric Science and Radioactivity Releases,** JUNE 3-6
Learn the basic science and underlying assumptions of atmospheric particle dispersion and transport and dose projection. Use 4 dose projection computer programs in workshop settings. Receive a free copy of RASCAL software.

☐ **Management and Disposal of Radioactive Waste,** JUNE 16-20
Learn to develop a management perspective that ranges from generation to disposal; identify situations where the generation of radioactive waste can be reduced or prevented. Led by Dade Moeller, author of *Environmental Health*, the industry's most comprehensive source book.

☐ **Radioactivity in the Environment: Risk, Assessment, & Measurement,** JUNE 17-20
Prepare your organization to respond to the demands of new regulations governing environmental measurement and assessment of man-made radioactivity. Learn the latest methods of measurement, data analysis, and risk assessment.

☐ **Nuclear Emergency Planning,** AUGUST 19-22
Covers fundamentals as well as current issues. Current issues include: realistic scenarios, severe weather emergency response; the changing face of public communication; crisis communication. Keynote address by The Honorable Greta Dicus, NCR Commissioner

Also Upcoming . . .
☐ Occupational & Environmental Radiation Protection, ☐ Fundamentals of Industrial Hygiene, ☐ In-Place Filter Testing Workshop

radwaste/197

To receive a brochure and a complete schedule of '97 courses, check boxes above and . . .

FAX WITH NAME AND ADDRESS TO: 617-432-1969
CALL: 617-432-1171 CONTEDU@SPH.HARVARD.EDU

Circle Reader Service No. 9

ANSI/ANS-15.8-1995

Quality Assurance Program Requirements for Research Reactors

Revision of ANSI/ANS-15.8-1976;R1986

☑ This standard provides criteria for quality assurance in the design, construction, operation, and decommissioning of research reactors.

☑ Contact ANS for this standard as well as a complete list of standards developed by the ANS Standards Committee.

$32 **Order # 240215**

☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑

American Nuclear Society
555 North Kensington Ave.
La Grange Park, IL 60526
Phone: 708/579-8268

Circle Reader Service No. 26

Now Available from the American Nuclear Society

NUCLEAR POWER FROM UNDERSEAS TO OUTER SPACE

by John W. Simpson

John Simpson, former president of Westinghouse Power Systems Company, and past president of the American Nuclear Society, provides a vibrant account of the events associated with the birth of the nuclear industry. Simpson's account of his career and the many turns it took are formidable. Sixteen chapters provide the reader with a historical perspective portrayed by a person whose role, energy, and contributions to the development of fission power are significant.

Simpson takes you through the building and operation of the first submarine, nuclear propulsion units, Shippingport, the Astronuclear years, and early commercial power. Written largely in narrative and anecdotal, the technical story is also provided. The final chapter provides a summary and the author's thought-provoking view of the future of nuclear power.

Rated a "MUST READ" for nuclear buffs!

Hardcover, 480 pages
ISBN: 0-89448-559-8
ANS Order No: 690042 Price: $50.00
10% discount off list price for ANS members

For further information, contact:
American Nuclear Society • 708/579-8210

Circle Reader Service No. 27

Center for Environmental Communication Studies
Department of Communication
University of Cincinnati

National Dialogue Pilot Field Workshop
Sponsored by the League of Women Voters Education Fund
Hosted by the Center for Environmental Communication Studies
Contact: Jennifer J. Hamilton 513-556-4001
Stephen P. Depoe 513-556-4440

The Center for Environmental Communication Studies (CECS) has received a grant from the League of Women Voters Education Fund (LWVUSEF) to conduct a community workshop on DOE nuclear waste management issues. This grant is part of a cooperative agreement between the LWVUSEF and the Department of Energy to form a National Dialogue that will develop national consensus values that will inform DOE decisions about waste management within the nuclear weapons complex. The National Dialogue consists of three phases: initial planning, pilot field workshops to prepare citizens for a national conversation, and the nation-wide dialogue itself which is intended to develop consensus values.

CECS will host one of four pilot field workshops for the National Dialogue, with partnering support from the League of Women Voters of the Cincinnati-Area Education Fund. The other three workshops will be sponsored by the Nez Perce Tribe, LWV Pocatello, Idaho, and LWV Washington State.

The CECS-sponsored workshop will be coordinated from Cincinnati and held on September 6th and 7th, 1997. Participation will include the neighbors of the following DOE installations: Fernald (OH), Mound (OH), Oak Ridge (TN), Paducah (KY), Portsmouth (OH), and Savannah River (SC). CECS will invite representatives from the following sectors from each site: grassroots citizens groups and advisory boards; labor representatives; community councils, local, state, tribal, and federal government representatives; health officials; environmental regulators; DOE officials; and university faculty.

Planning of the CECS-sponsored workshop has begun. Attached you will find the draft workshop agenda. Please review it and provide comments by calling Jennifer Hamilton at 513-556-4001, FAXing at 513-556-0899, or emailing at duffiejj@email.uc.edu

We hope that your organizations will participate in this discussion of DOE nuclear waste management during the workshop. We also invite your input throughout the planning process. Please contact us with any other ideas or suggestions.

DRAFT 7/97
National Dialogue Pilot Field Workshop
Sponsored by the League of Women Voters Education Fund

Hosted by University of Cincinnati's
Center for Environmental Communication Studies and
The League of Women Voters Education Fund of the Cincinnati Area

Contact: Jennifer Duffield Hamilton 513-556-4001

Starting the Dialogue: A Cross-site, Cross-perspective Discussion of Department of Energy Nuclear Waste Management Issues Facing the Country

DATE: September 6 - 7, 1997

LOCATION: Oak Ridge, TN / Knoxville, TN

PARTICIPANTS: Grassroots citizens groups and advisory boards, labor representatives, community councils, local, state, tribal, and federal government representatives, health officials, environmental regulators, DOE officials, and university faculty from the following sites:

Fernald, Ohio
Mound, Ohio
Oak Ridge, Tennessee
Paducah, Kentucky
Portsmouth, Ohio
Savannah River Site, South Carolina

WORKSHOP AGENDA

Friday, September 5, 1997

Participants arrive from Georgia, Kentucky, Ohio, South Carolina, and Tennessee.

7:00 - 9:00 p.m. **Reception** (Perspective papers, workshop agenda and handouts, and participant literature available)

Note: a table will be provided for workshop participants to set out newsletters, t-shirts, and other descriptive materials from their groups.

Note: name tags will be color coded by site.

Saturday, September 6, 1997

8:00 - 8:30 **Workshop Registration**
Breakfast Available

8:30 - 9:30 **What is the National Dialogue?**
(PRESENTERS: LWVEF REPRESENTATIVE; CENTER FOR ENVIRONMENTAL COMMUNICATION STUDIES REPRESENTATIVE)
1. LWVEF perspective: overview of design, goals, and programs of the National Dialogue
2. Why public participation?
   A. NEPA and other stakeholder involvement processes
   B. How the National Dialogue fits with existing processes
3. The role of the Pilot Field Workshops in the National Dialogue
4. Why develop consensus values and principles?
   Why develop a national perspective?
5. A "two-way" communication perspective for the workshop/ ground rules

9:30 - 12:30 **Local Perspective Sharing**

9:30 - 11:00 Local grassroots perspective (12 person panel)
- Fernald Site-Specific Advisory Board
- Savannah River Site-Specific Advisory Board
- Oak Ridge Reservation Site-Specific Advisory Board
- Paducah Site-Specific Advisory Board
- PRESS (Portsmouth Residents for Environmental Safety & Security)
- MESH (Mound Environmental Safety & Health)
- FRESH (Fernald Residents for Environmental Safety & Health)
- OREPA (Oak Ridge Environmental Peace Alliance)
- Energy Research Foundation
- Citizens for Environmental Justice
- Hanford Citizen
- Nevada Citizen

11:00 -11:30 Local labor perspective (6 people, 1 from each site)
11:30- 12:00 Local regulators perspective (6 people, 1 from each site)
12:00- 12:30 Local DOE perspective (6 people, 1 from each site)

12:30 - 1:30 Lunch (The discussion of site perspectives will informally continue over lunch. Each person will be asked to sit with people from another "site" and "sector." This will allow for more interaction time)

WASTE AREA GROUP 23

November 26, 1996

DOE's Revised Risk Calculations
Issued for EPA and KDEP Review

35H830-36.04.46 1126.938

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

November 26, 1996

Mr. Robert H. Daniell, Director
Division of Waste Management
Kentucky Department for Environmental Protection
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

Mr. Carl R. Froede Jr., P. G.
United States Environmental Protection Agency
Region IV
DOE Remedial Section
Federal Facilities Branch
Waste Management Division
100 Alabama Street, S. W.
Atlanta, Georgia 30303

REMEDIATION LEVELS FOR WASTE AREA GROUPING (WAG) 23 AND SOLID WASTE MANAGEMENT UNIT (SWMU) 1 OF WAG 27 AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP)

Dear Mr. Daniell and Mr. Froede:

During the November 19, 1996, path forward meeting held with the Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP) for the WAG 23 project, the EPA and KDEP agreed that Department of Energy (DOE) should move forward with an interim remedial action (IRA) for WAG 23 and SWMU 1 of WAG 27. DOE also agreed to provide the enclosed information which details the rationale supporting the proposed remediation levels.

The first enclosure, the Polychlorinated Biphenyls (PCB) package, summarizes the EPA's recent changes to the PCB toxicity value and the resulting effect to the current remediation project. As shown in the enclosures, a PCB remediation level of 25 parts per million will achieve the KDEP's $1x10^{-6}$ risk guidance for the current industrial worker. Based upon this remediation level, IRA for PCB-contaminated soils is planned at SWMUs 1, 56 and 80, and 57 and 81.

The second enclosure, the dioxin package, contains the congener-specific screening steps and a summary. Following the November 19 meeting, Mr. Froede verbally approved the DOE's approach to dioxin screening, on the condition that language be included in the decision documents indicating PCBs were not burned at these sites. (A copy of the dioxin package was previously sent to the EPA, at their verbal request, for review; therefore, the second enclosure is not being forwarded to the EPA.) Please note the DOE's approach to screening dioxin is consistent with published EPA risk methodology and comment 6 contained in the KDEP's November 7, 1996, letter on the draft document *Methods for Conducting Human Health Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant*. Remedial action for soil contaminated with 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin, the only dioxin congener which exceeds it remedial goal, is planned at SWMU 1 and 56 and 80.

As you are aware, this project is being conducted under a compressed schedule. In order to maintain the schedule proposed at the November 19 meeting, your approval of the enclosed information is requested by no later than December 20, 1996. If this approach does not meet your expectations, any questions or comments can be resolved at a meeting in mid-January.

If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

Sincerely,

for Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Alvarado

Enclosure

cc: P. A. Gourieux, LMES/Kevil
C. A. Hudson, LMES/Kevil
D. J. Wilkes, JEG/Kevil

PCB Package

FACT SHEET FOR THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY'S CHANGE IN THE POLYCHLORINATED BIPHENYL TOXICITY VALUE AND THE IMPACTS TO WASTE AREA GROUP 23 AND SOLID WASTE MANAGEMENT UNIT 1 OF WASTE AREA GROUP 27 AT THE PADUCAH GASEOUS DIFFUSION PLANT

The United States Department of Energy received a letter from Elmer Aiken of the United States Environmental Protection Agency (EPA) October 3, 1996, announcing the addition of a new toxicity value [i.e., cancer slope factor (SF)] for polychlorinated biphenyls (PCBs) to the EPA's toxicity database, the Integrated Risk Information System (IRIS). Below is a brief discussion of the change and the impact in relation to the calculation of residual risk associated with the remediation level (RL) for Waste Area Group (WAG) 23 soils. Included on the following page is a table that outlines these changes.

According to information presented in the IRIS database, the SF for PCB mixtures (e.g., Aroclor®-1260) has been reduced from 7.7 $(mg/kg\text{-}day)^{-1}$ to 1 $(mg/kg\text{-}day)^{-1}$. This reduction in the SF for PCBs reflects the EPA's recent reevaluation of the toxicity information, both existing and newly available. The reduced toxicity value is the central tendency SF, which is appropriate for estimating residual risk across an exposed population (i.e., current and future industrial workers). This revised SF is used to re-calculate the residual risk associated with the RL of 25 mg/kg (ppm) for PCB-contaminated soils in WAG 23. The same exposure parameters used in the previous calculation and presented in the feasibility study (FS) have been retained with only the SF being changed.

Using the former PCB toxicity value [i.e., 7.7 $(mg/kg\text{-}day)^{-1}$], the risks associated with the 25 ppm RL from the WAG 23 FS were calculated to be approximately 4×10^{-6} for a current industrial worker and 4×10^{-5} for a future industrial worker. Exchanging the former SF with the revised SF, the corresponding risks associated with the 25 ppm RL are 7×10^{-7} for a current industrial worker and 7×10^{-6} for a future industrial worker. As discussed previously, these calculations are based on the same exposure parameters previously used in the WAG 23 FS. Furthermore, as noted in the FS, the exposure time for a current industrial worker is actually much lower than that assumed for the RL residual risk calculation. Consequently, based on an exposure scenario for grounds keepers (i.e., those most likely to be frequently exposed to WAG 23 soils) and assuming an exposure rate of about four days per year for eight hours per day, the residual risk associated with the PCB RL is 1×10^{-7}.

Using the revised PCB SF, the RL identified in the WAG 23 FS for PCBs leaves residual risk well below the lower parameter (1×10^{-6}) of the EPA's risk range (i.e., 1×10^{-4} to 1×10^{-6}), for the current worker. The residual risk calculated for the future industrial worker just exceeds the upper parameter, although the risk remains within the above range. However, the residual risk for this receptor using the most likely exposure rate (discussed above), is below the upper parameter of the risk range. Consequently, the residual risk associated with the 25 ppm RL is below the *de minimus* risk guidance requested by the Kentucky Department for Environmental Protection (i.e., 1×10^{-6}).

Summary of Changes Resulting from the United States Environmental Protection Agency's New Polychlorinated Biphenyl Toxicity Value

	Value Included in the FS	Current Value
Exposure Parameters	No Change	No Change
Slope Factor	7.7 $(mg/kg\text{-}day)^{-1}$	1 $(mg/kg\text{-}day)^{-1}$
RL	25 ppm	25 ppm
Current Industrial Worker Risk Using EPA Default Values	4×10^{-6}	7×10^{-7}
Future Industrial Worker Risk Using EPA Default Values	4×10^{-5}	7×10^{-6}
Risk to an Actual Worker	9×10^{-7}	1×10^{-7}

Dioxin Package

ATTACHMENT 1

FACT SHEET FOR REFINING AREA AND VOLUME ESTIMATES AT WASTE AREA GROUP 23 AND SOLID WASTE MANAGEMENT UNIT 1 OF WASTE AREA GROUP 27 AT THE PADUCAH GASEOUS DIFFUSION PLANT

The United States Department of Energy (DOE) is preparing a Record of Decision (ROD) for Waste Area Group (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27 at the Paducah Gaseous Diffusion Plant (PGDP), Paducah, Kentucky. The latest version of the ROD will include refined area and volume estimates for polychlorinated biphenyls (PCBs), based on the recently conducted characterization of the affected SWMUs. Consistent with refining the area and volume estimates for PCBs, the DOE is proposing to refine the area and volume estimates for dioxin and furan contamination. The purpose of this letter is to outline the decision-making process used to refine the estimates for dioxins and furans.

The Proposed Remedial Action Plan (PRAP) for WAG 23 and SWMU 1 of WAG 27 includes a conservative estimate of the total volume of soil to be excavated during the remedial action phase. This volume includes total dioxin and furan concentrations that exceed the remedial goal (1.3 ppb) for the most toxic dioxin congener, 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD). The PRAP states that area and volume estimates may be refined further. The DOE proposes refining the area and volume estimates for soil contaminated with dioxins and furans by comparing the concentration of each dioxin and furan hit to its individual remedial goal, based on its toxicity equivalent to 2,3,7,8-TCDD (PCB-contaminated areas have already been refined, as presented in the addendum to the feasibility study (FS) report and will not be modified further). A table has been prepared (Attachment 2) which delineates these comparisons. Please note that those dioxins which exceed their remedial goals are in bold for distinct identification. The attached tables indicate that only one point at SWMU 1 (boring H050), and one point at SWMUs 56 and 80 (boring H037) exceed the remedial goal for dioxins and furans. Based on these comparisons, the area and volume estimates for soils contaminated with dioxins have significantly decreased. Also, furans were completely eliminated (Attachment 3). Consequently, the only areas requiring remediation are SWMUs 1, 56 and 80, and 57 and 81.

After excavation, samples will be collected to confirm the removal of PCBs greater than or equal to 25 ppm. Should confirmatory soil samples from the excavations detect PCBs greater than or equal to 25 ppm, additional soil will be excavated and more confirmatory samples will be collected and analyzed. In order to illustrate this decision-making process, a flow chart has been prepared (Attachment 4).

If you have any questions or require additional information, please call Carlos R. Alvarado at (502) 441-6804.

ATTACHMENT 2

COMPARISON OF DIOXIN AND FURAN CONCENTRATIONS IN SURFACE SOIL SAMPLES TAKEN AT WASTE AREA GROUP 23 AND SOLID WASTE MANAGEMENT UNIT 1 OF WASTE AREA GROUP 27 TO REMEDIAL GOALS

The following tables compare dioxin concentrations in soil samples collected at WAG 23 and SWMU 1 of WAG 27 (during Phase I and Phase II of the PGDP site investigations) to the remedial goals established for these chemicals in the WAG 23 FS. The information in these tables may be used to refine area and volume estimates for dioxins and furans.

The following is a summary of the results found in the comparison tables:

- SWMU 1. Only Sample 05044 from Station H050 had a detection of dioxin (2,3,7,8-TCDD, 1.43J µg/kg) that exceeded the remedial goal. However, since the concentration only slightly exceeded its remedial goal, it should be noted that the dioxin result is reported with a "J" validation qualifier, which indicates that the concentration is questionable. No sample had a detection of furan that exceeded a remedial goal.

- SWMUs 32 and 33. No sample had a detection of dioxin or furan that exceeded a remedial goal.

- SWMUs 56 and 80. Only Sample 05127 from Station H037 had a detection of dioxin (2,3,7,8-TCDD, 2.92 µg/kg) that exceeded the remedial goal. However, it should be noted that each of the results for this sample carry a validation code of "N" indicating that these results were not or could not be validated. No sample had a detection of furan that exceeded the remedial goal.

- SWMUs 57 and 81. No sample had a detection of dioxin or furan that exceeded a remedial goal.

- SWMU 74. No sample had a detection of PCB, dioxin, or furan that exceeded a remedial goal.

- SWMU 79. No sample had a detection of PCB, dioxin, or furan that exceeded a remedial goal.

According to United States Environmental Protection Agency guidance [*Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-dioxins and Dibenzo Furans (CDDs and CDFs), March 1989* (EPA/625-3-89/016)] the toxicity equivalencies of all other dioxin congeners (e.g., a total of 22 TCDD isomers) are zero. Therefore, while individual dioxin and furan congeners are compared to their remedial goals, those dioxin totals (e.g., total TCDD) that exceed the remedial goal for an individual dioxin congener are not identified as such in the tables.

These comparisons differ from those presented in the WAG 23 FS. The WAG 23 FS used a very conservative approach to identify the areas of dioxin and furan contamination that needed to be addressed. In the FS, a single remedial goal was used for all dioxin and furan

congeners. This approach led to identification of areas and volumes of marginal dioxin and furan contamination that do not need to be addressed. The cleanup of these areas and volumes would yield negligible benefit toward protection of human health and the environment.

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm

Station=H050 Sample=05044			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	1.43J	1.3	YES
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	2.33J	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	0.55J	2.7	NO
total-PCDF	1U	2.7	NO
total-TCDD	8.82J	1.3	NO
total-TCDF	1U	1.3	NO
Station=H051 Sample=05047			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	0.24J	1.3	NO
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	2.37J	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	0.22J	2.7	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm (Continued)

Station=H051 Sample=05047 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	1U	2.7	NO
total-TCDD	1.38J	1.3	NO
total-TCDF	1U	1.3	NO
Station=H052 Sample=05050			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
1,2,3,4,6,7,8-HpCDD	3.05	130	NO
2,3,7,8-TCDD	1U	1.3	NO
2,3,7,8-TCDF	1U	1.3	NO
total-HpCDD	5.35J	130	NO
total-HpCDF	0.78J	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	39.3J	1,300	NO
total-OCDF	1.8J	1,300	NO
total-PCDD	1U	2.7	NO
total-PCDF	1U	2.7	NO
total-TCDD	0.17J	1.3	NO
total-TCDF	1U	1.3	NO
Station=H208 Sample=14091			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not available

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm (Continued)

Station=H208 Sample=14091 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H209 Sample=14089			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
NR = Not detected at the detection limit
NP = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm (Continued)

Station=H210 Sample=14090			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H258 Sample=14026			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	0.2U	1.3	NO
2,3,7,8-TCDF	0.2U	1.3	NO
total-HpCDD	0.3U	130	NO
total-HpCDF	0.1U	130	NO
total-HxCDD	0.3U	13	NO
total-HxCDF	0.2U	13	NO
total-OCDD	2.7	1,300	NO
total-OCDF	0.2U	1,300	NO
total-PCDD	0.5U	2.7	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm (Continued)

Station=H258 Sample=14026 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	0.3U	2.7	NO
total-TCDD	0.2U	1.3	NO
total-TCDF	0.2U	1.3	NO
Station=H260 Sample=14032			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	0.1U	1.3	NO
2,3,7,8-TCDF	0.1U	1.3	NO
total-HpCDD	0.3U	130	NO
total-HpCDF	0.2U	130	NO
total-HxCDD	0.1U	13	NO
total-HxCDF	0.1U	13	NO
total-OCDD	3	1,300	NO
total-OCDF	0.1U	1,300	NO
total-PCDD	0.2U	2.7	NO
total-PCDF	0.1U	2.7	NO
total-TCDD	0.1U	1.3	NO
total-TCDF	0.1U	1.3	NO
Station=H355 Sample=14151			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm (Continued)

Station=H355 Sample=14151 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H356 Sample=14150			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm (Continued)

Station=H357 Sample=14161			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

Station=H358 Sample=14160			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 1 C-747-C Oil Landfarm (Continued)

Station=H358 Sample=14160 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J - Estimated concentration
U - Not detected at the detection limit
NR - Not reported
NA - Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 32 C-728 Clean Waste Oil Tank and SWMU 33 C-728 Motor Cleaning Facility

Station=H047 Sample=05034			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	1.44J	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO
total-PCDF	1U	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO

Station=H048 Sample=05037			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	3.29J	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 32 C-728 Clean Waste Oil Tank and SWMU 33 C-728 Motor Cleaning Facility (Continued)

Station=H048 Sample=05037 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	1U	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO
Station=H049 Sample=05040			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	1.84J	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO
total-PCDF	1U	2.7	NO
total-TCDD	2.24J	1.3	NO
total-TCDF	0.21J	1.3	NO
Station=H301 Sample=14050			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not available

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 32 C-728 Clean Waste Oil Tank and SWMU 33 C-728 Motor Cleaning Facility (Continued)

Station=H301 Sample=14050 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H302 Sample=14112			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 32 C-728 Clean Waste Oil Tank and SWMU 33 C-728 Motor Cleaning Facility (Continued)

Station=H303 Sample=14117			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

Station=H304 Sample=14115			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 32 C-728 Clean Waste Oil Tank and SWMU 33 C-728 Motor Cleaning Facility (Continued)

Station=H304 Sample=14115 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H304 Sample=14116			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H305 Sample=14114			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 32 C-728 Clean Waste Oil Tank and SWMU 33 C-728 Motor Cleaning Facility (Continued)

Station=H305 Sample=14114 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H306 Sample=14113			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site

Station=H034 Sample=04630			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	0.05U	1.3	NA
2,3,7,8-TCDF	0.04U	1.3	NA
total-HpCDD	0.27U	130	NO
total-HpCDF	0.16U	130	NO
total-HxCDD	0.11U	13	NO
total-HxCDF	0.09U	13	NO
total-OCDD	8.3	1,300	NO
total-OCDF	0.18U	1,300	NO
total-PCDD	0.13U	2.7	NO
total-PCDF	0.06U	2.7	NO
total-TCDD	0.05U	1.3	NO
total-TCDF	0.04U	1.3	NO

Station=H035 Sample=04632			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H035 Sample=04632 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H036 Sample=04633			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H037 Sample=05127			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	2.92	1.3	YES
2,3,7,8-TCDF	0.62J	1.3	NO
total-HpCDD	1	130	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H037 Sample=05127 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HpCDF	0.87J	130	NO
total-HxCDD	3.36	13	NO
total-HxCDF	5.2	13	NO
total-OCDD	3.54	1,300	NO
total-OCDF	1.71	1,300	NO
total-PCDD	24.9	2.7	NO
total-PCDF	35.03	2.7	NO
total-TCDD	37.2	1.3	NO
total-TCDF	21.05	1.3	NO
Station=H325 Sample=14088			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H326 Sample=14092			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H327 Sample=14093			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H327 Sample=14093 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H327 Sample=14094			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H328 Sample=14087			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H328 Sample=14087 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H330 Sample=14086			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H339 Sample=14060			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H343 Sample=14125			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H343 Sample=14125 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H344 Sample=14124			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H345 Sample=14123			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H345 Sample=14123 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H346 Sample=14121			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 56 C-540-A Polychlorinated Biphenyl Waste Staging Area and SWMU 80 C-540-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H347 Sample=14122			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 57 C-541-A Polychlorinated Biphenyl Waste Staging Area and SWMU 81 C-541-A Polychlorinared Biphenyl Spill Site

Station=H041 Sample=05055			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H042 Sample=05058			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	3.19	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 57 C-541-A Polychlorinated Biphenyl Waste Staging Area and SWMU 81 C-541-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H042 Sample=05058 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	1U	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO
Station=H043 Sample=05063			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	1U	1.3	NO
2,3,7,8-TCDF	1U	1.3	NO
total-HpCDD	0.44J	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	0.28J	13	NO
total-HxCDF	0.42J	13	NO
total-OCDD	12.63J	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1.06J	2.7	NO
total-PCDF	1.79J	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO
Station=H332 Sample=14083			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 57 C-541-A Polychlorinated Biphenyl Waste Staging Area and SWMU 81 C-541-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H332 Sample=14083 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H333 Sample=14080			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 57 C-541-A Polychlorinated Biphenyl Waste Staging Area and SWMU 81 C-541-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H334 Sample=14082			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H335 Sample=14084			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 74 C-340 Polychlorinated Biphenyl Spill Site

Station=H038 Sample=04610			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	0.01U	1.3	NO
2,3,7,8-TCDF	0.01U	1.3	NO
total-HpCDD	0.02U	130	NO
total-HpCDF	0.02U	130	NO
total-HxCDD	0.02U	13	NO
total-HxCDF	0.02U	13	NO
total-OCDD	9.9	1,300	NO
total-OCDF	0.01U	1,300	NO
total-PCDD	0.02U	2.7	NO
total-PCDF	0.02U	2.7	NO
total-TCDD	0.01U	1.3	NO
total-TCDF	0.01U	1.3	NO
Station=H039 Sample=04614			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	0.01U	1.3	NO
2,3,7,8-TCDF	0.01U	1.3	NO
total-HpCDD	0.02U	130	NO
total-HpCDF	0.01U	130	NO
total-HxCDD	0.02U	13	NO
total-HxCDF	0.01U	13	NO
total-OCDD	3.8	1,300	NO
total-OCDF	0.01U	1,300	NO
total-PCDD	0.02U	2.7	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 74 C-340 Polychlorinated Biphenyl Spill Site (Continued)

Station=H039 Sample=04614 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	0.01U	2.7	NO
total-TCDD	0.01U	1.3	NO
total-TCDF	0.01U	1.3	NO
Station=H040 Sample=04617			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	0.04U	1.3	NO
2,3,7,8-TCDF	0.04U	1.3	NO
total-HpCDD	0.04U	130	NO
total-HpCDF	0.04U	130	NO
total-HxCDD	0.06U	13	NO
total-HxCDF	0.04U	13	NO
total-OCDD	3.4	1,300	NO
total-OCDF	0.05U	1,300	NO
total-PCDD	0.06U	2.7	NO
total-PCDF	0.04U	2.7	NO
total-TCDD	0.04U	1.3	NO
total-TCDF	0.04U	1.3	NO
Station=H307 Sample=14053			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 74 C-340 Polychlorinated Biphenyl Spill Site (Continued)

Station=H307 Sample=14053 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H308 Sample=14118			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 74 C-340 Polychlorinated Biphenyl Spill Site (Continued)

Station=H309 Sample=14119			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H310 Sample=14120			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 74 C-340 Polychlorinated Biphenyl Spill Site (Continued)

Station=H310 Sample=14120 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H311 Sample=14077			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H312 Sample=14076			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 74 C-340 Polychlorinated Biphenyl Spill Site (Continued)

Station=H312 Sample=14076 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H337 Sample=14126			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 74 C-340 Polychlorinated Biphenyl Spill Site (Continued)

Station=H338 Sample=14127			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 79 C-611 Polychlorinated Biphenyl Spill Site

Station=H053 Sample=05067			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	1U	1.3	NO
2,3,7,8-TCDF	1U	1.3	NO
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	8.69J	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO
total-PCDF	1U	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO
Station=H054 Sample=05071			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	1.33	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 79 C-611 Polychlorinated Biphenyl Spill Site (Continued)

Station=H054 Sample=05071 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	1U	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO
Station=H055 Sample=05074			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	3.21	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO
total-PCDF	1U	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO
Station=H056 Sample=05077			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	1U	130	NO
total-HpCDF	1U	130	NO

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 79 C-611 Polychlorinated Biphenyl Spill Site (Continued)

Station=H056 Sample=05077 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-HxCDD	1U	13	NO
total-HxCDF	1U	13	NO
total-OCDD	1.82	1,300	NO
total-OCDF	1U	1,300	NO
total-PCDD	1U	2.7	NO
total-PCDF	1U	2.7	NO
total-TCDD	1U	1.3	NO
total-TCDF	1U	1.3	NO
Station=H320 Sample=14070			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 79 C-611 Polychlorinated Biphenyl Spill Site (Continued)

Station=H321 Sample=14069			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

Station=H322 Sample=14064			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 79 C-611 Polychlorinated Biphenyl Spill Site (Continued)

Station=H322 Sample=14064 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

ATTACHMENT 3

Areas and Volumes for Excavation at WAG 23 and SWMU 1 of WAG 27

Unit and Location	PCBs >25 ppm	2,3,7,8-TCDD >1.3 ppb	Total Area	Depth	Total *in situ* Volume		Total *ex situ* Volume (25% swell)	
SWMU 1:								
H050	none	(estimated) 625 ft^2	625 ft^2	0-1 ft	625 ft^3	(23 yd^3)	781 ft^3	(29 yd^3)
SWMUs 32 & 33:	none	none						
SWMUs 56 & 80:								
H037	none	(estimated) 625 ft^2	625 ft^2	0-1 ft	625 ft^3	(23 yd^3)	781 ft^3	(29 yd^3)
Grid no. 7	625 ft^2	none	625 ft^2	0-1 ft	625 ft^3	(23 yd^3)	781 ft^3	(29 yd^3)
Grid no. 9	625 ft^2	none	625 ft^2	0-1 ft	625 ft^3	(23 yd^3)	781 ft^3	(29 yd^3)
Grid no. 27	625 ft^2	none	625 ft^2	0-1 ft	625 ft^3	(23 yd^3)	781 ft^3	(29 yd^3)
SWMUs 57 & 81:								
Grid no. 33	2,500 ft^2	none	2,500 ft^2	0-1 ft	2,500 ft^3	(93 yd^3)	3,125 ft^3	(116 yd^3)
Project Totals:			5,625 ft^2					260 yd^3

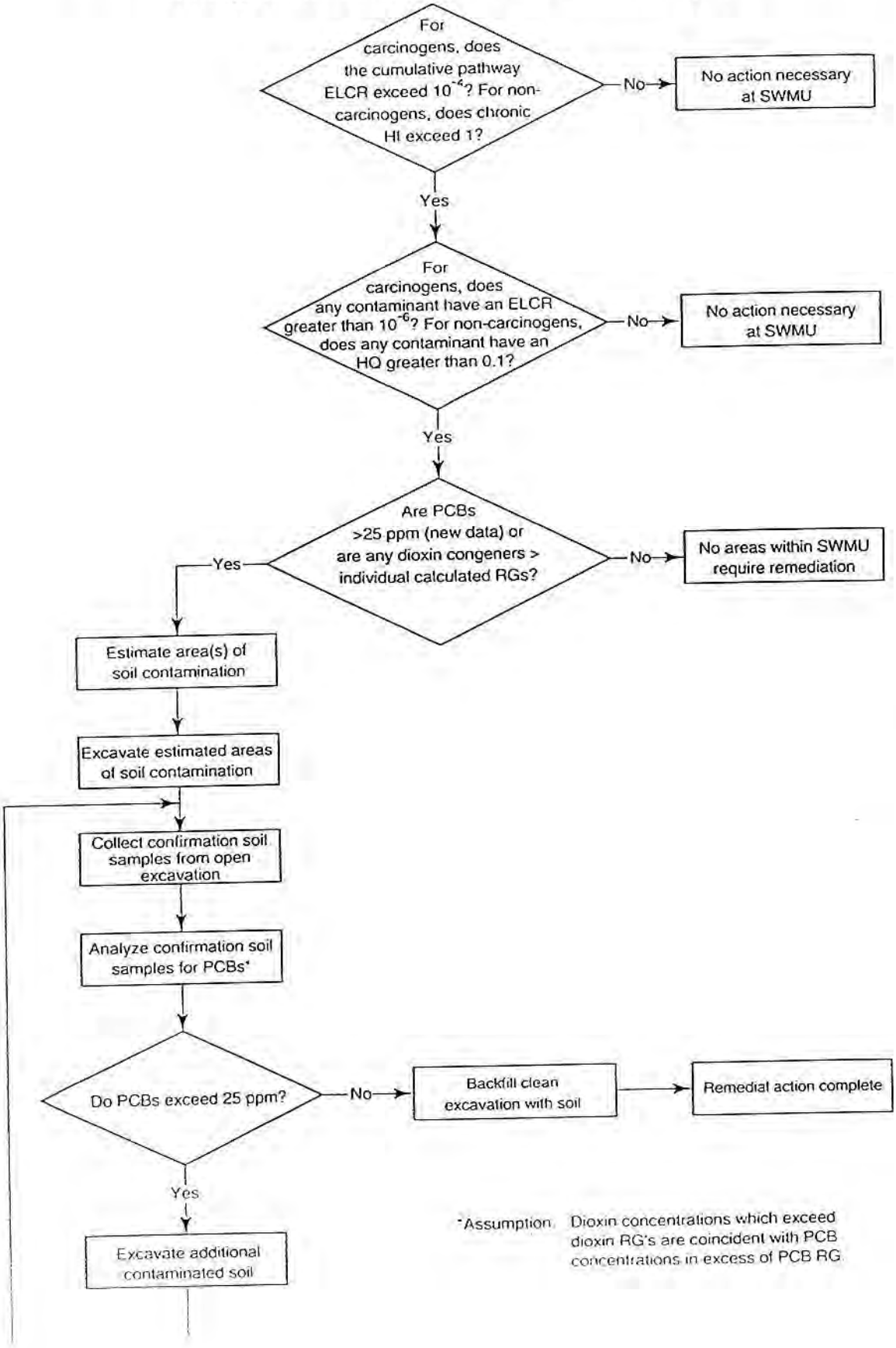
Notes:

PCB concentrations based on data presented in the *Soil Characterization Addendum to the Feasibility Study for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*.

Dioxin/furan concentrations based on data presented in the *Results of the Site Investigation, Phase I, Paducah Gaseous Diffusion Plant* and *Results of the Site Investigation, Phase II, Paducah Gaseous Diffusion Plant*. The only dioxin/furan congener to exceed an individual remedial goal was 2,3,7,8-TCDD

ATTACHMENT 4

Decision Tree for Remedial Action at Individual Solid Waste Management Units of Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27



*Assumption: Dioxin concentrations which exceed dioxin RG's are coincident with PCB concentrations in excess of PCB RG

Comparison of Remedial Goals for Individual Dioxin and Furan Congeners to Concentrations Found During the Phase I and Phase II Site Investigations at SWMU 57 C-541-A Polychlorinated Biphenyl Waste Staging Area and SWMU 81 C-541-A Polychlorinared Biphenyl Spill Site (Continued)

Station=H335 Sample=14084 (Continued)			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA
Station=H336 Sample=14085			
Chemical	Concentration (µg/kg)	Remedial Goals (µg/kg)	Exceeds Remedial Goals?
2,3,7,8-TCDD	NR	1.3	NA
2,3,7,8-TCDF	NR	1.3	NA
total-HpCDD	NR	130	NA
total-HpCDF	NR	130	NA
total-HxCDD	NR	13	NA
total-HxCDF	NR	13	NA
total-OCDD	NR	1,300	NA
total-OCDF	NR	1,300	NA
total-PCDD	NR	2.7	NA
total-PCDF	NR	2.7	NA
total-TCDD	NR	1.3	NA
total-TCDF	NR	1.3	NA

J = Estimated concentration
U = Not detected at the detection limit
NR = Not reported
NA = Not applicable

WASTE AREA GROUP 23

January 29, 1997

DOE's Response
to EPA and KDEP Comments
on DOE's 11/26/97 Risk Calculations

3SH830-36 C.A. 970129. 150

Department of Energy
Oak Ridge Operations
Paducah Site Office
P.O. Box 1410
Paducah, KY 42001

January 29, 1997

FEB 1997

Paducah Site Office

Mr. Robert H. Daniell, Director
Division of Waste Management
Kentucky Department for Environmental Protection
14 Reilly Road, Frankfort Office Park
Frankfort, Kentucky 40601

Mr. Carl R. Froede Jr., P. G.
United States Environmental Protection Agency
Region IV
DOE Remedial Section
Federal Facilities Branch
Waste Management Division
100 Alabama Street, S. W.
Atlanta, Georgia 30303

TRANSMITTAL OF THE COMMENT RESPONSE SUMMARY FOR REMEDIATION LEVELS FOR WASTE AREA GROUPING (WAG) 23 AND SOLID WASTE MANAGEMENT UNIT (SWMU) 1 OF WAG 27 AT THE PADUCAH GASEOUS DIFFUSION PLANT (PGDP), PADUCAH, KENTUCKY

Dear Mr. Daniell and Mr. Froede:

Enclosed you will find the subject comment response summary. Based on conversations with members of the University of Kentucky Federal Facilities Oversight Unit staff (Mr. Jack Stickney, Mr. John Maybriar, and Mr. Al Westerman), on January 17, 1997, it is the understanding of the Department of Energy (DOE) that submittal of this document serves as resolution to their comments and clears the path forward for a February 7, 1997, submittal for your approval of a D3 Proposed Remedial Action Plan (PRAP) for WAG 23 and SWMU 1 of WAG 27 at PGDP, which will move our program closer to a projected interim Record of Decision (ROD) for these Polychlorinated Biphenyls (PCB) Spill Sites in late spring of 1997. The changes to the DOE approach outlined in the comment response summary will be incorporated into the D3 Proposed Plan prior to submittal.

Additionally, in a response to a request for information by the Environmental Protection Agency (EPA) Region IV, based on all available information it is the position of the DOE that PGDP has never systematically or intentionally incinerated quantities of PCBs that would cause the production f high concentrations or promote contamination of wide spread areas of dioxin at the site. ·cifically regarding the PCB spill sites associated with this action, areas of dioxin contamination ·he result of catastrophic failures of electrical equipment and would be isolated in the area · the spill.

If the information presented in this letter does not address the issues associated with this action sufficiently to move forward with submittal of the PRAP, please notify Mr. Carlos R. Alvarado of my staff at (502) 441-6804 immediately so that we may respond in an expedient manner to your concerns.

Sincerely,

Jimmie C. Hodges, Site Manager
Paducah Site Office

EF-22:Alvarado

Enclosure

cc: P. A. Gourieux, LMES/Kevil
C. A. Hudson, LMES/Kevil
R. C. Sleeman, EW-91
T. Taylor, KDEP/Frankfort
D. J. Wilkes, JEG/Kevil

COMMENT RESPONSE SUMMARY

for the

Remediation Levels for Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Permit Number KY8-890-008-982

Prepared by
Jacobs Engineering Group, Inc.
175 Freedom Blvd. • Kevil, KY 42053
DE-AC05-93OR22028

Prepared for
United States Department of Energy
Environmental Restoration Division

COMMENT RESPONSE SUMMARY
Remediation Levels for
Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27
at the Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky.
Permit Number KY 8-890-008-982

Comment Number	Section Page/Para.	Reviewer and Comment	Response
1.		**Kentucky Department for Environmental Protection Agency:** **Cancer Slope Factor for Polychlorinated Biphenyls Mixtures (PCBs):** Although the recent re-evaluation of the toxicity information for PCBs appears to be more of an acquiescence to the political power of industry rather than an attempt to improve the science, several considerations indicate that the slope factor for this site should be the upper-bound slope factor of 2.0 $(mg/Kg\text{-}day)^{-1}$ rather than the central-estimate slope factor of 1.0 $(mg/Kg\text{-}day)^{-1}$ utilized. At a recent scientific meeting, (Society for Risk Analysis and International Society of Exposure Analysis Annual Meeting, December 8-12, 1996, New Orleans, Louisiana), Ms. Jeanette Wiltse and Mr. Scott Baker of EPA Headquarters presented information on the current status of the Cancer Risk Assessment Guidelines. They noted that, although they had proposed that the upper-bound and central-estimate slope factors be used in risk evaluations, the use of the central-estimate slope factor approach was 2-3 years away or perhaps much more from approval. That factor (central-estimate) had gathered more public comments than they have received on any proposed regulatory change in the Guidelines, and it would require years just to address those comments. In addition, the National Science Advisory Board had not reviewed the material and were not likely to receive it for review until, at the earliest, the end of next year. The use of this approach, central-estimate slope factor, appears very much premature for any location.	Noted. However, the slope factors published in the IRIS database are final and are available to the public. These numbers have been through a review by scientific work groups within the EPA prior to publication and presented at a public workshop in May 1996. All comments to the IRIS summary have been evaluated and included. Additionally, central-estimate values describe a typical individual's risk. Since these sites are industrial, sensitive individuals or groups are not likely to be present. Furthermore, since this is an operating industrial facility, institutional controls are in place to limit exposures. With regard to bioaccumulation, since the WAG 23 sites are located inside the security fence, the primary exposure pathways are likely direct contact and/or inhalation and not food-chain exposures.

COMMENT RESPONSE SUMMARY
Remediation Levels for
Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27
at the Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky.
Permit Number KY 8-890-008-982

Comment Number	Section Page/Para.	Reviewer and Comment	Response
1.		**Kentucky Department for Environmental Protection Agency:** **Cancer Slope Factor for Polychlorinated Biphenyls Mixtures (PCBs):** Although the recent re-evaluation of the toxicity information for PCBs appears to be more of an acquiescence to the political power of industry rather than an attempt to improve the science, several considerations indicate that the slope factor for this site should be the upper-bound slope factor of 2.0 $(mg/Kg\text{-}day)^{-1}$ rather than the central-estimate slope factor of 1.0 $(mg/Kg\text{-}day)^{-1}$ utilized. At a recent scientific meeting, (Society for Risk Analysis and International Society of Exposure Analysis Annual Meeting, December 8-12, 1996, New Orleans, Louisiana), Ms. Jeanette Wiltse and Mr. Scott Baker of EPA Headquarters presented information on the current status of the Cancer Risk Assessment Guidelines. They noted that, although they had proposed that the upper-bound and central-estimate slope factors be used in risk evaluations, the use of the central-estimate slope factor approach was 2-3 years away or perhaps much more from approval. That factor (central-estimate) had gathered more public comments than they have received on any proposed regulatory change in the Guidelines, and it would require years just to address those comments. In addition, the National Science Advisory Board had not reviewed the material and were not likely to receive it for review until, at the earliest, the end of next year. The use of this approach, central-estimate slope factor, appears very much premature for any location.	Noted. However, the slope factors published in the IRIS database are final and are available to the public. These numbers have been through a review by scientific work groups within the EPA prior to publication and presented at a public workshop in May 1996. All comments to the IRIS summary have been evaluated and included. Additionally, central-estimate values describe a typical individual's risk. Since these sites are industrial, sensitive individuals or groups are not likely to be present. Furthermore, since this is an operating industrial facility, institutional controls are in place to limit exposures. With regard to bioaccumulation, since the WAG 23 sites are located inside the security fence, the primary exposure pathways are likely direct contact and/or inhalation and not food-chain exposures.

COMMENT RESPONSE SUMMARY
Remediation Levels for
Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27
at the Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky.
Permit Number KY 8-890-008-982

Comment Number	Section Page/Para.	Reviewer and Comment	Response
1. (cont.)		Another consideration indicating the upper-bound slope factor (that has for many years been applied by EPA to carcinogens) should be used is information on environmental mixtures of PCBs. As noted in IRIS (1996), "It is crucial to recognize that commercial PCBs tested in laboratory animals were not subject to prior selective retention of persistent congeners through the food chain (that is, the rats were fed Aroclor mixtures, not environmental mixtures that had been bioaccumulated). Bioaccumulated PCBs appear to be more toxic than commercial PCBs (Auterich et al., 1986; Hornshaw et al., 1983) and to be more persistent in the body (Hovinga et al., 1992). For exposure through the food chain, risks can be higher than those estimated in this assessment." One of the primary concerns with PCBs at the Paducah Gaseous Diffusion Plant (PGDP) is the bioaccumulation of PCBs through the food chain. Therefore, it would be prudent and appropriate to provide as much protection as possible (i.e., the use of the currently accepted upper-bound slope factor for PCBs).	Agree. Food-chain exposures appear to be more toxic than commercial PCBs; however, as previously indicated, food chain exposures are not part of the conceptual site model. Also, food chain exposures and soil and/or sediment exposures are both part of the "High Risk and Persistence" tier; therefore, these pathways are considered equivalent in terms of exposure. Using the upper-bound versus the central-estimate slope factor is not based on the degree of protection, rather its use is indicative of the uncertainties in the risk assessment.
		The haste at which EPA moved toward lowering (less protective) the PCBs cancer slope factor is apparent by the study they relied upon for their re-evaluation (Brunner et al., 1996). When we (Kentucky Department for Environmental Protection, KYDEP) attempted to access the study, we discovered that the Battelle study was a draft document and was not available for review. The scientific peer-review process potentially will change some of the conclusions of the study. As noted previously, it appears that politics were as important as science in determining the recommended slope factors.	The re-evaluation of PCB carcinogenicity was based on numerous studies, one of which is Brunner, et. al., 1996. A workshop report was prepared (U.S. EPA. 1996c in IRIS) that evaluated and considered comments made to the EPA work group on this assessment. This document is available from the Risk Information Hotline.

COMMENT RESPONSE SUMMARY
Remediation Levels for
Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27
at the Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky.
Permit Number KY 8-890-008-982

Comment Number	Section Page/Para.	Reviewer and Comment	Response
2.		**Kentucky Department for Environmental Protection Agency:** **Calculations of Risk Based n a Cancer Slope Factor of 2.0 (mg/Kg-day)$^{-1}$:** As noted above, the appropriate slope factor to calculate risks at the site should be 2.0 (mg/Kg-day)$^{-1}$. Based on the use of that value, the summary Table (P.2) results in different risk levels for the current value column. The *de minimus* risk concentration in soils for the future industrial worker would be approximately 2.0 ppm. If PGDP is attempting to choose a clean-up soil concentration at a level of no further action for PCBs, the slope factor of 2.0 (mg/Kg-day)$^{-1}$ and a soil level of 2.0 mg/Kg PCBs should be applied at the facility. The use of 25 ppm PCBs represents an "interim" level rather than a "final".	The DOE feels that it is appropriate to use the central-tendency slope factor at these units due to the lack of sensitive receptors and the fact that the PGDP is an active industrial facility with proper controls to limit exposures. However, since the action being taken at these units is interim, the upper-bound will be used. Additionally, if the numbers provided by the KDEP are rounded per the EPA's guidance, the 25 ppm cleanup goal is within the KDEP's *de minimus* risk level at 1 x 10^{-6} for a current industrial worker.

COMMENT RESPONSE SUMMARY
Remediation Levels for
Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27
at the Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky.
Permit Number KY 8-890-008-982

Comment Number	Section Page/Para.	Reviewer and Comment	Response
3.		**Kentucky Department for Environmental Protection Agency:** **Dioxin Re-evaluation of Surface Soil Samples - Attachment 2:** A number of problems are apparent with the calculations and the data developed for soil dioxins/furans at Waste Area Group 23 and Solid Waste Management Unit 2 of Waste Area Group 27. The problems result in greater remedial goals concentrations than are appropriate based on the data. (A) We (KYDEP) agree with the use of EPA's toxicity equivalencies approach for combining the dioxin and furan congeners into a 2,3,7,8-Tetrachloro-p-dibenzo dioxin (2,3,7,8-TCDD)-based toxicity level. However, the method employed by PGDP is not equivalent to that approach. In the EPA (1989, EPA/625-3-89/016) guidance, each concentration of a congener is multiplied by a toxicity equivalent factor, the results are summed ant the summed, 2,3.7,8-TCDD toxicity-equivalent concentration is used in conjunction with the 2,3,7,8-TCDD slope factor and the risk algorithms to determine a risk level; or as in this case, a remedial "de minimus risk" goal level. Remedial goals should be based on the total dioxin/furan concentrations as 2,3,7,9-TCDD. If only one congener was present then the remedial goal approach chosen would be equivalent, however, a number of congeners were present in the samples making the approach invalid.	The purpose of the dioxin package was to provide a better definition of areas requiring remediation, not to define baseline risks. (A) Agree. The DOE inadvertently excluded OCDD from the TEF calculation in the original dioxin package. Consequently, the approach used was incorrect. These numbers have been recalculated according to the EPA's guidance (as outlined in this comment).

COMMENT RESPONSE SUMMARY
Remediation Levels for
Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27
at the Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky.
Permit Number KY 8-890-008-982

Comment Number	Section Page/Para.	Reviewer and Comment	Response
3. (cont.)		(B) The approach we (KYDEP) have applied and one that follows U.S. EPA guidance (1989. RAGS) is to calculate the total 2,3,7,8-TCDD equivalent concentration of dioxin/furans by including 1/2 the detection limit for congeners at or below the detection limits This is particularly important for the dioxin/furan group of chemicals because the commonly reported analytical detection limits are above the potential toxic levels of concern. Since almost any amount may be a problem, conservatism indicates the need to include all the data.	(B) This is typically the method used when calculating baseline risks. As previously noted, this dioxin package was merely an approach to provide a clearer definition of areas for remedial design (i.e., risk management decisions only). However, the DOE has recalculated the dioxin/furan concentrations to include 1/2 the detection limit for non-detects. As a result of KDEP's suggested changes, only one additional sample (number 05063, found at station H043 and associated with SWMUs 57 and 81) slightly exceeded the RL for 2,3,7,8-TCDD (at 1.7 µg/kg). However, several noteworthy items are associated with this exceedance. No 2,3,7,8-TCDD was identified in the sample at a detection limit of 0.21 µg/kg. Total pentachlordibenzo-p-dioxin and total pentachlorodibenzofuran concen-trations contribute to 84% of the total dioxin and furan value in the sample. Total pentachlorinated dibenzo-p-dioxin and penta-chlorinated dibenzofuran concentrations were multiplied by the TEFs for their toxic isomers when only 7% of the total pentachlorinated isomers are toxic (or three toxic isomers out of a total of 42). Therefore, if one-half of the total pentachlorinated number is used (an example that is still overly conservative), the total dioxin and furan toxicity equivalent

COMMENT RESPONSE SUMMARY
Remediation Levels for
Waste Area Grouping (WAG) 23 and Solid Waste Management Unit (SWMU) 1 of WAG 27
at the Paducah Gaseous Diffusion Plant, Paducah, McCracken County, Kentucky.
Permit Number KY 8-890-008-982

Comment Number	Section Page/Para.	Reviewer and Comment	Response
3. (cont.)			concentration becomes 0.96 µg/kg, well below the RG for 2,3,7,8-TCDD. Consequently, the DOE believes that not remediating this area for dioxins is an appropriate risk management decision.
		(C) Chemical analysis of samples should include all the major congeners of the dioxin/furan group. The "Not reported" (NR) designation is inappropriate. Either the congeners reported as NR were at or below the analytical detection limits or an incomplete analysis of contaminants present in the sample was made. The result is an incomplete picture of the potential effects.	(C) Agree. The "Not Reported" symbol was used to indicate that the sample was not run [for those samples where all congeners are reported as NR (e.g. sample 14091 at SWMU 1).]. These numbers should not have been included in the data set provided to KDEP and have been deleted from the data set. Those NRs that are present in samples that have other concentrations present (e.g. 2,3,7,8-TCDF in sample 05044 at SWMU 1) should have been non-detects. These NRs have been replaced with the appropriate detection limit and the U qualifier to indicate that they were not detected in the revised dioxin/furan calculations.

WASTE AREA GROUP 23

June 30, 1997

DOE's Finalized Dioxin Risk Calculations

JACOBS ENGINEERING
Engineers and Constructors

Jacobs Engineering Group Inc.
175 Freedom Blvd.
Kevil, Kentucky 42053
Telephone (502) 462-2550 • FAX (502) 462-2551

MEMORANDUM

DATE: June 30, 1997 JE/PAD/97-0188

TO: Carlos Alvarado, DOE
Julia Carter, LMES

FROM: Don J. Wilkes Patricia Barnhill for/

SUBJECT: **Final List of Dioxins which Exceed Remedial Goals at Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27**

A post-feasibility study (FS) report package titled *Remediation Levels for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27* was submitted to the United States Environmental Protection Agency (EPA) and the Kentucky Department for Environmental Protection (KDEP) November 26, 1996. The purpose of that package was to provide the regulatory agencies with the United States Department of Energy's (DOE's) rationale supporting the proposed remediation levels for dioxins and polychlorinated biphenyls at these units.

The DOE received comments on the package from the KDEP January 9, 1997 (the EPA had no comments on the package), and provided a comment response package January 17, 1997; however, recalculated dioxin remediation levels were not included in the package. The purpose of this memorandum is to provide the file with documentation of the recalculated dioxin remediation levels based on the KDEP's comments. Note that no dioxins exceed remediation levels (listed as remedial goals on the attachment) at Solid Waste Management Units (SWMUs) 32 and 33 even though the risk assessment included in the FS indicated that dioxins were chemicals of concern at these units. Since the levels of dioxins found at SWMUs 32 and 33 are below the remediation level, no remedial/removal action is necessary at these units to protect human health and the environment. The raw analytical data reports from Phase I and Phase II of the Site Investigation were reviewed to identify concentrations of individual dioxin/furan congeners not reported in the Waste Area Group (WAG) 23 Remedial Investigation (RI) Addendum. Additionally, where the data reported in the WAG 23 RI Addendum did not match the information from the raw data, the raw data were used as the default. Please note that Lockheed Martin Energy Systems, Inc. was involved in all phases of the comment resolution with the regulators.

If you have any questions regarding the information in this package, please contact David Shehee of my staff at (502) 462-2550.

Attachment

cc: Bob Carson
Bruce Ford
Gary Reside
Amy Shehee
David Shehee
Cathy Woehr
Document Control (2)

SWMU 1 C-747-C Oil Landfarm

Station=H050	Sample=05044				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	1.43J	1	1.43		
2,3,7,8-TCDF	0.23U	0.1	0.0115		
2,3,7,8-PeCDD	0.27U	0.5	0.0675		
1,2,3,7,8-PeCDF	0.09U	0.5	0.0225		
2,3,4,7,8-PeCDF	0.09U	0.05	0.00225		
2,3,7,8-HxCDD	0.11U	0.1	0.0055		
2,3,7,8-HxCDF	0.11U	0.1	0.0055		
2,3,7,8-HpCDD	0.01U	0.01	0.00005		
2,3,7,8-HpCDF	0.13U	0.01	0.00065		
OCDD	2.33J	0.001	0.00233		
OCDF	0.06U	0.001	0.00003		
Totals			1.54781	1.3	Yes

Station=H051	Sample=05047				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.24J	1	0.24		
2,3,7,8-TCDF	1U	0.1	0.05		
2,3,7,8-PeCDD	1U	0.5	0.25		
1,2,3,7,8-PeCDF	1U	0.5	0.25		
2,3,4,7,8-PeCDF	1U	0.05	0.025		
2,3,7,8-HxCDD	1U	0.1	0.05		
2,3,7,8-HxCDF	1U	0.1	0.05		
2,3,7,8-HpCDD	1U	0.01	0.005		
2,3,7,8-HpCDF	1U	0.01	0.005		
OCDD	2.37J	0.001	0.00237		
OCDF	1U	0.001	0.0005		
Totals			0.92787	1.3	No

Station=H052	Sample=05050				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.10U	1	0.05		
2,3,7,8-TCDF	0.10U	0.1	0.005		
2,3,7,8-PeCDD	0.06U	0.5	0.015		
1,2,3,7,8-PeCDF	0.03U	0.5	0.0075		
2,3,4,7,8-PeCDF	0.03U	0.05	0.00075		
2,3,7,8-HxCDD	0.19U	0.1	0.0095		
2,3,7,8-HxCDF	0.5U	0.1	0.025		
2,3,7,8-HpCDD	3.05	0.01	0.0305		
2,3,7,8-HpCDF	0.65U	0.01	0.00325		
OCDD	39.27J	0.001	0.03927		
OCDF	1.8J	0.001	0.0018		
Totals			0.18757	1.3	No

SWMU 1 C-747-C Oil Landfarm

Station=H258	Sample=14026				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.2U	1	0.1		
2,3,7,8-TCDF	0.2U	0.1	0.01		
2,3,7,8-PeCDD	0.5U	0.5	0.125		
1,2,3,7,8-PeCDF	0.3U	0.5	0.075		
2,3,4,7,8-PeCDF	0.3U	0.05	0.0075		
2,3,7,8-HxCDD	0.3U	0.1	0.015		
2,3,7,8-HxCDF	0.2U	0.1	0.01		
2,3,7,8-HpCDD	0.3U	0.01	0.0015		
2,3,7,8-HpCDF	0.1U	0.01	0.0005		
OCDD	2.7	0.001	0.0027		
OCDF	0.2U	0.001	0.0001		
Totals			0.3473	1.3	No

Station=H259	Sample=14023				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.1U	1	0.05		
2,3,7,8-TCDF	0.1U	0.1	0.005		
2,3,7,8-PeCDD	0.1U	0.5	0.025		
1,2,3,7,8-PeCDF	0.1U	0.5	0.025		
2,3,4,7,8-PeCDF	0.1U	0.05	0.0025		
2,3,7,8-HxCDD	0.4U	0.1	0.02		
2,3,7,8-HxCDF	0.1U	0.1	0.005		
2,3,7,8-HpCDD	2U	0.01	0.01		
2,3,7,8-HpCDF	0.1U	0.01	0.0005		
OCDD	4U	0.001	0.002		
OCDF	0.8U	0.001	0.0004		
Totals			0.1454	1.3	No

Station=H259	Sample=14024				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.2U	1	0.1		
2,3,7,8-TCDF	0.2U	0.1	0.01		
2,3,7,8-PeCDD	0.5U	0.5	0.125		
1,2,3,7,8-PeCDF	0.2U	0.5	0.05		
2,3,4,7,8-PeCDF	0.2U	0.05	0.005		
2,3,7,8-HxCDD	0.2U	0.1	0.01		
2,3,7,8-HxCDF	0.1U	0.1	0.005		
2,3,7,8-HpCDD	0.1U	0.01	0.0005		
2,3,7,8-HpCDF	0.1U	0.01	0.0005		
OCDD	2.6	0.001	0.0026		
OCDF	0.1U	0.001	0.00005		
Totals			0.30865	1.3	No

SWMU 1 C-747-C Oil Landfarm

Station=H260	Sample=14032				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.1U	1	0.05		
2,3,7,8-TCDF	0.1U	0.1	0.005		
2,3,7,8-PeCDD	0.2U	0.5	0.05		
1,2,3,7,8-PeCDF	0.1U	0.5	0.025		
2,3,4,7,8-PeCDF	0.1U	0.05	0.0025		
2,3,7,8-HxCDD	0.1U	0.1	0.005		
2,3,7,8-HxCDF	0.1U	0.1	0.005		
2,3,7,8-HpCDD	0.3U	0.01	0.0015		
2,3,7,8-HpCDF	0.2U	0.01	0.001		
OCDD	3	0.001	0.003		
OCDF	0.2U	0.001	0.0001		
Totals			0.1481	1.3	No

Station=H260	Sample=14033 (Duplicate of 14032)				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.1U	1	0.05		
2,3,7,8-TCDF	0.1U	0.1	0.005		
2,3,7,8-PeCDD	0.4U	0.5	0.1		
1,2,3,7,8-PeCDF	0.2U	0.5	0.05		
2,3,4,7,8-PeCDF	0.2U	0.05	0.005		
2,3,7,8-HxCDD	2U	0.1	0.1		
2,3,7,8-HxCDF	0.4U	0.1	0.02		
2,3,7,8-HpCDD	0.7U	0.01	0.0035		
2,3,7,8-HpCDF	0.7U	0.01	0.0035		
OCDD	5	0.001	0.005		
OCDF	0.8U	0.001	0.0004		
Totals			0.3424	1.3	No

SWMU 32 C-728 Clean Waste Oil Tank and SWMU 33 C-728 Motor Cleaning Facility

Station=H047	Sample=05034				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	1U	1	0.5		
2,3,7,8-TCDF	1U	0.1	0.05		
2,3,7,8-PeCDD	1U	0.5	0.25		
1,2,3,7,8-PeCDF	1U	0.5	0.25		
2,3,4,7,8-PeCDF	1U	0.05	0.025		
2,3,7,8-HxCDD	1U	0.1	0.05		
2,3,7,8-HxCDF	1U	0.1	0.05		
2,3,7,8-HpCDD	1U	0.01	0.005		
2,3,7,8-HpCDF	1U	0.01	0.005		
OCDD	1.44J	0.001	0.00144		
OCDF	1U	0.001	0.0005		
Totals			1.18694	1.3	No
Station=H048	Sample=05037				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.23U	1	0.115		
2,3,7,8-TCDF	0.14U	0.1	0.007		
2,3,7,8-PeCDD	0.42U	0.5	0.105		
1,2,3,7,8-PeCDF	0.08U	0.5	0.02		
2,3,4,7,8-PeCDF	0.05U	0.05	0.00125		
2,3,7,8-HxCDD	0.19U	0.1	0.0095		
2,3,7,8-HxCDF	0.04U	0.1	0.002		
2,3,7,8-HpCDD	0.07U	0.01	0.00035		
2,3,7,8-HpCDF	0.03U	0.01	0.00015		
OCDD	3.29J	0.001	0.00329		
OCDF	0.06U	0.001	0.00003		
Totals			0.26357	1.3	No
Station=H049	Sample=05040				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	1U	1	0.5		
2,3,7,8-TCDF	1U	0.1	0.05		
2,3,7,8-PeCDD	1U	0.5	0.25		
1,2,3,7,8-PeCDF	1U	0.5	0.25		
2,3,4,7,8-PeCDF	1U	0.05	0.025		
2,3,7,8-HxCDD	1U	0.1	0.05		
2,3,7,8-HxCDF	1U	0.1	0.05		
2,3,7,8-HpCDD	1U	0.01	0.005		
2,3,7,8-HpCDF	1U	0.01	0.005		
OCDD	1.84J	0.001	0.00184		
OCDF	1U	0.001	0.0005		
Totals			1.18734	1.3	No

SWMU 56 C-540-A PCB Waste Staging Area and SWMU 80 PCB Spill Site

Station=H034	Sample=04630				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.05U	1	0.025		
2,3,7,8-TCDF	0.04U	0.1	0.002		
2,3,7,8-PeCDD	0.13U	0.5	0.0325		
1,2,3,7,8-PeCDF	0.06U	0.5	0.015		
2,3,4,7,8-PeCDF	0.06U	0.05	0.0015		
2,3,7,8-HxCDD	0.11U	0.1	0.0055		
2,3,7,8-HxCDF	0.09U	0.1	0.0045		
2,3,7,8-HpCDD	0.27U	0.01	0.00135		
2,3,7,8-HpCDF	0.16U	0.01	0.0008		
OCDD	8.3	0.001	0.0083		
OCDF	0.18U	0.001	0.00009		
Totals			0.09654	1.3	No

Station=H037	Sample=05127				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	2.92	1	2.92		
2,3,7,8-TCDF	0.62J	0.1	0.062		
2,3,7,8-PeCDD	24.9	0.5	12.45		
1,2,3,7,8-PeCDF	35.03	0.5	17.515		
2,3,4,7,8-PeCDF	35.03	0.05	1.7515		
2,3,7,8-HxCDD	3.36	0.1	0.336		
2,3,7,8-HxCDF	5.2	0.1	0.52		
2,3,7,8-HpCDD	1	0.01	0.01		
2,3,7,8-HpCDF	0.87J	0.01	0.0087		
OCDD	3.54	0.001	0.00354		
OCDF	1.71	0.001	0.00171		
Totals			35.57845	1.3	Yes

SWMU 57 C-540-A PCB Waste Staging Area and SWMU 81 PCB Spill Site

Station=H042	Sample=05058				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.22U	1	0.11		
2,3,7,8-TCDF	0.04U	0.1	0.002		
2,3,7,8-PeCDD	0.28U	0.5	0.07		
1,2,3,7,8-PeCDF	0.26U	0.5	0.065		
2,3,4,7,8-PeCDF	0.26U	0.05	0.0065		
2,3,7,8-HxCDD	0.16U	0.1	0.008		
2,3,7,8-HxCDF	0.14U	0.1	0.007		
2,3,7,8-HpCDD	0.10U	0.01	0.0005		
2,3,7,8-HpCDF	0.18U	0.01	0.0009		
OCDD	3.19	0.001	0.00319		
OCDF	0.22U	0.001	0.00011		
Totals			0.2732	1.3	No
Station=H043	Sample=05063				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.21U	1	0.105		
2,3,7,8-TCDF	1U	0.1	0.05		
2,3,7,8-PeCDD	1.06J	0.5	0.53		
1,2,3,7,8-PeCDF	1.79	0.5	0.895		
2,3,4,7,8-PeCDF	1U	0.05	0.0025		
2,3,7,8-HxCDD	0.28J	0.1	0.028		
2,3,7,8-HxCDF	0.42J	0.1	0.042		
2,3,7,8-HpCDD	0.44J	0.01	0.0044		
2,3,7,8-HpCDF	0.44U	0.01	0.0022		
OCDD	12.63J	0.001	0.01263		
OCDF	0.85U	0.001	0.000425		
Totals			1.672155	1.3	Yes

SWMU 79 C-611 PCB Spill Site

Station=H053	Sample=05067				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.25U	1	0.125		
2,3,7,8-TCDF	0.16U	0.1	0.008		
2,3,7,8-PeCDD	0.25U	0.5	0.0625		
1,2,3,7,8-PeCDF	0.19U	0.5	0.0475		
2,3,4,7,8-PeCDF	0.19U	0.05	0.00475		
2,3,7,8-HxCDD	0.22U	0.1	0.011		
2,3,7,8-HxCDF	0.16U	0.1	0.008		
2,3,7,8-HpCDD	0.12U	0.01	0.0006		
2,3,7,8-HpCDF	0.25U	0.01	0.00125		
OCDD	8.69J	0.001	0.00869		
OCDF	0.20U	0.001	0.0001		
Totals			0.27739	1.3	No
Station=H054	Sample=05071				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.10U	1	0.05		
2,3,7,8-TCDF	0.04U	0.1	0.002		
2,3,7,8-PeCDD	0.16U	0.5	0.04		
1,2,3,7,8-PeCDF	0.15U	0.5	0.0375		
2,3,4,7,8-PeCDF	0.15U	0.05	0.00375		
2,3,7,8-HxCDD	0.15U	0.1	0.0075		
2,3,7,8-HxCDF	0.15U	0.1	0.0075		
2,3,7,8-HpCDD	0.12U	0.01	0.0006		
2,3,7,8-HpCDF	0.16U	0.01	0.0008		
OCDD	1.53	0.001	0.00153		
OCDF	0.10U	0.001	0.00005		
Totals			0.15123	1.3	No
Station=H055	Sample=05074				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	0.30U	1	0.15		
2,3,7,8-TCDF	0.05U	0.1	0.0025		
2,3,7,8-PeCDD	0.12U	0.5	0.03		
1,2,3,7,8-PeCDF	0.18U	0.5	0.045		
2,3,4,7,8-PeCDF	0.18U	0.05	0.0045		
2,3,7,8-HxCDD	0.13U	0.1	0.0065		
2,3,7,8-HxCDF	0.15U	0.1	0.0075		
2,3,7,8-HpCDD	0.17U	0.01	0.00085		
2,3,7,8-HpCDF	0.14U	0.01	0.0007		
OCDD	3.2	0.001	0.0032		
OCDF	0.04U	0.001	0.00002		
Totals			0.25077	1.3	No

SWMU 79 C-611 PCB Spill Site

Station=H056	Sample=05077				
Chemical	Concentration (µg/kg)	TEF	Sub totals (µg/kg)	RG (µg/kg)	Exceeds RG
2,3,7,8-TCDD	1U	1	0.5		
2,3,7,8-TCDF	1U	0.1	0.05		
2,3,7,8-PeCDD	1U	0.5	0.25		
1,2,3,7,8-PeCDF	1U	0.5	0.25		
2,3,4,7,8-PeCDF	1U	0.05	0.025		
2,3,7,8-HxCDD	1U	0.1	0.05		
2,3,7,8-HxCDF	1U	0.1	0.05		
2,3,7,8-HpCDD	1U	0.01	0.005		
2,3,7,8-HpCDF	1U	0.01	0.005		
OCDD	1.82	0.001	0.00182		
OCDF	1U	0.001	0.0005		
Totals			1.18732	1.3	No

DOE/OR/06-1423&D2

Feasibility Study for Waste Area Group 23 and Solid Waste Management Unit 1 of Waste Area Group 27 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

April 1996

DOE/OR/07-1149 & D2
KY/ER-32 & D2

Remedial Investigation Addendum for Waste Area Grouping 23, PCB Sites at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

REVISION 2
SEPTEMBER, 1994

SAE30688.R2.23 9/6/94 alk

DOE/OR/07-1233&D2

COMMUNITY RELATIONS PLAN
FOR THE ENVIRONMENTAL MANAGEMENT AND ENRICHMENT FACILITIES PROGRAM

PADUCAH GASEOUS DIFFUSION PLANT
Paducah, Kentucky

July 1997

CLEARED FOR PUBLIC RELEASE

DOE/OR/07-1233&D2

COMMUNITY RELATIONS PLAN
FOR THE
PADUCAH GASEOUS DIFFUSION PLANT
Paducah, Kentucky

Date Issued - July 1997

Prepared by
CH2M HILL INC.
Paducah, Kentucky
under General Order 18B-99345C
for
LOCKHEED MARTIN ENERGY SYSTEMS. INC.
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-84OR21400

For more information about this document or other public outreach activities, contact the individuals listed below:

Dennis Hill
Public Affairs Manager
Environmental Management and Enrichment Facilities
(502) 441-5099

Lockheed Martin Energy Systems
761 Veterans Avenue
Kevil, Kentucky 42053

Jeannie Brandstetter
Community Relations Specialist
Environmental Management and Enrichment Facilities
(502) 441-5105

Lockheed Martin Energy Systems
761 Veterans Avenue
Kevil, Kentucky 42053

CONTENTS

FIGURES v

TABLES v

APPENDICES vii

ACRONYMS ix

EXECUTIVE SUMMARY xi

1. OVERVIEW OF COMMUNITY RELATIONS PLAN 1-1
   1.1 Introduction 1-1
   1.2 Scope 1-1

2. SITE DESCRIPTION 2-1
   2.1 Site Location and History 2-1
   2.2 Discovery of Groundwater Contamination 2-4
   2.3 Water Policy 2-4
   2.4 Site Contamination Overview 2-5

3. ENVIRONMENTAL MANAGEMENT AND ENRICHMENT FACILITIES PROGRAM 3-1
   3.1 Introduction to EMEF and Applicable Environmental Laws 3-1
   3.2 Decontamination and Decommissioning of Inactive Facilities 3-2
   3.3 Site Management Plan 3-2
   3.4 Land Use 3-3
   3.5 EMEF Program Management 3-3

4. COMMUNITY BACKGROUND 4-1
   4.1 Community Profile 4-1
   4.2 History of Community Involvement 4-1
      4.2.1 Overview of Activities 4-1
      4.2.2 Medical Examination, Medical Surveillance Pilot, and Public Health Assessment 4-2
      4.2.3 Current Status of Community Involvement 4-3

5. COMMUNITY INTERVIEWS 5-1
   5.1 Introduction 5-1
   5.2 Scope 5-1
   5.3 General Attitudes 5-1
      5.3.1 Public Perception of PGDP Activities 5-1
      5.3.2 PGDP Public Outreach Ratings 5-2
      5.3.3 Public Outreach Methods 5-2
   5.4 Specific Concerns 5-3
      5.4.1 Human Health and Drinking Water 5-3
      5.4.2 Property Value 5-3
      5.4.3 Water Policy 5-3

5.4.4 Final Cleanup Plan and Schedule 5-3
5.4.5 Western Kentucky Wildlife Management Area 5-3
5.4.6 Conservative Attitudes 5-4
5.4.7 Future of PGDP 5-4
5.5 Addressing Concerns 5-4

6. HIGHLIGHTS OF THE COMMUNITY RELATIONS PROGRAM 6-1
6.1 Overview 6-1
6.2 Program Activities to Date 6-1
6.2.1 Personal Contacts and Designated Contact Person 6-1
6.2.2 Mailing List 6-4
6.2.3 Interviews 6-4
6.2.4 Information Bulletins 6-5
6.2.5 Public Meetings 6-5
6.2.6 Information Repository 6-6
6.2.7 Public Comment Periods 6-6
6.2.8 Administrative Record 6-6
6.2.9 Media 6-6
6.2.10 Community Boards, Councils, and Committees 6-7
6.2.11 Speakers Bureau 6-8
6.2.12 Plant Tours 6-9
6.2.13 Technical Assistance Grants 6-9
6.3 Potential Community Relations Activities 6-9
6.3.1 Suggestion Boxes 6-9
6.3.2 Local Cable Access 6-10
6.4 Community Relations Program Coordination and Timing 6-10

7. REFERENCES 7-1

FIGURES

Fig. 2.1 Plant Location 2-2
Fig. 2.2 Plant Layout and Boundaries 2-3

TABLES

Table 2.1 Summary of major site activities 2-5
Table 6.1 Summary of major community relations events 6-2
Table 6.2 Timing and implementation of community relations activities 6-10

APPENDICES

Appendix A	Information Repository
Appendix B	Paducah Gaseous Diffusion Plant Water Policy
Appendix C	Summary of Major Environmental Activities
Appendix D	Summary of Environmental Laws
Appendix E	Paducah Gaseous Diffusion Plant Community Relations Plan Questionnaire
Appendix F	List of Contacts and Interested Parties
Appendix G	Glossary

ACRONYMS

ACO	Administrative Consent Order
AIP	Agreement in Principle
AOC	Area of Concern
AR	Administrative Record
ARARs	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
AVLIS	Atomic Vapor Laser Isotope Separation
BTEX	benzene, toluene, ethylbenzene, and total xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (1980)
CMS	Corrective Measures Study
CRP	Community Relations Plan
CWA	Clean Water Act
CX	categorical exclusion
D&D	decontamination and decommissioning
DNAPL	dense nonaqueous-phase liquid
DOE	U.S. Department of Energy
EA	environmental assessment
EE/CA	Engineering Evaluation/Cost Analysis
EIS	environmental impact statement
ER	Environmental Restoration
EMEF	Environmental Management and Enrichment Facilities
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement (under CERCLA)
FFCA	Federal Facility Compliance Agreement (under TSCA)
FONSI	finding of no significant impact
FS	Feasibility Study
HRS	Hazard Ranking System
HSWA	Hazardous and Solid Waste Amendments
KPDES	Kentucky Pollutant Discharge Elimination System
LMES	Lockheed Martin Energy Systems, Inc.
LMUS	Lockheed Martin Utility Services, Inc.
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEPA	National Environmental Policy Act
NOV	notice of violation
NPL	National Priorities List
ORO	Oak Ridge Operations
OU	Operable Unit

PA	preliminary assessment
PCB	polychlorinated biphenyl
PGDP	Paducah Gaseous Diffusion Plant
PHEA	Public Health and Ecological Assessment
ppb	parts per billion
ppm	parts per million
PRP	potentially responsible party
PRAP	Proposed Remedial Action Plan
RA	remedial action
RCRA	Resource Conservation and Recovery Act of 1976
RD	remedial design
RFI	RCRA Facility Investigation
RI	remedial investigation
ROD	record of decision
SARA	Superfund Amendments and Reauthorization Act of 1986
SI	Site Inspection
SMP	Site Management Plan
SWMU	solid waste management unit
TAG	Technical Assistance Grant
^{99}Tc	technetium-99
TCE	trichloroethylene or trichloroethene
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
UST	underground storage tank
WAG	Waste Area Grouping
WKWMA	West Kentucky Wildlife Management Area

EXECUTIVE SUMMARY

This Community Relations Plan (CRP) describes a program for conducting community relations activities related to the U.S. Department of Energy (DOE) Environmental Management and Enrichment Facilities (EMEF) program at the Paducah Gaseous Diffusion Plant (PGDP) in western Kentucky. This plan updates and expands the CRP released in March 1989 that addressed the initial phases of a groundwater-contamination investigation at the plant. The 1989 CRP is being revised and expanded to update information regarding EMEF program activities, identify changes in community concerns, assess the effectiveness of community relations activities to date, and plan additional activities to meet the current and future needs of the community. The plan will be implemented through the public affairs office by the manager for EMEF at Lockheed Martin Energy Systems , Inc. (LMES), with DOE oversight.

LMES representatives interviewed a cross section of Paducah residents during the week of November 18, 1996. Interviews were conducted with individuals from the following categories:

- Local officials/community leaders
- Media (newspaper, radio, and television)
- PGDP neighbors and area residents
- Members of the Neighborhood Council, Site Specific Advisory Board, and Environmental Advisory Committee
- Randomly selected individuals

These individuals included environmental activists, homemakers, local business people, plant workers, and students. All of the 1996 respondents were aware of PGDP, and a distinct majority stated that their overall impression of the plant was positive. With few exceptions, everyone interviewed was aware, to some extent, of the environmental activities taking place at the plant and the DOE water policy that provides municipal drinking water to the residents who are affected, or potentially affected, by the groundwater contamination.

A variety of concerns regarding the plant were shared that included property values, economic opportunities, recreation, wildlife, cost of the cleanup, plant closure, and internal plant management. The most frequently cited areas of concern were human health and drinking water issues. Most respondents said their attitudes about PGDP have either not changed or have become more positive over time.

The 1996 round of community interviews concluded that there is a high level of community awareness regarding PGDP: 100% of respondents were aware of the plant's existence in their community. PGDP neighbors, environmental activists, local officials, and the media showed the highest level of understanding about and involvement with the environmental activities at the plant. Many other respondents, although not actively involved, expressed interest in being kept informed about the activities through newsletters and media coverage.

Community relations outreach activities to date include the following:

- Personal contact between PGDP and the public
- Maintaining a mailing list to disseminate public information
- Conducting interviews
- Producing information bulletins
- Holding public meetings
- Maintaining an information repository
- Publishing information about environmental activities through local media and announcing public comment periods for major documents
- Offering access to the Administrative Record
- Chartering and/or promoting community special interest groups
- Providing public speakers
- Conducting plant tours

In addition to the above, future community outreach activities may include establishing suggestion boxes for anonymous comment and using local cable television programming to present PGDP environmental activities and progress to date.

1. OVERVIEW OF COMMUNITY RELATIONS PLAN

1.1 INTRODUCTION

This Community Relations Plan (CRP) describes a program for conducting community relations activities related to the Environmental Management and Enrichment Facilities (EMEF)[1] program at the Paducah Gaseous Diffusion Plant (PGDP) in western Kentucky. This plan updates and expands the CRP released in March 1989 that addressed the initial phases of a groundwater-contamination investigation at the plant. A copy of the original 1989 CRP is available for review at the Information Repository of the U.S. Department of Energy (DOE) Environmental Information Center in Kevil, Kentucky (see Appendix A for the address and telephone number). The 1989 CRP is being revised and expanded to update information regarding EMEF program activities, identify changes in community concerns, assess the effectiveness of community relations activities to date, and plan additional activities to meet the current and future needs of the community.

DOE has established the EMEF program to investigate, clean up, and comprehensively manage contamination from past operations at all DOE facilities. The scope of this document covers community relations activities as they relate to environmental restoration and waste management efforts under the EMEF program at Paducah. The CRP will help DOE meet its commitment to public involvement during the cleanup and permitting activities being conducted under the EMEF program.

1.2 SCOPE

The information in this CRP is based primarily on the following:

- Formal interviews with residents, elected officials, and community-based groups affiliated with the DOE environmental program
- Facts provided by the DOE community relations staff
- Documents available to the public, including reports from remedial activities at PGDP, the February 1996 draft *PGDP Site Management Plan*, and the October 1996 draft *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant*

This CRP has been prepared in accordance with the following guidance manuals issued by the U.S. Environmental Protection Agency (EPA) Office of Emergency and Remedial Response:

- *Community Relations in Superfund: A Handbook* (Directive 9230.0-03C)
- *Guidance on Public Involvement in the RCRA Program* (Directive 9901.3)

---

[1] The Environmental Management and Enrichment Facilities (EMEF) program was previously called the Environmental Restoration and Waste Management (ERWM) program.

The plan will be implemented through the public affairs office by the manager for EMEF of Lockheed Martin Energy Systems (LMES), Inc., with DOE oversight.

Community relations objectives will be met by providing the community with information about current and planned environmental activities at PGDP, and encouraging public input and comments on these activities. The CRP is organized into the following sections:

- Overview
- Site description
- EMEF Program
- Community background
- Key community concerns
- Highlights of the community relations program

Supplemental information in the appendices includes material on the following:

- Information Repository
- DOE PGDP water policy
- Summary of major environmental activities
- Applicable environmental regulations
- Results of November 1996 interviews
- List of contacts and interested parties
- Glossary

2. SITE DESCRIPTION

2.1 SITE LOCATION AND HISTORY

PGDP is an operating uranium enrichment facility that includes 748 fenced acres within a DOE reservation of approximately 3,556 acres. The plant is in McCracken County in far western Kentucky, approximately 3 miles south of the Ohio River, as shown in Fig. 2.1. The layout and boundaries of the site are shown in Fig. 2.2.

The closest communities to PGDP are the unincorporated towns of Grahamville (about 1 mile east) and Heath (about 1 mile southeast). The closest communities with public water supplies are Kevil, Kentucky (about 3 miles southwest), and Metropolis, Illinois (about 4 miles northeast, across the Ohio River). Paducah, Kentucky is approximately 12 miles east of the plant. The population of the greater Paducah area, based on the 1990 U.S. census, is about 27,400. The total population of McCracken County (251 square miles) is about 62,800.

The area surrounding the plant is mostly agricultural and open land, with some forested areas. Homes are scattered along rural roads around the plant. The Tennessee Valley Authority (TVA) Shawnee Steam Plant, adjacent to the northeast border of the DOE reservation, is the only other major industrial facility in the immediate area. An Allied Signal Plant across the Ohio River near Metropolis, Illinois, produces feed material for PGDP.

As shown in Fig. 2.1, the DOE tract includes approximately 1,986 acres that are licensed to the Commonwealth of Kentucky Department of Fish and Wildlife Resources as part of the West Kentucky Wildlife Management Area (WKWMA). The WKWMA is an important recreational resource for western Kentucky and is used by more than 10,000 people each year. Major recreational activities include hunting deer and small game, field trials for dogs and horses, trail riding, fishing, skeet shooting, and camping.

The plant is in the drainage areas of Big Bayou Creek and Little Bayou Creek, which flow around the western and eastern boundaries of PGDP. The two streams converge about 3 miles north of PGDP and flow into the Ohio River. Much of the water in both creeks, especially during dry weather, comes from controlled discharges at the plant. PGDP is above an 80-foot-deep gravel aquifer that provides water to private residential wells.

Before the plant was built, a munitions-production facility, the Kentucky Ordnance Works (KOW), operated in an area southwest of the plant. Munitions, including trinitrotoluene, were manufactured and stored at the KOW between 1941 and 1946. The site was shut down immediately after World War II and later became part of the WKWMA. DOE performed preliminary investigations at the site and turned the information over to the U.S. Army Corps of Engineers (COE). COE has conducted public meetings describing their work at the site and seeking public input.

PGDP was constructed from 1951 to 1954, and production began in 1952. The plant was operated by Union Carbide until 1984, when Martin Marietta Energy Systems, Inc., was contracted to operate the plant for DOE. In July 1993, the U.S. Enrichment Corporation (USEC) became responsible for managing production. At that time, Lockheed Martin Utility Services, Inc. (LMUS), was created to serve USEC as its operations and maintenance contractor, and LMES was named as the management and operations contractor. Although USEC continues to enrich uranium for

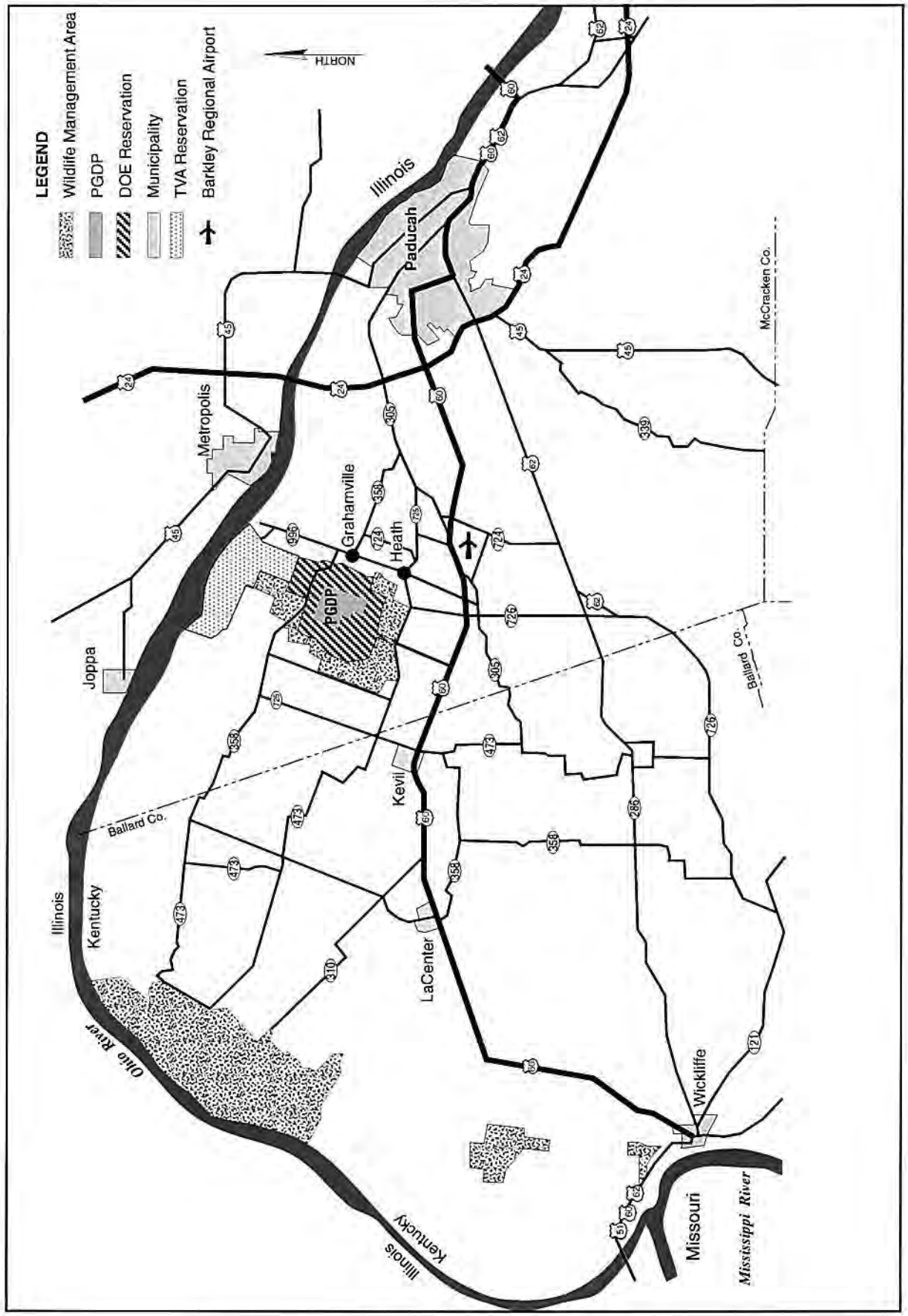


Fig. 2.1. Plant Location.

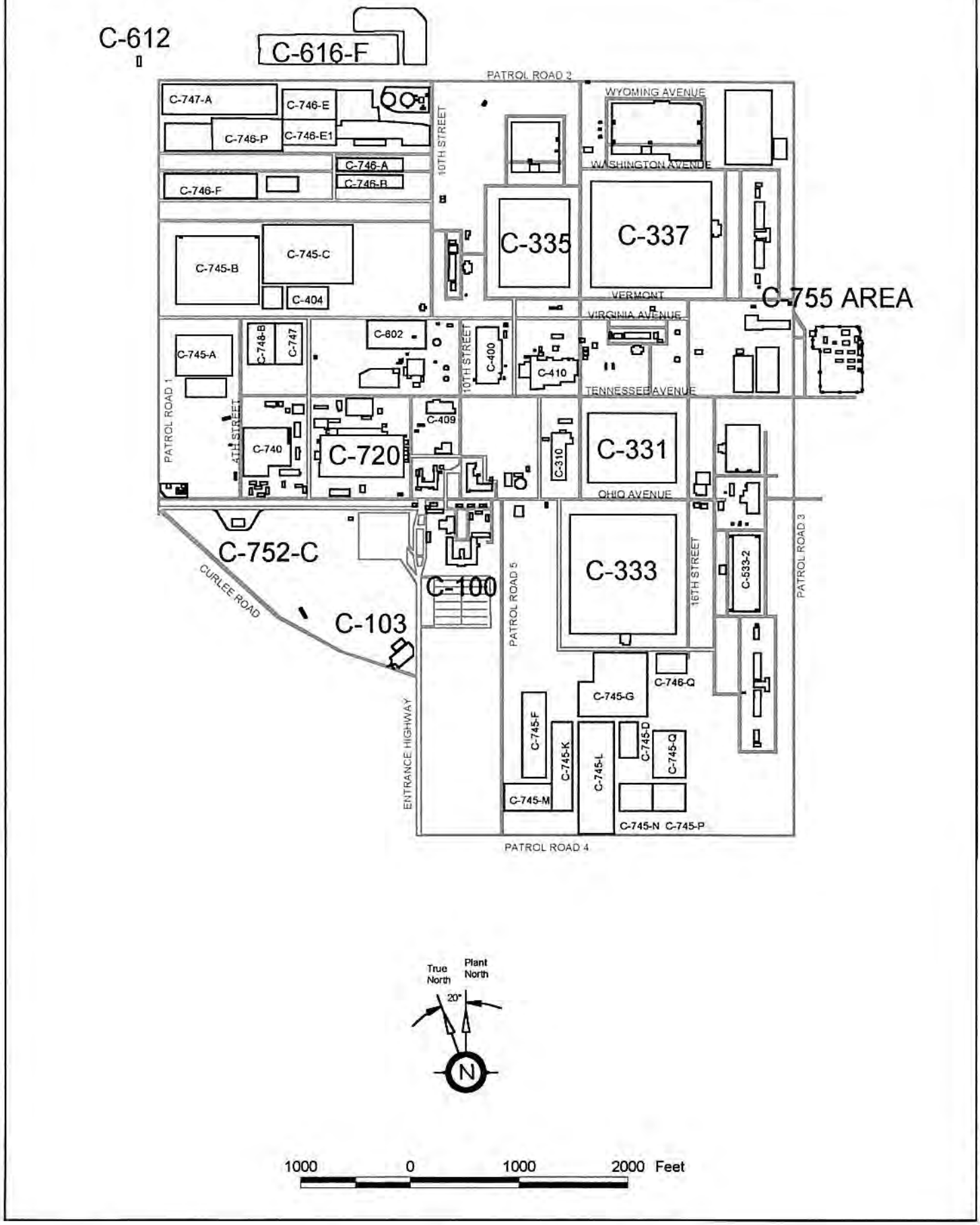


Fig. 2.2 Plant Layout and Boundaries.

commercial nuclear power use, DOE owns the plant and property and still oversees environmental restoration and waste management activities. The plant is a significant regional employer, providing work for approximately 1,850 people from 20 counties in 4 states (Kentucky, Illinois, Missouri, and Tennessee). The annual payroll totals more than $70 million.

2.2 DISCOVERY OF GROUNDWATER CONTAMINATION

In August 1988, in response to questions from residents about the quality of their water, the Purchase District Health Department (in conjunction with the Cabinet for Health Services, Department for Public Health, Radiation Control Branch) sampled residential wells north of PGDP. Elevated concentrations of gross beta contamination, indicating radionuclides, were identified in the samples. PGDP, once informed of the results of the analyses, sampled additional private groundwater wells. The samples were analyzed for trichloroethene (TCE), an industrial degreaser, and for technetium-99 (^{99}Tc), a product of nuclear fission that has been reprocessed from spent nuclear reactor fuel.

As a result of the plant's sampling, DOE provided potable water to the potentially affected residents via a centrally located water truck. Four residences where wells had detectable TCE or ^{99}Tc were each furnished with a 1,000-gallon water tank connected directly to the house's plumbing. These tanks were later replaced with a permanent connection to public water.

2.3 WATER POLICY

In response to the contamination, a water policy was implemented that stated that municipal water from the West McCracken Water District would be provided free of charge to any resident whose well became contaminated with TCE or ^{99}Tc. Since 1988, two additional wells were identified as containing detectable concentrations of TCE and ^{99}Tc, for a total of six residential wells (north of the plant) with contamination. The six wells served seven residences, and DOE supplied municipal water to those households.

In 1993, the water policy was revised. The new policy offered free municipal water to all existing private residences and businesses within or adjacent to the area of potential groundwater contamination. This "water policy area" is bounded generally by the Ohio River to the north of PGDP, Metropolis Lake Road to the east, and Bethel Church Road to the west. South of the plant, the water policy area extends to the limits of DOE property. As of December 1996, 97 residences were supplied with municipal water. Households receiving free water do not use existing wells or dig new wells in accordance with a licensing agreement entered into with DOE, and must allow DOE personnel access to their properties to collect water samples from their wells. All wells at a residence where DOE provides municipal water have been locked and capped, or abandoned.

DOE will pay all reasonable costs of water for users in this area through December 1997, at which time the policy will be reevaluated and either continued, modified, or ended. Those who now live outside the water policy area or who moved into the area after November 1, 1993, may hook up to municipal water at their own expense and must pay their own water bills. If additional wells become contaminated and municipal water is not already being provided, DOE will immediately provide an alternate water supply and connect the affected residences to municipal water as soon as possible. PGDP samples groundwater from residential and monitoring wells on a regular basis. EMEF personnel will visit each residence and explain the revised policy before offering the agreement to the resident for signature.

After DOE reevaluates the water policy in December 1997, the plant will contact those affected residences via phone, mail, or personal visit. This communication will include the name of a contact person and phone number to call in case of future questions. A copy of the water policy is provided in Appendix B.

2.4 SITE CONTAMINATION OVERVIEW

Past operations at PGDP generated hazardous wastes as by-products of the enrichment process, and some wastes were released into the environment. The areas where releases originally occurred are referred to as solid waste management units (SWMUs) and Areas of Concern (AOCs). In general, SWMUs and AOCs are typically areas such as waste burial grounds, spill sites, and underground storage tanks (USTs). Some contaminants have moved into the surrounding soil and, in some cases, into the underlying groundwater and adjacent surface waters.

As of October 1996, 208 SWMUs and AOCs had been identified at the plant as a result of the groundwater investigation and other related environmental activities. Others may be identified as environmental work continues. Not all of the sites have been confirmed as contributing to contamination, but all require at least some degree of evaluation, and many will require remediation (such as cleanup or isolation) or closure.

Because the contamination problems at PGDP are technically complex and many sites need to be evaluated with limited resources, the EMEF program has developed a long-term strategy for remediation. The strategy involves setting priorities for studying the sites, reducing risks as early as possible through interim remedial actions, and phasing remediation by dividing cleanup response actions into discrete units, called Waste Area Groupings (WAGs) that can be dealt with incrementally.

As a part of this strategy, the numerous SWMUs and AOCs at the plant have been grouped into WAGs based on factors such as geographic location, contaminant type, media (soil, groundwater, and surface water), and common remedial alternatives or timing. The WAGs are ranked for study and cleanup on the basis of their potential to contribute to human health problems and/or offsite contamination.

Table 2.1 summarizes environmental activities that have occurred since 1988. More detailed information regarding environmental site activities can be found in Appendix C, as well as in the PGDP Site Management Plan (SMP) and other technical documents that are maintained in the Information Repository at the Environmental Information Center listed in Appendix A.

Table 2.1. Summary of major site activities

Date		Activity
1988	August 9	Paducah Gaseous Diffusion Plant (PGDP) notified of possible groundwater contamination from PGDP
	August 9-11	Plant conducted sampling and confirmed that groundwater had been contaminated with trichloroethene (TCE), an industrial solvent, and technetium-99 (Tc-99), a man-made radioactive element

Table 2.1 (continued)

Date		Activity
	August 12	Bottled water and water trucks supplied in response to contamination: 10 area households advised not to drink or bathe in water from their wells
	August	Five of the 10 households were allowed to return to use of their wells after no contamination was found
	August 20	Interim water supply (water tanks) furnished to affected residences
	August	PGDP begins routinely sampling area residential water wells
	November 23	Administrative Consent Order (ACO), between the U.S: Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA), approved with participation by the Commonwealth of Kentucky
	November	Municipal water line completed; five residences furnished water by DOE
	December	Elevated levels of polychlorinated biphenyls (PCBs) detected in fish from Big Bayou Creek. Subsequent sampling and analyses were conducted by the University of Kentucky in a DOE-sponsored program
1989	February	A fifth well was identified and residents were provided with municipal water
	May	Phase I of ACO site investigation to evaluate nature and extent of offsite contamination began
	June	Initiation of Agreement in Principle (AIP) - DOE activity oversight by University of Kentucky and Kentucky Division of Waste Management personnel
1990	November	Phase II of ACO site investigation to evaluate onsite sources of offsite contamination began
1991	March	Final report of Phase I of ACO site investigation issued
	May	Contaminants found in one additional residential well; municipal water supplied (for a total of six residential wells with detected contaminants)
	June	Phase I of ACO site investigation report approved as final by EPA
	October	Draft report on Phase II of ACO site investigation issued
	November	Draft reports on alternatives evaluation and public health and environment assessment issued
	December	Draft report detailing and evaluating a preliminary range of alternatives for remediation of off-site contamination issued
1992	May	Approximately 50 landowners around plant contacted to obtain license agreements to enter their property for an environmental assessment to help plan off-site environmental restoration and waste management projects
		Draft interim corrective measure work plan for hydraulic containment and treatability test of northwest plume issued

Table 2.1 (continued)

Date		Activity
	August	License agreements with landowners obtained for drilling and sampling to better characterize northwest plume
		Carbon filters furnished by DOE to two homes where wells were found to contain TCE from a source not related to plant activities
	December	Draft *Environmental Restoration Program Site Management Plan* issued
1993	January	Permission obtained from landowners for drilling and sampling to characterize northeast plume more accurately
	March	Proposed revision to water policy, furnishing water to all residences within a defined geographic area, sent to EPA and state for comments
		Site-Specific Plan (PGDP's part of DOE's 5-year plan for environmental restoration and waste management) issued
	April	Draft Federal Facilities Agreement (FFA) for the PGDP issued
	May 10	*Federal Register* notice proposing to add PGDP to the National Priorities List (NPL, or "Superfund" sites) issued by EPA
	June/July	Proposed plan for an interim remedial action to contain contaminated groundwater in the northwest plume issued
	July	Record of decision (ROD) signed for interim remedial action of the northwest plume
		Formation of U.S. Enrichment Corporation/Lockheed Martin Utility Services
	November 1	DOE began paying water bills for 73 residences in the vicinity of the plant
	December	Remedial investigation (RI) fieldwork began on Waste Area Groupings (WAGs) 1 and 7
1994	January	Construction of Phase 2 of the water-line extension began
		Construction of the hydraulic containment of the northwest plume began
		ROD signed for interim remedial action of the North/South diversion ditch
	April	Construction of silt containment around scrapyards and ditches started
	May	Phase 2 of municipal water-line construction completed
		PGDP placed on NPL
	August	DOE extended municipal water service to approximately 100 residents to complete the implementation of the water policy
		Site assessment performed by the Agency for Toxic Substances and Disease Registry (ATSDR) in response to NPL listing
	November	Begin innovative technology demonstration: "Lasagna™" Phase I

Table 2.1 (continued)

Date		Activity
1995	February	Preliminary characterization of the northeast plume completed
	April	Moratorium on off-site shipping of waste to commercial facilities lifted
	June	ROD signed for interim remedial action of the northeast plume
		DOE approves the locating of Vortec, a waste treatment technology demonstration, at Paducah
	August	Northwest plume pilot plant begins extracting and treating contaminated groundwater to slow the movement of the subsurface plume
		ROD signed for interim remedial action in WAG 22
1996	January	Additional characterization began at WAG 23 to quantify PCBs in surface soils at nine different SWMUs
		Second site visit completed by ATSDR
	May	Proposed Plan for the remediation of WAGs 1 and 7 submitted to EPA and the Commonwealth of Kentucky
	June	Cylinder refurbishment program begins
		Northeast plume treatment systems construction begins
	July	Begin Lasagna™ Phase II demonstration
	August	D3 version of WAG 6 work plan submitted to EPA and the Commonwealth of Kentucky
	September	Contained Solid Waste Landfill completed
		ATSDR draft site summary document sent to DOE for data validation
		PCB Offsite Disposal Project completed. 6,330 PCB capacitors were disposed of off site to reduce the risk to the environment from continued storage
	November	D1 version of WAG 27 work plan issued for comment
		D1 version of RI report for the WAG 17 rubble piles
	December	Completed construction of the northeast plume treatment system
1997	January	ATSDR final site summary sent to DOE
	April	Final FFA for the PGDP issued on April 18
		90-day public comment period began on April 21

Note: All applicable documents were produced and issued in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Resource Conservation and Recovery Act (RCRA) guidelines for public availability and review.

3. ENVIRONMENTAL MANAGEMENT AND ENRICHMENT FACILITIES PROGRAM

3.1 INTRODUCTION TO EMEF AND APPLICABLE ENVIRONMENTAL LAWS

The EMEF program at Paducah is part of a nationwide DOE initiative to clean up and restore DOE facilities that have been contaminated with hazardous substances during past production or disposal activities. EMEF is an integrated program that addresses:

- Remedial actions for cleaning up contamination from past activities
- Corrective actions for bringing facilities into compliance with air, water, and waste regulations
- Waste management and minimization
- Decontamination and decommissioning of inactive facilities

The EMEF program at PGDP is driven by several environmental laws and regulations including:

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) of 1980, as modified by the Superfund Amendments and Reauthorization Act of 1986
- The Resource Conservation and Recovery Act (RCRA) of 1976, as modified by the Hazardous and Solid Waste Amendments of 1984
- The National Environmental Policy Act (NEPA) of 1969, as amended, supplemented by Council on Environmental Quality 1988 regulations and DOE NEPA-implementing procedures issued in April 1992
- The Clean Water Act, as implemented by Commonwealth of Kentucky regulations for permitting surface water discharges
- The Toxic Substances Control Act
- Commonwealth of Kentucky underground storage tank (UST) laws and regulations (KRS Chapter 224 and 401 KAR 42) and hazardous waste regulations

Although all these regulations impact the EMEF program to some degree, RCRA and CERCLA are considered the primary regulations that currently drive most investigations and remedial activities on-site. Additionally, provisions within these laws (most notably CERCLA, RCRA, and NEPA) include public involvement elements that provide opportunities for the public to participate in the remedial process.

The Federal Facilities Agreement (FFA), which CERCLA requires, helps to coordinate environmental restoration activities under the EMEF program at PGDP that are regulated under the environmental laws listed above. The FFA also helps to establish schedules and priorities for action and serves to resolve inconsistencies between the various environmental regulations.

Appendix D describes the environmental laws listed above and explains how each affects the activities at PGDP.

The *DOE Accelerated Cleanup: Focus on 2006* (formerly known as *The 10-Year Plan*) was developed in response to public and congressional calls for faster, more efficient, and cost effective cleanup of DOE sites while adhering to state and federal regulations and protecting human health and the environment. This document addresses a large number of environmental restoration issues at Paducah and calls for accelerated cleanup and stabilization of a large number of sites. This document states that PGDP remedial action will be achieved by the year 2010 or 2012 depending on the level of funding provided for these activities.

3.2 DECONTAMINATION AND DECOMMISSIONING OF INACTIVE FACILITIES

Decontamination and decommissioning (D&D) is a process that usually begins when a contaminated facility is declared surplus and is officially shut down by the party responsible for its operation. At PGDP, two groups of process facilities at the plant are scheduled for D&D: the C-340 metals plant and the C-410 feed plant.

D&D follows a series of phased steps, in accordance with CERCLA, to clean up the contamination, including the following:

- Planning (site characterization, risk assessment, and hazard classification)
- Evaluation of remedial alternatives
- Environmental review
- Conceptual design
- Cleanup
- Surveillance and maintenance

D&D plans at PGDP are closely related to the other remedial activities being conducted. In some cases, investigation and cleanup of SWMUs will depend on first completing the D&D of certain facilities. New SWMUs may be identified during the D&D process. Those SWMUs may be subject to CERCLA removal actions or the full CERCLA remedial process.

3.3 SITE MANAGEMENT PLAN

The PGDP SMP is a planning document that is a vital part of the environmental program at Paducah. The main purpose of the SMP is to identify specific milestones, in accordance with regulatory requirements and EMEF goals, that can be used to monitor the progress of the remedial action. The SMP presents project schedules and also defines remedial priorities. The SMP is intended to be a dynamic document that will be updated annually.

The most recent SMP is available at the DOE Environmental Information Center in Kevil (see Appendix A).

3.4 LAND USE

Mixed industrial/recreational is the future use scenario for PGDP. The future use of selected property at PGDP will have significant impact on the cleanup standards, types of remedial action, and total cost for site remediation. For example, remediation for industrial areas may differ significantly from actions taken for recreational areas. Major factors that will be considered regarding final land-use decisions include existing lease commitments, the nature of contamination at the facility, and community input.

3.5 EMEF PROGRAM MANAGEMENT

Successful implementation of the EMEF program relies on the expertise, communication, and coordination of multiple agencies and organizations. Major participants are listed below.

- **DOE–Headquarters Environmental Management** is responsible to the Secretary of Energy for accomplishing the DOE environmental management program nationally.

- The **DOE–Oak Ridge Office (DOE–ORO) Assistant Manager for Environmental Management and Enrichment Facilities** is responsible for accomplishing the environmental management program at DOE–ORO managed installations, which includes PGDP. Within the DOE–ORO framework, the PGDP DOE site manager is responsible for executing the work at the Paducah site.

- **Lockheed Martin Energy Systems, Inc.**, is the current Managing and Integrating contractor at the five DOE–ORO installations. LMES is directly responsible for the remedial investigations, has oversight responsibility for all other environmental work, and is assigned the role of integrating contractor for this work through DOE at PGDP. The LMES contract expires March 31, 1998.

- **U.S. EPA Region IV** is the federal regulatory entity that provides program management support as it relates primarily to CERCLA and the FFA.

- **Kentucky Department for Environmental Protection, Division of Waste Management** is the Commonwealth regulatory agency responsible for managing RCRA and other permitting issues and supporting the FFA.

- **Kentucky Water Resources Research Institute Federal Oversight Unit** is a committee from the University of Kentucky that acts (with Commonwealth oversight) in an advisory capacity to DOE on the EMEF program regarding technical documents and activities.

- **Jacobs Engineering Group, Inc.**, is the technical support contractor to DOE–ORO for EMEF work at PGDP and is responsible for developing proposed plans, feasibility studies, and records of decision.

- A number of other **environmental subcontractors** provide remedial design, construction, and other comprehensive environmental management support services to LMES.

4. COMMUNITY BACKGROUND

4.1 COMMUNITY PROFILE

Paducah, Kentucky, has a population of approximately 27,400. The population of McCracken County is approximately 62,800. The nearest population center to the plant other than Paducah is Metropolis, Illinois, which has a population of about 6,700 (see Fig. 2.1). The towns of La Center and Kevil, Kentucky, each have populations of 1,000 persons or fewer. With about 1,850 employees, PGDP is a major employer in the area and is credited by many in the community as being the primary reason for Paducah's development into a regional center for western Kentucky.

The area immediately around the plant has an identity separate from the nearby city of Paducah and is known as west McCracken County. The area is rural and is characterized by small farms and the WKWMA. The only other industrial activity close to the plant is the TVA Shawnee Steam Plant, about 2 miles north of PGDP on the Ohio River.

Approximately 300 people live within 2 miles of the plant. This area includes the unincorporated communities of Grahamville and Heath. Community focal points include local restaurants, grocery stores, schools, and the post office.

Several neighbors of PGDP live on small farms, where they raise cattle and horses and cultivate crops such as sorghum, corn, wheat, soybeans, hay, and tobacco. Many residents have lived in the area all their lives, and neighbors tend to know each other well. Some of the residents around the plant are related, and grown children and their families often live near their parents. Because PGDP is a major employer in the area, many of the residents work there. Almost all residents who do not work at the plant have relatives or friends who do.

4.2 HISTORY OF COMMUNITY INVOLVEMENT

4.2.1 Overview of Activities

In 1988, after groundwater contamination was first identified and information was released to the media, PGDP received frequent phone calls (15 to 20 per day-primarily from the community) for approximately 6 weeks before interest tapered off. The plant designated a contact person to handle all telephone inquiries. Personal visits were made to inform affected residents of the groundwater contamination.

In response to the intensity of public interest regarding the groundwater investigation, PGDP personnel began implementing additional means to update the community regarding ongoing activities. Such activities included:

- Letters to affected residents
- Periodic interviews with community members to gauge public interest and concern
- Information bulletins
- Newspaper advertisements announcing the availability of reports and meetings

- Public briefings
- Providing information to reporters for stories
- Providing related documents in an information repository
- Establishing community groups to enhance communication between PGDP and the public

These community relations elements are detailed in Section 6. Other areas of noteworthy community involvement include:

- Interest of two local environmental groups: Association of Concerned Environmentalists and Coalition for Health Concerns
- Two lawsuits filed by local residents since 1988: one was dismissed, and the other was settled out of court
- A lawsuit was filed in January 1997 by four individuals who live near PGDP; the lawsuit remains in litigation

4.2.2 Medical Examinations, Medical Surveillance Pilot, and Public Health Assessment

Medical Examinations

In December 1988, PGDP arranged for a physician and a toxicologist from the University of Cincinnati Medical Center to meet with interested residents, including three families whose wells were contaminated. Sixteen residents were examined for effects of possible exposure to contaminants in drinking water. The health study identified no signs of medical problems that could be associated with the presence of TCE or ^{99}Tc in drinking water. Two families were offered annual health examinations for health effects from drinking the contaminated well water before DOE supplied municipal water.

Residents whose wells were selected for routine sampling were informed of the results through personal letters sent to their homes. Residents of property where "special sampling" was performed on groundwater, surface water, sediment, soil, or vegetables received letters indicating that the results were available and would be reviewed with the residents on request.

Medical Surveillance Pilot

In September 1996, the Paducah Medical Surveillance Pilot Program for former DOE workers was initiated. Phase I will assess the nature and extent of health hazards that former workers encountered and determine the need for further action, including medical surveillance. Phase II, if needed, will begin late in 1997.

Public Health Assessment

Because the Paducah site is listed on the Superfund National Priorities List (NPL), the Agency for Toxic Substances and Disease Registry (ATSDR) is required to perform a site assessment. After completing site visits in 1994 and 1996, a site summary document identifying potential exposure and community health concerns was drafted in support of developing a Public Health Assessment. A draft of the Public Health Assessment is scheduled for release in late 1997.

4.2.3 Current Status of Community Involvement

The 1996 round of community interviews concluded that there is a high level of community awareness regarding PGDP; 100% of respondents were aware of the plant's existence in their community. PGDP neighbors, environmental activists, local officials, and the media showed the highest level of understanding about and involvement with the environmental activities at the plant. Many other respondents, although not actively involved, expressed interest in being kept informed about the activities through newsletters and media coverage.

PGDP will continue with a proactive community relations program that both informs the community and provides an opportunity for public input and opinions about the DOE EMEF program.

5. COMMUNITY INTERVIEWS

5.1 INTRODUCTION

Residents have been interviewed to assess the community's level of knowledge and perception regarding the environmental activities at PGDP. Interviews were performed in 1988, 1990, and again in 1992-1993. Information gathered from these interviews was used to establish a program for public involvement.

In November 1996, another round of interviews was conducted to reassess public awareness of the plant and its activities, reevaluate public perception, and determine if attitudes or types of concerns had changed. This information was used to update this CRP. A copy of the interview questionnaire and a summary of responses is provided in Appendix E.

5.2 SCOPE

LMES representatives interviewed a cross section of Paducah residents during the week of November 18, 1996. Interviews were conducted with individuals from the following categories:

- Local officials/community leaders
- Media (newspaper, radio, and television)
- PGDP neighbors and area residents
- Members of the Neighborhood Council, Site Specific Advisory Board, and Environmental Advisory Committee (see Section 6.2)
- Randomly selected individuals

These individuals included environmental activists, homemakers, local business people, plant workers, and students. Forty-two people responded to questionnaires through face-to-face and telephone interviews, or returned the questionnaires by mail or facsimile transmission (fax).

5.3 GENERAL ATTITUDES

5.3.1 Public Perception of PGDP Activities

As observed through previous interviews and supported through the most recent interviews, community perception and level of knowledge about the PGDP varies greatly among different groups. For instance, residents close to the plant, environmental activists, and individuals on associated boards or councils have a greater understanding of and involvement with the ongoing environmental activities than do many of the randomly interviewed community members who have no direct association to PGDP.

Local officials had a very positive outlook about the plant and its activities, gave high credibility ratings for government agencies, and were concerned primarily about the related economic issues.

Environmental activists had an overall negative outlook about the plant, its activities, and the agencies and organizations running the program. Their concerns primarily centered around contamination harming the environment and causing human health problems.

All of the 1996 respondents were aware of PGDP, and a distinct majority stated that their overall impression of the plant was positive. With few exceptions, everyone interviewed was aware, to some extent, of the environmental activities taking place at the plant and the DOE water policy that provides municipal drinking water to the residents who were affected or potentially affected by the groundwater contamination.

A variety of concerns regarding the plant were shared that included property values, economic opportunities, recreation, wildlife, cost of the cleanup, plant closure, and internal plant management. The most frequently cited areas of concern were human health and drinking water issues. Most respondents said their attitudes about PGDP have either not changed or have become more positive over time.

5.3.2 PGDP Public Outreach Ratings

Most respondents think PGDP has made a good effort in providing the community with information about the environmental activities, and they feel confident in the information the plant is providing. However, a small group of respondents did not trust the information they were receiving. Some comments included:

- "The plant will only tell us what they want us to know."
- "There are so many issues that the plant doesn't even understand the extent of what they're dealing with."
- "The plant will say anything to stay open."
- "The public is not receiving the 'bad' or 'dangerous' information."

To pinpoint the source of mistrust among this vocal minority and the level of trust within the population as a whole, respondents were asked to rate the credibility of a number of associated organizations and agencies. Responses were varied and inconclusive; however, federal agencies involved in the environmental cleanup received lower marks than the other groups, including LMES and the public affairs staff.

5.3.3 Public Outreach Methods

Most respondents receive their information on the environmental program through the media or, if they are a member of a board, through board meetings. Many people reported that they are on the LMES Public Affairs Office mailing list and receive periodic (or monthly) newsletters. A smaller number said they receive their information by word of mouth from neighbors, friends, or acquaintances. Most individuals who were interviewed seemed satisfied with the frequency of information they receive about site activities. When asked to specify the optimal frequency, "quarterly" and "whenever something newsworthy occurs" were the most frequent responses.

One frequent comment was that information is too technical. Newsletters, meetings, reports, and even newspaper advertisements about activities were specifically noted as being difficult to understand.

5.4 SPECIFIC CONCERNS

5.4.1 Human Health and Drinking Water

Human health and drinking water contamination were the most frequently expressed concerns among respondents. Accounts of higher than average levels of childhood leukemia and brain cancer were reported by residents and speculated to be associated with the groundwater and other contamination problems at PGDP. (Medical records were not researched for this report to substantiate those claims.) Another respondent noted that anytime anyone gets sick (with anything), the plant is blamed.

5.4.2 Property Value

Property value was a concern among residents close to PGDP. This concern, however, was somewhat subdued, perhaps because many of those interviewed were lifelong residents and farmers who did not plan on selling their properties. One resident receiving municipal water was concerned that he could not subdivide his land for residential housing because of the water policy provisions. (The water policy provisions do not place restrictions on subdividing land. Landowners can subdivide their land and they can hook up to municipal water; however, the water costs for the newly established parcels may not be covered by DOE.)

5.4.3 Water Policy

A few residents who are receiving municipal water expressed interest in knowing what changes, if any, will take place at the time the water policy is revised (in December 1997). These same residents stated that they haven't received any progress reports in a long time on the status of the groundwater investigation and water policy, and expressed interest in receiving more regular updates.

5.4.4 Final Cleanup Plan and Schedule

Several individuals expressed their interest in knowing when the facility will be completely cleaned up. Although incremental updates are being provided, community members would like to know about the comprehensive cleanup plans and schedule. Others said that although they want a comprehensive cleanup, they doubt it can be accomplished. Another respondent specifically wanted to know about the plans to address depleted uranium cylinders.

5.4.5 Western Kentucky Wildlife Management Area

Although not one of the most frequently stated concerns, recreational issues were cited as a concern for some respondents. Despite the fact that use of the WKWMA has been increasing, respondents stated that fewer people seem to be using the WKWMA for hunting and fishing. Other respondents said they were concerned about contamination found in deer.

5.4.6 Conservative Attitudes

One often-repeated concern was that residents may not be sharing their true feelings regarding PGDP, fearing that they may anger management and cause the plant to shut down. Along the same line, one respondent said that the media does not report opposing views, noting that only safe stories appear.

5.4.7 Future of PGDP

Although not an environmental issue, economic concerns were frequently noted. Concerns were raised about the future location of the Atomic Vapor Laser Isotope Separation (AVLIS) plant and how it would affect PGDP, and about the overall economic health of the plant.

5.5 ADDRESSING CONCERNS

LMES public affairs staff will consider the community concerns described in this section when implementing public outreach activities. Section 6 describes activities to address community concerns.

6. HIGHLIGHTS OF THE COMMUNITY RELATIONS PROGRAM

6.1 OVERVIEW

Community relations activities have been conducted at PGDP since 1988, when the first indication of offsite groundwater contamination was identified. Since then, numerous outreach activities have been conducted to inform and educate residents about environmental efforts at the plant, to address their pressing concerns, and to provide an opportunity for public input on environmental activities.

Information gathered from the November 1996 community interviews was used to determine if outreach activities should be modified or if supplemental activities should be instituted to make the program more effective. This section reviews the elements of the current program and recommends supplemental activities as a result of the interviews. Table 6.1 lists major outreach activities conducted to date.

In the 1996 interviews, responses indicated that overall DOE efforts to keep the community informed are perceived as effective. A number of respondents specifically noted improvement in outreach activities over the past few years. DOE is committed to maintaining a strong community relations program and will strive to make improvements to meet changing community needs.

6.2 PROGRAM ACTIVITIES TO DATE

6.2.1 Personal Contacts and Designated Contact Person

In the early stages of PGDP environmental investigations, EMEF personnel went door-to-door informing local residents of important findings as they developed. Site personnel, including the plant manager and DOE officials on occasion, continue to visit or telephone residents to discuss concerns and pass on new information. In addition, the community at large has been given names and phone numbers of designated plant representatives who can be contacted with questions or concerns. Lists of these contacts have been published in information bulletins and other written outreach material and are provided to the media and at public briefings and meetings. Current contact names and phone numbers are provided at the front of this document.

Personal contact is a very effective outreach method used regularly by DOE and LMES at PGDP. When residents were asked whom they would contact with questions about the plant, many 1996 interviewees named LMES public affairs staff or PGDP personnel. Many respondents appreciate the fact that their concerns are addressed personally and prefer calling the public affairs office to attending meetings. The name and phone number of a contact person will continue to be published in all community relations publications and will be provided at public meetings and briefings. Public affairs staff are dedicated to accommodating personal inquiries and will continue to encourage calls from the public.

Table 6.1. Summary of major community relations events

Date		Activity
1988	August 12-13	Paducah Gaseous Diffusion Plant (PGDP) and McCracken County personnel conduct home visits to 10 affected households to request that residents stop using their wells until sampling is completed
	August 12	Media notified that contamination had been confirmed at one location by sampling and that additional sampling was under way
	August	Regular home visits and telephone communication between plant environmental personnel and neighbors began
1989	January	*Information Bulletin Number 1* issued
	February	U.S. Department of Energy (DOE) initiated the reporting of sampling results to residences with affected wells. Public briefing held
	March	*Community Relations Plan for Paducah Gaseous Diffusion Plant* for Administrative Consent Order site investigation issued
1990	January	*Information Bulletin Number 2* issued
	March 12	Public briefing held
1991	January	Regional scoping meetings held for DOE systemwide *Programmatic Environmental Impact Statement* for environmental restoration and waste management activities
		Information Bulletin Number 3 issued
	November	*Information Bulletin Number 4* issued
1992	January	*Information Bulletin Number 5* issued
	February 4	Public briefing held
	August	Neighborhood Council chartered
	September	First meeting of Neighborhood Council held
	October	DOE Environmental Information Center at Kevil, Kentucky, established. Administrative Record and lengthy Environmental Restoration and Waste Management (ERWM) documents moved there from Paducah Public Library
1993	March	*Environmental Restoration Information Bulletin* (Vol. 1, No. 1) issued
	March	Neighborhood Council and Environmental Advisory Committee briefed on proposed plan for northwest plume
	April 6	Public briefing held
	August 10	Public comment period on Engineering Evaluation and Cost Analysis for Water Policy
	August 18	Public comment period on Interim Corrective Measures Work Plan for containment of sediments from scrapyards

Table 6.1 (continued)

Date		Activity
	October	Published fact sheet on Federal Facilities Agreement
1993	November	Public comment period on Proposed Remedial Action Plan and Interim Corrective Measures for Source Control of the North/South Diversion Ditch
	December	Published notice of availability of Administrative Record File for the PGDP Water Policy
	December	*ERWM Information Bulletin* (Vol. 1, No. 2) issued
1994	April 10	Public comment period for the Conceptual Site Treatment Plan
	June 22	Conducted Public Workshop
	September 11	Issued Draft Site Treatment Plan for public comment
	December 1	Conducted Public Workshop
1995	January 26	Conducted Public Workshop
	March	Issued Proposed Remedial Action Plan for northeast groundwater contamination plume
	May 2	Conducted scoping meeting on feasibility and desirability of forming a Site Specific Advisory Board (SSAB) at Paducah
	May 7	Conducted Public Meeting
	July 9	Conducted Public Workshop
	September 10	SSAB Selection Committee begins soliciting applications for membership
	September 28	Conducted public meeting on Baseline Environmental Management Report
1995	November 5	Conducted public video conference with DOE-Headquarters (HQ) and other sites on Draft Waste Management Programmatic Environmental Impact Statement
1996	January 31	Conducted Public Meeting on Depleted Uranium Hexafluoride Programmatic Environmental Impact Statement
	July 23	Conducted Public Meeting on the Waste Area Groupings 1 and 7 activities
	September	SSAB chartered by DOE-HQ Office of Public Accountability
		Initiated Paducah Medical Surveillance Pilot Program for former DOE workers
	October	SSAB meeting held
	November 14	Conducted Public Workshop
	November	SSAB meeting held

Table 6.1 (continued)

Date		Activity
1997	January	A lawsuit was filed in U.S. District Court, Western District of Kentucky by four individuals who live near PGDP
		SSAB meeting held
	February	SSAB meeting held
	March	SSAB meeting held
	April	SSAB meeting held
	May	SSAB meeting held
	June	SSAB meeting held

6.2.2 Mailing List

The LMES Public Affairs Office maintains an extensive mailing list of approximately 2,000 individuals and groups. The list includes PGDP neighbors; members of the Environmental Advisory Council, Neighborhood Council, and Site Specific Advisory Board; local officials; meeting attendees; environmental activists; plant workers; past interviewees; and other individuals who have requested to be on the list. This list is used when dispensing materials (such as information bulletins) about environmental activities at the plant.

Although newsletters were reported to be an attractive method of receiving information, more than half of those interviewed who were not currently on the LMES Public Affairs Office mailing list declined to be added. It would appear that those individuals who did not want to be on the mailing list were satisfied with their sources of information. DOE will continue to provide opportunities for individuals to join the LMES mailing list by completing cards at public meetings and briefings, and announcing the opportunity in written materials that are widely distributed.

6.2.3 Interviews

Many community interviews have been conducted as part of the plant's information-gathering efforts to improve public outreach. Formal interviews were conducted in 1988, in October 1990, and between August 1992 and April 1993 by DOE and their representatives. In November 1996, additional interviews were conducted to reevaluate public concern and opinion and to update the CRP. Interviews are an effective method of obtaining opinions from a cross section of the community. If major or unexpected changes develop in the EMEF program, PGDP may initiate another round of extensive interviews to assess opinion regarding the changes. However, other methods of gathering information, such as door-to-door canvassing, telephone interviews, and community forums (e.g., the Site Specific Advisory Board [SSAB] or the Neighborhood Council) may be used when the plant is seeking more immediate communication on specific issues. LMES public affairs staff will evaluate the November 1996 questionnaires to determine if individual attention can help address specific concerns.

6.2.4 Information Bulletins

Information bulletins have been prepared and distributed by the plant at least once a year since contamination was first detected. These bulletins provide technical information and program updates to the community. Ten bulletins have been distributed since 1989. As many as 4,000 people received each bulletin—2,000 through the mailing list and the remainder through distribution at the plant.

Interview respondents who received the information bulletins were generally pleased with the length and subject of the bulletins. However, many respondents said the material has been too technical for the average person. Because information bulletins are a good source of information regarding progress and technical activities, these bulletins will be produced at least twice a year. Every effort will be made to simplify the material in the bulletins.

In addition to program activities, a question-and-answer section within the bulletins may be included to address relevant concerns collected through interviews and community forums. Future bulletin topics (such as those raised during the 1996 interviews) may include a projected schedule for plant remediation, an update on the water policy, and plans for addressing the issue of depleted uranium cylinders.

To improve bulletin distribution, additional measures will be implemented, including providing copies of the bulletin at local libraries and other public locations and providing opportunities for community members to join the LMES Public Affairs Office mailing list.

6.2.5 Public Meetings

Public meetings (also called briefings or workshops) have been held at least once a year since contamination was first detected. Attendance has varied from approximately 40 to 100 people. Attendance by community members has decreased since the first meetings. Public affairs staff noted that there is a core of regular attendees at community meetings.

Most residents who have attended the meetings have found them informative; however, a few people reported that the meetings have become repetitive and do not provide new information. In general, 1996 interview respondents thought the frequency, format, and duration of the public meetings were appropriate.

The 1996 interviews did not find many people who regularly attend the public meetings (with the exception of those interviewed who were members of the Neighborhood Council, Environmental Advisory Committee, or SSAB). A few people said they had attended one or two meetings but do not attend regularly. Other people said they are aware that meetings are being held, but do not attend. A smaller subset of respondents, made up primarily of PGDP neighbors, prefer to call the public affairs office to personally discuss their specific concerns rather than attend a meeting.

One respondent suggested that PGDP host an annual event similar to the "Calvert City Good Neighbor Night" where guests can discuss issues in an informal setting rather than being a captive audience to a specific topic or briefing. DOE currently hosts a semi-annual/annual workshop that is conducted along those lines. There are no formal presentations, but a number of information stations are set up around the meeting room. These stations are staffed by experts in those particular fields. The public is free to ask questions and relate one-on-one with DOE, LMES, and DOE support contractor personnel. These workshops serve as a comprehensive introduction for those not familiar

with the EMEF program and provide an opportunity to join the mailing list, acquire written material, and learn about the Information Repository, community boards, and other available resources.

Public meetings will continue to be offered at least annually or as needed (depending on site activities and public interest). The meetings will continue to be advertised to give the public the opportunity to attend. Evaluation forms will be distributed and attendees will be tallied to further evaluate the effectiveness of the meetings and determine continued need.

6.2.6 Information Repository

The Information Repository is the collection of documents associated with the environmental site activities at PGDP. The repository is maintained for public access to documents relating to past and ongoing environmental activities at the plant. This repository is maintained at the DOE Environmental Information Center in Kevil. Documents released for public comment are also available at the information desk of the Paducah Public Library for the duration of any published public comment period.

Availability of documents to the public is an important element in maintaining openness with the community. During the interviews, a number of respondents noted that they were aware of the Information Repository and acknowledged its availability as part of the plant's efforts to keep the community informed. The location of the DOE Environmental Information Center is and will continue to be mentioned in every information bulletin, display advertisement, and news release. (See Appendix A for locations, hours, and contact person for the Information Repository.)

6.2.7 Public Comment Periods

Public comment periods are required by law for major documents produced through the environmental program at PGDP and for RCRA permit modifications. The public comment period provides the official opportunity for public input into the remedy selection process. Comment periods of 45 to 60 days are generally provided.

Documents for public comment will be made available at the Information Repository at the DOE Environmental Information Center and at the Paducah Public Library. In most cases, copies will also be sent to SSAB and Environmental Advisory Committee members. Comment periods will continue to be announced to the public through notices in the local newspaper.

6.2.8 Administrative Record

The administrative record is a collection of documents similar to the Information Repository, but more extensive. The administrative record is a formal collection that must legally contain all documentation relating to the decision-making process for an NPL site remedy. The administrative record for DOE EMEF activities is maintained at the DOE Environmental Information Center (see Appendix A) and is available for public review.

6.2.9 Media

Multiple runnings of display advertisements printed in *The Paducah Sun* have announced each public briefing, meeting, and workshop. Display advertisements also announce the release of reports, work plans, and other documents that are subject to public comment. The display advertisements are approximately one-sixth of a page in size and usually appear in the first section of the

Sunday newspaper. Legal notices have been used for permit applications and other actions, such as extending the public comment period for the proposed plan for the northwest plume.

News releases have been used by regional television stations, radio stations, and newspapers. Coverage has been heaviest in western Kentucky, southern Illinois, and southeastern Missouri, although articles also have appeared in the *Louisville Courier-Journal*, which has statewide circulation.

Many respondents stated that they receive information about the plant and its environmental activities through the media. Public affairs personnel contact television stations, radio stations, and newspapers through personal correspondence, fax transmittals, and mail. Media representatives interviewed in November 1996 reported general satisfaction with the frequency and method with which they are informed about plant environmental activities.

Display ads and legal notices will continue to be submitted and published in the *Paducah Sun* to announce public meetings, public comment periods, and permit actions. News releases will continue to be prepared by PGDP personnel at important milestones in a project and whenever significant developments occur. News releases about activities specifically covered in the FFA will also be provided to EPA and state regulators.

Timely personal contact will continue as the standard for the public affairs group to inform the media about newsworthy issues.

6.2.10 Community Boards, Councils, and Committees

Special interest groups such as the Neighborhood Council, the Environmental Advisory Committee and the SSAB can be dynamic and effective in community relations by sharing information with the community and providing important input to DOE about environmental concerns.

Environmental Advisory Committee. The Environmental Advisory Committee was established in 1986. Six to eight members representing academia, local business, and PGDP neighbors were originally appointed by plant managers to provide input on environmental activities at PGDP. The six- to eight-member committee reviews technical documents and gives DOE and LMES comments from technical and professional perspectives.

The Environmental Advisory Committee generally meets four to five times a year but may meet as often as eight times according to its charter. Committee members are paid a stipend by LMES to provide their input and are viewed as technical consultants who provide recommendations individually, not as a group.

Neighborhood Council. In response to community members who requested more direct interaction with the plant, DOE chartered the Neighborhood Council in August 1992. The Neighborhood Council is a nontechnical group of six members composed of PGDP neighbors and nearby residents. According to its charter, the members serve terms of up to 2 years. The Neighborhood Council is an exclusively volunteer group that acts as a liaison between LMUS, LMES, USEC, DOE and the immediate community. DOE and LMES staff meet with the Neighborhood Council to answer questions and to brief members about EMEF program events on a more frequent and detailed basis than is practical at public meetings.

The Neighborhood Council provides members the opportunity to learn firsthand about plant activities. This information then filters into the community, when members share information within their individual social and business circles. The members see the council as a positive element for the community that will help provide more accurate information to residents. Past interviews showed that the community views the council as a valuable tool for reestablishing trust regarding PGDP.

Site Specific Advisory Board. A DOE initiative that was recently implemented is the formation of an SSAB. SSABs are recommended as public-participation tools for federal facilities involved in major cleanup programs. An SSAB provides a forum for dialogue among representatives from the community, DOE, and regulatory agencies earlier in the decision-making process than is usually provided by other RCRA, CERCLA, or NEPA public involvement activities.

The SSAB is composed of 16 members representing a diverse cross section of the community, DOE, EPA, and state agencies. Eleven volunteers were chosen through a structured selection process. The remaining five members (ex-officio members) were appointed by their respective agencies. The SSAB was chartered and held its first official meeting in November 1996.

The SSAB could be the most effective and broad-reaching public relations tool in the community relations program. This forum could be used to express public concerns about important decisions and educate the public about proposed actions and the decision-making process. It could also be used to evaluate and recommend additions to the EMEF public-participation program. At regularly scheduled meetings, the SSAB may address the following issues:

- Recommendations about priorities for the EMEF budget and other policy issues
- Recommendations about the EMEF decision-making process
- Scope of EMEF studies and alternatives
- Future land uses

Additionally, the SSAB could supplement public briefings and meetings by convening special meetings or including special topics on the regularly scheduled agenda. Presentations of interest to the community (such as sampling demonstrations or speeches by environmental specialists) and site tours can be scheduled through the SSAB. Activities that are currently being addressed by the SSAB include:

- Opening the meetings to the general public
- Advertising meetings through local media outlets to inform the general community
- Creating a Community Relations Subcommittee to review community concerns and how they should be addressed

6.2.11 Speakers Bureau

LMES public affairs staff offers public speakers to address civic groups, local businesses, trade associations, utilities, and educational institutions. To help advertise this service, LMES developed a brochure that is distributed to groups primarily at public meetings. In response to the sustained interest and frequent requests for this service, LMES will continue to offer speakers to local groups.

6.2.12 Plant Tours

Plant tours and tours of DOE projects are conducted on a fairly regular basis for groups and individuals. Tours will be continued and efforts to publicize these events will be increased.

6.2.13 Technical Assistance Grants

When PGDP became a Superfund site, local environmental or other community groups became eligible to apply for the EPA Technical Assistance Grant (TAG) program. The TAG program provides funds for qualified citizen groups affected by a Superfund site to hire independent technical advisers to help them understand and comment on site-related information and thus participate in the cleanup effort. Grants of up to $50,000 are available for community groups to hire a technical adviser to interpret site-related technical information.

The grant is not a lump sum, but is provided on a reimbursement basis, and the group must provide at least 20% of the necessary funds. The 20% may be in the form of cash, in-kind services, or volunteer work, but cannot be federal funding. Only incorporated community groups (excluding political groups or academic institutions) may apply for grants. The group must file a letter of intent with the EPA office for their area. For Kentucky, that address is:

Sharon Chandler
USEPA Region 4
100 Alabama Street, SW
Atlanta, GA 30303-3104
(404) 562-8888

Once this has been done, the *Superfund TAG Handbook*, which includes an application and instructions, will be sent to the party. Before the grant is awarded, EPA will ensure that the group has specific goals and intent. The group must demonstrate its ability to manage the grant in compliance with EPA rules and must be willing to share any results with the community.

Records of accounting and administration of the funds must be kept and properly maintained. These records should be kept so that the funds will be reimbursed by the EPA, and records must show that the group is paying for 20% of the effort. Lastly, quarterly progress reports must be submitted to EPA.

6.3 POTENTIAL COMMUNITY RELATIONS ACTIVITIES

The following activities are not currently part of the program but may be included as outreach activities in the future.

6.3.1 Suggestion Boxes

In response to comments that the community and media may not feel confident in expressing their true concerns about the plant in fear of retribution or of the plant closing and damaging the local economy, the Public Affairs Office may establish suggestion boxes in public locations or at public meetings to encourage anonymous candid comments and concerns. Comments can be collected periodically by public affairs staff and evaluated for possible action.

6.3.2 Local Cable Access

Two interview respondents recommended using the resource of local cable television programming to disseminate information about PGDP environmental activities and progress. Using this method, local political events are covered and may reach a different audience than other current outreach methods. Periodic coverage may be scheduled in response to major milestones in the DOE EMEF program.

6.4 COMMUNITY RELATIONS PROGRAM COORDINATION AND TIMING

Although many of the outreach activities discussed in this section are strictly voluntary, a number of community relations elements are required by law at specific milestones in each regulation (CERCLA, RCRA, NEPA). These public involvement requirements for the EMEF program will be integrated under the FFA. Table 6.2 presents a generalized timeline of activities that will be implemented under the DOE EMEF program at PGDP.

Table 6.2. Timing and implementation of community relations activities

Activity	Timing/Frequency of Activity
Point of Contact	A point of contact has been established to field inquiries from the community. A contact person will be maintained throughout the Environmental Management and Enrichment Facilities (EMEF) program
	Contact information is provided in all publications
Personal Contact	Personal contact has been used for relaying information when appropriate
	Personal contact will be made with residents, local officials, and the media as significant developments occur
	Results of the Water Policy reevaluation will be shared (by December 1997) with residents affected by the policy
Mailing List	Established. Maintain the list throughout the program to include any new interested parties and to eliminate outdated entries
Interviews	Interviews conducted in 1988, 1990, 1992-1993, and 1996
	Formal interviews with the community, or informal interviews through established forums such as the Site Specific Advisory Board (SSAB), will be conducted as necessary to evaluate public opinion about the Paducah Gaseous Diffusion Plant (PGDP)
Information Bulletins	Produced and distributed at least twice a year
	Information bulletins or fact sheets will be produced on the Remedial Design/Remedial Action (also called Corrective Measures Implementation) stage of the cleanup. Multiple projects may be covered in one bulletin.
Information Repository	Established in 1994. Will continue to be updated with applicable documents

Table 6.2 (continued)

Activity	Timing/Frequency of Activity
Public Comment Periods	30-day comment period for proposed plan and significant changes to record of decision
	45 days for major Resource Conservation and Recovery Act (RCRA) permit modifications
Administrative Record	Established in 1989. Will continue to be updated with applicable documents
Media - Public Notice	Public notices will be placed in the newspaper to announce comment periods on proposed plans, records of decision, and modifications to records of decisions
Media - General	Media contacts have been used regularly to publicize information
	Media will continue to be updated on EMEF milestones and newsworthy events
	Meetings will be announced and information will be provided for reporters' use in stories
Community Boards	Three groups (Environmental Advisory Committee, Neighborhood Council, and SSAB) have been established to represent community interests in the EMEF program. Boards will meet according to their charters
Speakers Bureau	Established. Continue to have speakers available for civic groups, academia, and businesses
Plant Tours	Tours may be scheduled in conjunction with specific environmental activities at the plant
Technical Assistance Grants	Information on Technical Assistance Grants (TAGs) has been made available, and citizens' groups may apply through the U.S. Environmental Protection Agency (EPA)
Suggestion Boxes	May establish suggestion boxes in public locations to encourage candid comments. Comments would be collected periodically
Local Cable Access	Updates regarding major milestones on EMEF program can be covered on the local cable television station. Frequency and topics will be determined as necessary

7. REFERENCES

CH2M HILL. *Community Relations Plan for Paducah Gaseous Diffusion Plant.* March 1989.

Federal Register. May 10, 1993.

U.S. Environmental Protection Agency (EPA). *Community Relations in Superfund: A Handbook.* Directive 9230.0-03C.

U.S. EPA. *Guidance on Public Involvement in the RCRA Program.* Directive 9901.3.

U.S. Department of Energy (DOE). Oak Ridge Operations Environmental Management. *Accelerating Cleanup: Focus on 2006.* Discussion Draft. June 1997.

U.S. DOE. *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant.* Draft. Prepared by Lockheed Martin Energy Systems, Inc. (LMES) with support from Science Applications International Corporation (SAIC). August 1996.

U.S. DOE. *PGDP Site Management Plan.* Draft. Prepared by LMES. February 1996.

U.S. DOE. *Environmental Restoration Information Bulletin* (Vol 1, No. 2). Prepared by Martin Marietta Energy Systems, Inc. (MMES). December 1993.

U.S. DOE. *Federal Facility Agreement for the Paducah Gaseous Diffusion Plant.* Draft. Prepared by MMES. April 1993.

U.S. DOE. *Site-Specific Plan.* Prepared by MMES. March 1993.

U.S. DOE. *ERWM Information Bulletin* (Vol. 1, No. 1). Prepared by MMES. March 1993.

U.S. DOE. *Information Bulletin Number 5.* Prepared by MMES. January 1992.

U.S. DOE. *Information Bulletin Number 4.* Prepared by MMES. November 1991.

U.S. DOE—Headquarters. *Programmatic Environmental Impact Statement.* January 1991.

U.S. DOE. *Information Bulletin Number 3.* Prepared by MMES. January 1991.

U.S. DOE. *Information Bulletin Number 2.* Prepared by MMES. January 1990.

U.S. DOE. *Information Bulletin Number 1.* Prepared by MMES. January 1989.

Appendix A

Information Repository

Information Repository

Copies of technical reports, information bulletins, and other site documentation relating to the environmental activities at the Paducah Gaseous Diffusion Plant are contained in the Information Repository that is available for review at the DOE Environmental Information Center.

Documents that are made available for review during public comment periods are available at the Environmental Information Center and at the Paducah Public Library.

Information Repository/Public Comment Documents

DOE Environmental Information Center
175 Freedom Boulevard
Kevil, Kentucky 42053

Hours:
Monday - Friday
7:30 a.m. - 5:00 p.m.

Contact Person:
Shelley Hawkins
Phone (502) 462-2550
Fax (502) 462-2551

Public Comment Documents Only

Paducah Public Library
555 Washington Street
Paducah, Kentucky 42001

Hours:
Monday - Thursday
9 a.m. - 9 p.m.
Friday and Saturday
9 a.m. - 6 p.m.
Sunday
1 - 6 p.m.

Request specific document or assistance at the
Information Desk.
(502) 442-2510

Appendix B

Paducah Gaseous Diffusion Plant
Water Policy

Paducah Gaseous Diffusion Plant
Water Policy

Policy

It is the intent of the Paducah Gaseous Diffusion Plant (PGDP) Environmental Restoration Program to offer municipal water service in accordance with this Policy to all existing private residences and businesses within the projected migration area of the contaminated groundwater originating at PGDP (affected area). [The figure at the end of this appendix shows the boundary of the Water Policy.]

Procedure

For all existing residences and businesses within the affected area currently using well water (users), PGDP will, at the U.S. Department of Energy's (DOE's) expense:

- Offer to connect all users to municipal water supply lines.
- Offer to pay the reasonable costs of water bills for "users" whose wells are currently contaminated from the plant or whose wells might potentially become contaminated from the plant, as determined by DOE. Any determination as to the reasonableness of a water bill shall be made by DOE.
- Provide locks for securing wells in the affected area to control unauthorized use of the wells and to ensure access by PGDP for sampling or testing.
- Continue to monitor the extent of contamination to determine movement of contaminated groundwater.
- Continue paying reasonable cost of water bills for residences and businesses through December 1997. At that time DOE will re-evaluate this policy and determine whether to continue, modify or terminate it. The long-term responsibilities of DOE in respect to this water policy are expected to ultimately be stipulated in a record of decision (ROD). When the ROD is issued, it will supersede whatever policy is in effect at that time.

Those outside the affected area and/or new residences and businesses will be allowed to connect to a municipal water supply at their own expense. Agreements will be developed with each user who is provided water that delineate the responsibilities of both parties, including a provision that no additional water supply wells may be drilled in the affected area. All users will cooperate and work directly with the West McCracken Water District to connect to the water supply.

New residences and businesses that are offered access to a municipal water supply at their own expense within the affected area will not be provided free water under this policy.

It is the intent of PGDP to provide water service comparable to that currently available to and used by people within the affected area. Increases in water usage as a result of increases in agricultural use of water, livestock watering, or subdivision of property will not be paid for under this policy.

The implementation of municipal water service to the affected area will modify PGDP's current off-site well sampling policy. These modifications are:

- No residential well that lies outside the boundaries of the water sampling box will be sampled.
- Sample schedules normally will not be changed to accommodate a sample request inside the boundary if there is not a good technical reason driving the schedule change.

The PGDP water policy will be periodically evaluated and modified as conditions warrant. Exceptions to this policy may be made on a case-by-case basis.

Appendix C

Summary of Major Environmental Activities

Summary of Major Environmental Activities

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Administrative Consent Order (ACO) that the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA) signed in November 1988 under the provisions of Section 104 and Section 106 of CERCLA formally documents the actions that will be taken to determine the nature and extent and the sources of the off-site contamination that was discovered in August 1988. Major activities completed under the ACO include the following:

- Site investigation completed in two phases
- A public health and ecological assessment that assessed the risks from exposure to trichloroethene (TCE), technetium-99, polychlorinated biphenyls (PCBs), and other contaminants to humans, plants, and animals
- An alternatives assessment and summary of alternatives that evaluated a preliminary range of potential alternatives

The specific requirements of the ACO are being met and will be considered to be complete when the Federal Facilities Agreement (FFA)is signed.

The FFA is required under CERCLA for any federal facility that is placed on the National Priorities List (NPL) for cleanup. The Paducah Gaseous Diffusion Plant (PGDP) was placed on the NPL on May 31, 1994. The first draft of the FFA was generated in 1993 and has been under negotiation since that time. The FFA is expected to be signed early in 1997 and will incorporate the corrective action requirements of CERCLA and RCRA. Therefore, additional work being performed for the 205 solid waste management units (SWMUs), now grouped into 30 Waste Area Groupings (WAGs), at PGDP will be implemented according to FFA requirements.

CERCLA/RCRA Activity

Interim Actions

Several interim actions to protect human health and the environment, such as keeping additional contaminants from migrating off the site while the final remedial alternatives are being determined, have been implemented at PGDP. These actions are called "interim corrective measures" under the Resource Conservation and Recovery Act (RCRA) or "interim remedial actions" under CERCLA. Some of the interim actions that have been completed or are in progress include the following:

- Institutional controls (erecting fences and posting signs) on outfalls, ditches, and creeks that may contain contaminated sediment, surface water, or fish to limit human exposure, specifically Little Bayou Creek and the North-South Diversion Ditch. (Completed 1993 - maintained annually)
- Silt fences designed to control sediment movement and surface water runoff from the scrapyards (completed 1994 - maintained annually)
- A pump-and-treat system intended to hydraulically contain the highest concentration areas of contaminated groundwater in the northwest area of the plant while a final remedial action for the contamination is developed (completed 1995)

- A pump-and-treat system intended to hydraulically contain the highest concentration areas of contaminated groundwater in the northeast area of the plant (completed 1996)

RCRA Facility Investigations/Remedial Investigations

The terms of PGDP's RCRA (Hazardous and Solid Waste Amendments [HSWA]) permit require that SWMUs on the permit be investigated through RCRA Facility Investigations (RFIs), which are very similar to the phased CERCLA Remedial Investigation (RI) process. DOE uses the CERCLA terms for these documents or combines them with the equivalent RCRA terms as part of the integration of the two regulatory programs required by the FFA.

RFIs (RIs) are used for evaluation of SWMUs to identify the sources, the release mechanisms, and the extent and concentrations of potential contaminant releases. RFIs are initiated by work plans and are followed by reports that contain information on site characterization along with human health and ecological risk assessments. If a remedial action is determined necessary, the potential remedial alternatives are assessed, a preferred alternative is identified and presented to the public, and a remedy is selected. The final stages include remedial design, implementation of the remedial action (the "corrective action," in RCRA terminology) and, finally, monitoring to assess the effectiveness of the remedial action.

WAGs that have been or are being investigated are listed below with brief descriptions:

- WAGs 1 and 7 RFI (1993,1994): 12 SWMUs in two different WAGs were investigated. Three of the SWMUs were inside the secured fence: nine SWMUs were located outside the fence adjacent to the plant, or in the former Kentucky Ordnance Works area southwest of the plant. The SWMUs included spill sites, a fire training area, an inactive sanitary landfill, and several underground storage tanks (USTs).

- WAG 17 RFI (1994, 1995): WAG 17 is a grouping of construction rubble piles scattered around the outside of the fenced plant proper.

- WAG 23 RI (1995): WAG 23 is a collection of nine PCB spill sites of which eight are located inside the plant fenced area.

- WAG 22 RI (1995): WAG 22 is three former landfills inside the security fence.

- WAG 6 RI/Feasibility Study (FS) (1996,1997): WAG 6 includes four SWMUs associated with off-site contamination emanating from the C-400 building.

Closure and Cleanup of Underground Storage Tanks

USTs are managed under RCRA Subtitle I under 401 KAR 42. To reduce the risk of a release, 12 USTs at the plant have been or are being investigated, as follows:

- Two USTs (C-611-2, C-746-B) were determined not to be present.

- One UST (C-750-C) was removed and closed under RCRA.

- Four USTs (C-611-1, C-611-3, C-611-4, C-611-5) have been closed or determined to require no further action.

- Four USTs (C-750-D, C-746-A, C-200-A, C-710-B) will be closed in the summer of 1997 by grouting in place.

- Two USTs (C-750-A, -B) have been removed and the closure process is ongoing.

Waste Management Program

The Paducah Waste Management program consists of the treatment, storage, and/or disposal of various wastes including mixed waste, scrap metal, and other stored DOE material. It is divided into three work breakdown structure elements: treatment, storage, and disposal. The Vortec Vitrification Demonstration project, preparation of legacy waste for treatment, and on-site wastewater treatment are managed under the treatment work breakdown structure. The storage work breakdown structure includes RCRA closure of certain Waste Management facilities. Disposal activities include operation of a 60-acre solid waste landfill (approximately 3,000 tons of waste per year) and preparation and shipment of certain RCRA and low-level radioactive wastes to off-site disposal facilities.

Management of Legacy Wastes

Legacy waste is waste that was generated prior to July 1, 1993, when DOE transferred uranium enrichment process operations to U.S. Enrichment Corporation (USEC). Management of legacy waste is covered under a number of state and federal regulations. Some of the legacy waste is slated for shipment off-site for treatment and/or disposal, while some is stored on-site for future disposition, which may include on-site treatment dependent on the nature of the waste and available technologies for treatment/disposition. The current plans are to treat and dispose of all DOE legacy waste (except for transuranic waste) by the end of FY 2006. A number of documents, including the Site Treatment Plan, are used to govern this waste. In addition, DOE has issued a draft Waste Management Programmatic Environmental Impact Statement (PEIS) to deal with legacy waste at DOE sites nationwide.

Disposition of Uranium Hexafluoride (DUF6) Cylinders

DOE owns close to 30,000 10- to 14-ton cylinders at Paducah that contain depleted uranium hexafluoride. There is an aggressive cylinder inspection and maintenance program at the site that includes cleaning and coating cylinders and constructing new, concrete cylinder yards for storage. The DUF6 is being addressed in a PEIS. Public meetings on the draft PEIS are scheduled for the fall of 1997.

Innovative Technologies/Demonstrations

Within the arena of environmental restoration activities at PGDP, DOE and/or Lockheed Martin Energy Systems, Inc. (LMES), have sponsored or implemented several innovative technology demonstrations. An innovative technology is a new or untried approach used to solve an environmental problem. Trying these new ideas at a site where active environmental cleanup is ongoing provides more realistic conditions and results than can be duplicated in a laboratory setting. Several innovative technologies are described below.

Iron Filings Demonstration

This idea concerned the chemical relationship between TCE and iron, i.e. that TCE dissolved in water would chemically adhere to iron. To test the idea, groundwater contaminated with TCE was passed through a container filled with iron filings.

Lasagna™

A group from private industry that included Dupont, General Electric, and Monsanto developed a technology called Lasagna™ to remove TCE from clay. In Phase I (1995), the concept for this technology was demonstrated in an actual contaminated medium (soil at the PGDP Cylinder Drop Yard). In Phase IIa (1996), a commercial application of the technology is being conducted at PGDP.

Vortec

The Vortec Corporation in Pittsburgh, Pennsylvania, has a contract with the DOE Morgantown Environmental Technology Center to build and demonstrate a waste treatment unit at PGDP. The unit, which is a new application of an existing technology, will treat mixed waste by heating the waste to very high temperature with the raw products used to make glass. Any hazardous or radiological materials in the waste would be captured in the resulting vitrified glass frit.

The reader can find more detailed information on the activities described above by contacting the DOE Environmental Information Center in Kevil, Kentucky (see Appendix A).

Appendix D

Summary of Environmental Laws

SUMMARY OF ENVIRONMENTAL LAWS

Comprehensive Environmental Response, Compensation, and Liability Act

Overview of CERCLA

The main intent of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is to protect human health and the environment by investigating and remediating (containing or cleaning up) releases of hazardous substances at unpermitted, uncontrolled, or abandoned hazardous waste sites.

Based on findings from environmental studies, facilities are scored by the U.S. Environmental Protection Agency's (EPA's) Hazard Ranking System. Sites scoring 28.5 or higher (out of 100) are placed on the EPA's National Priorities List (NPL) and become a high priority for cleanup. The Paducah Gaseous Diffusion Plant (PGDP) scored 56.9 and was placed on the NPL in May 1994. CERCLA requires federal facilities that are listed on the NPL to enter into a Federal Facilities Agreement with EPA.

The CERCLA remedial process normally takes place in three phases:

- A site evaluation
- A detailed study of the site along with an exploration of alternatives and a risk assessment, followed by the selection of a remedial action plan
- The design and implementation of the selected site remedy

If a site poses an immediate threat to public health or the environment, EPA can require a short-term removal action to address the threat immediately.

How CERCLA Affects PGDP

In November 1988, the U.S. Department of Energy (DOE) entered into an Administrative Consent Order (ACO) with EPA to determine the nature and extent of contamination of off-site groundwater caused by sources at PGDP and to take appropriate action as necessary to protect the public health, welfare, and the environment. To date, a series of site investigations and interim actions have been initiated under the ACO.

Resource Conservation and Recovery Act

Overview of RCRA

The main intent of the Resource Conservation and Recovery Act (RCRA) is to protect human health and the environment through the proper management of hazardous and nonhazardous wastes at operating sites. Three subtitles of RCRA apply to PGDP:

- RCRA Subtitle C, which establishes permit requirements for generation, transportation, and treatment, storage, and disposal (TSD) of hazardous wastes; regulates closure plans for inactive facilities; requires corrective actions for hazardous substances originating in solid waste management units (SWMUs); and provides for interim corrective measures (ICMs), if necessary, to respond to immediate threats to public health or the environment

- RCRA Subtitle D, which regulates the management and disposal of nonhazardous solid wastes
- RCRA Subtitle I, which regulates underground storage tanks (USTs) used for storing petroleum products or hazardous wastes to prevent and control leaks and releases from such tanks

RCRA Subtitle C is the most important of the three subtitles for the Environmental Management and Enrichment Facilities (EMEF) program at PGDP. The Commonwealth of Kentucky administers the RCRA Part B permit that applies to the PGDP TSD facilities that actively manage hazardous wastes and to postclosure groundwater monitoring of closed landfills. EPA administers the parts of the RCRA Part B permit (1) that apply to corrective actions for releases from SWMUs and Areas of Concern and (2) that govern necessary interim actions. RCRA requires a study and decision-making process for SWMU corrective actions that is similar to the CERCLA process.

How RCRA Affects PGDP

One facility at PGDP is operating under a RCRA Subtitle D permit administered by the Commonwealth of Kentucky: the residential C-746-U Contained Solid Waste Landfill. Two former Subtitle D facilities, C-746-S and C-746-T, have been closed and are in postclosure groundwater monitoring.

National Environmental Policy Act

Overview of NEPA

The main intent of the National Environmental Policy Act (NEPA) is to make sure that environmental resources, values, and factors are fully considered in major decisions and actions taken by federal agencies. NEPA requires federal agencies to determine whether a proposed action does one of the following:

- Qualifies for a categorical exclusion (CX)
- Requires the preparation of a report called an environmental assessment (EA) to evaluate the potential for environmental effects
- Will involve potentially significant environmental effects and thus require preparation of a more detailed report called an environmental impact statement (EIS)

How NEPA Affects PGDP

NEPA requirements generally overlap with those of RCRA and CERCLA and are therefore integrated according to DOE policy. In the early stages of environmental investigations, PGDP evaluated the appropriate NEPA actions (CX, EA, or EIS) and integrated them into the remedial activities.

Clean Water Act

Overview of CWA

The Clean Water Act (CWA) regulates pollutant discharges into surface water from municipal, industrial, and other sources. The Commonwealth of Kentucky administers the CWA under EPA authorization.

How CWA Affects PGDP

Effluent discharges from PGDP through the plant discharge ditches into Big Bayou Creek and Little Bayou Creek are regulated under the CWA through a Kentucky Pollutant Discharge Elimination System (KPDES) permit.

Toxic Substances Control Act
Overview/How TSCA Affects PGDP

The Toxic Substances Control Act (TSCA) comprehensively regulates the manufacturing, use, and disposal of certain chemical products. The most significant provisions of TSCA that apply to PGDP are regulations on the use and disposal of polychlorinated biphenyls (PCBs).

Commonwealth of Kentucky Underground Storage Tank Program
Overview/How UST Affects PGDP

The Commonwealth of Kentucky passed a UST law in April 1990 and adopted the federal regulations in December 1990. Kentucky administers the federal UST program under Subtitle I of RCRA and the state's UST regulations. The state and federal UST regulations govern the installation of USTs used to store petroleum and chemicals, requirements for leak-detection systems and containment of releases, reporting of known or suspected leaks and releases, UST closure and removal, certification of persons who install and remove USTs, and cleanup of releases from USTs. Several USTs at PGDP are being investigated or removed under Kentucky's administrative jurisdiction.

Appendix E

Paducah Gaseous Diffusion Plant
Community Relations Plan
Questionnaire

PADUCAH GASEOUS DIFFUSION PLANT
COMMUNITY RELATIONS PLAN
QUESTIONNAIRE

Purpose: To learn about the community's level of knowledge regarding the plant and its environmental activities, and determine the type and extent of public outreach activities the public prefers.

Objective: To produce a Community Relations Plan (based on these interviews) that will meet the needs of the Paducah community in understanding the environmental activities at the Paducah Gaseous Diffusion Plant, and provide improved two-way communication between the community and the plant.

1) **Are you familiar with the Paducah Gaseous Diffusion Plant? Yes / No**
Yes 42 No 0

2a) **Do you work at the plant? Yes / No**
Yes 5 No 37

2 Retired from plant

2b) **If no, do you know anyone who does? Yes / No (neighbor/relative/friend/other)**
Yes 36 No 3

2 Knows retirees

3) **What is your overall impression of the plant?**

□ **Positive / Why?** 26

15	Economic impact
4	Good neighbors, intelligent people
3	High level of safety awareness
2	Open and honest
2	No reason to feel negatively
1	Poses no real danger
1	No personal problems with it
1	Bogged down with bureaucracy

□ **Negative / Why?** 6

6	Environmental/health issues concern
1	Energy hog
1	Management wasted money

□ **No opinion/Neutral** 10

4a) Do you have any concerns about the plant? Yes / No

Yes 27 No 10

4b) If so, what are they? Please specify.

- ☐ **Property values** 10
  - 3 Can't dig or use wells
  - 2 Can't subdivide land
  - 1 Realize it may become a concern but it's not a concern now
  - 1 Concern about what is in the silos at KOW (not PGDP property)

- ☐ **Human health** 15
  - 5 Contamination issues
  - 3 Cancer/health concerns
  - 2 Groundwater issues

- ☐ **Drinking water** 15
  - 7 Drinking water contaminated now or in the future
  - 1 The plant has done a good job off taking care of it

- ☐ **Recreation** 7
  - 3 Concern with loss of opportunity
  - 1 Decline in use, may be related to plant
  - 1 Pollutants in the deer

- ☐ **Environment** 12
  - 5 Negative impact on the environment
  - 1 The extent of all areas of contamination hasn't been investigated
  - 1 Going overboard to please the public

- ☐ **Other** 6 *(Some respondents had multiple comments)*
  - 2 Economic concerns/longevity of the plant
  - 2 Wants plant to have a good future
  - 1 Information leaks on work done at the plant
  - 1 Management problems
  - 1 Wildlife
  - 1 Maintenance

Comments:

- 3 Economic concerns
- 2 Why try to clean it up when it's impossible to do so; let nature do it
- 1 Doesn't always believe everything on the news
- 1 Contaminant release affects all of the above
- 1 Done an excellent job in community awareness, notifying appropriate people
- 1 Many people died on Bradford Road from cancer, freezing vapors from cooling tower blow and settle there (rumor)
- 1 If we are to be attacked by another country, Paducah might be a target because of the plant
- 1 Heavy industry concerns, nothing radiological
- 1 Costly cleanup (the prospect of spending billions of dollars)

5) **Are you aware of the environmental cleanup activities ongoing at the plant? Yes / No**
Yes 38 No 4

6) **Are you aware of the Water Policy? Yes / No**
Yes 32 No 7

7) **Is there anything you want to know about the plant or its environmental activities? Yes / No If yes, please specify.**
Yes 15 No 22 *(Some respondents had multiple comments)*

8 Keep the community well informed.
3 Are contaminants affecting human health/environment?
3 How are contaminants affecting the environment/groundwater?
2 Would like to know updates on water policy. How long will water be supplied, will people be allowed to use wells?
1 Hold quarterly meetings.
1 Information will be discussed at Environmental Advisory Committee meetings.
1 Soil core sample, results cumulative from all plants in the area.
1 Does the plant communicate with the Wildlife Management Association?
1 What does the plant do?
1 Will cleanup solve drinking water problems?
1 Doing a good job of informing people and cleaning up.
1 Initial negligence by Union Carbide in construction stage.
1 Is there an anticipated date for cleanup of drums?
1 Wish plant would tell the truth
1 Has the plant contaminated the aquifer, and if so, does the plant have to clean up the aquifer to the same levels the city does as a result of the city's landfill problem?
1 Will be following Vitrification Demonstration Project with great interest.

8) **How do you rate the Plant's efforts in providing the community with information about environmental activities?**

- ☐ **Good** 28
- ☐ **Average** 7
- ☐ **Poor** 3

2 Library has documents and bulletins
2 Plant holds public meetings
2 Plant provides information when something happens
1 Excellent
1 Very poor. Used to be really good.
1 Too technical. Just give nuts and bolts. Talk to the people, not the technical folks.
1 Proactive, continue community awareness program
1 Not hiding anything
1 Good effort in getting information out, but is it information or propaganda.
1 Ads in newspaper for meetings, etc.

9) **Do you feel confident in the information the plant is giving to you? Yes / No**
Yes 28 No 3

3 Tells what they want to tell, not necessarily everything
2 Pretty well informed
2 Gives good information
2 Explains their position
1 So much data. Surprises come up when other people look at data
1 Doing best they can do
1 Don't believe them
1 Plant is afraid not to tell them
1 Always been credible
1 Information has been as accurate as possible, but DOE has not been so good at responding; slow to react to questions, given wrong dates, etc.

10) **Do you feel the plant is doing everything possible to correct the environmental problems? Yes / No Please explain.**
Yes 24 No 7

5 The Plant's doing as good a job as possible on environmental issues.
3 Is money being spent wisely?
3 Efforts are being made, but are they correcting everything?
2 How will they be able to clean it up?
2 Skeptical of bigger picture.
2 Doing more than necessary.
1 Is cleanup worth the cost?
1 The plant is using unproven experimental technologies.
1 Uranium is tough stuff to get rid of.
1 Doing everything within reason.
1 Pump and treat probably isn't needed at this site. It's blown out of proportion but provides lots of jobs.
1 DOE may be holding up progress.
1 Lack of trust.
1 More could be done, but should it?
1 Are not looking at total impact of cleanup.

11) **How do you get your information about environmental issues at the plant?**

□ **Public Meetings** 22
1 Go to meetings every once in a while.
1 See announcements for the meetings.
1 Informative, but how trustworthy?
1 Technical, but doing best job possible. Need to explain issues, give a reference like how much contamination is bad? How much is there?

□ **Newsletters** 21
1 Receives monthly employee bulletin

- ☐ **Media (Please specify: newspaper/radio/TV)** 19
  - Newspaper 7
  - Radio 1
  - Television 1

  1 Not much on TV
  1 Media don't want to rock the boat and cause the plant to leave

- ☐ **Public Affairs/Community Relations Office** 14
  1 Receives letters
  1 Best method
  1 Daily newspaper/newsletter type publication

- ☐ **Word of mouth through neighbors/Plant employees/other** 13

- ☐ **Other (please specify)** 17
  5 Mailing list
  4 Plant
  2 Environmental Advisory Committee
  2 Site Specific Advisory Board
  1 Technical documents
  1 Freedom of Information Act
  1 Environmental research group in Maryland (IEER), Native Americans for a Clean Environment, Indigenous People Network.
  1 Sometimes public calls
  1 U.S. Enrichment Corporation
  1 AIP Group (affiliated with the University of Kentucky)

12) Regarding the methods you checked in 11, can you suggest improvements in the way you receive information? For example, if you attend public meetings, how can they be improved?

5 Information is too technical – even ads in the newspaper
3 Public meetings
3 Inform media and newspaper, proactive articles needed
3 Keep newsletters simple and brief, not technical. Losing interest when too technical
2 Newsletters are useful
1 Unbiased articles in newspaper; biased media avoids opposing views
1 Meetings stacked with government and plant officials, very intimidating
1 More advanced notice of meetings
1 Meetings with officials under oath and available for cross examination
1 Is the plant hiding something?
1 Presenting information they believe at the time
1 Target the residents of piped water

13a) **How would you *prefer* to get information about the plant?**

□ **Public Meetings** 14

1 Allows people to ask questions
1 Not many people go

□ **Newsletters** 17

1 For standard updates

□ **Media (newspaper/radio/TV). Please specify** 19

□ **Public Affairs/Community Relations Office** 10

□ **Word of mouth through neighbors/Plant employees/friends** 4

□ **Other (please specify)** (Some respondents had multiple comments) 11

7 Okay as is.
2 Mailings
1 Technical documents
1 FOIA
1 Variety of ways
1 Environmental Committee meetings
1 E-mail or web page
1 If important, phone call or personal visit
1 Briefings by officials

□ **I'm not interested in getting information about the plant** 4

1 Don't know who's in charge
1 Go back to the old days when they sent out usable newsletters

13b) **How often would you like to get information about the plant?**

□ **Once a month** 11

1 For water policy recipients.
1 Whether new information or not. Monthly update.
1 Media updates once a month.

□ **Quarterly (four times a year)** 15

2 Updates quarterly.
1 Quarterly newsletter.

□ **Yearly (once a year)** 1

1 Would like updates once or twice a year.

□ **Other (please specify)** 15

13 Whenever something is an issue
2 As often as possible

14) **What other public outreach activities do you think should be conducted by plant personnel?**

3 Onsite inspection/tour
3 Local cable
3 None
2 Simplify material
2 Pamphlets
1 Public survey about health concerns
1 Get more information to the community
1 Church announcements
1 Public meetings
1 Host events similar to Calvert County Good Neighbor Night
1 Be more open about environmental problems
1 Cumulative effects of all environmental issues
1 Site Specific Advisory Board may be able to get information out - may be a better forum
1 Clean up their credibility
1 Not much more to do
1 Proactive approach to anticipating potential problems, address potential pitfalls rather than reacting to them after they occur

15) **How has your attitude about the plant and its environmental activities changed over the last few years or since your last interview?**

□ **More positive / Why?** 16

3 Plant is more forthright and open.
1 Taking more caution when necessary.
1 Plant has participated in public meetings and is ready to answer questions.
1 Plant is doing everything possible.
1 More public involvement.
1 Afraid of plant in earlier years.
1 Privatization.
1 Budget cuts.
1 What I've seen gives me a more positive outlook.
1 Being proactive, trying to remedy the situation, looking at the environmental side.
1 When I retired 12 years ago, the attitude was negative. Plant is now doing more to clean up. More sensitive to public opinion.
1 Not paying attention to the little guys anymore. Doing well with trying to get information out, but not in manner conducive to community members.
1 Doing more cleanup activities

□ **More negative / Why?** 5

1 Plant continues to pollute and covers up future plans to pollute.

□ **No change** 20

1 Get the run-around on answers, used to be more direct, management getting worse
1 Positive all along.
1 Did the right thing with providing piped water.
1 Seems like there's a lot of wasted time and money regarding other issues.
1 Always been excellent source of employment and excellent contributor to community.

16) Who would you call if you had a question about environmental issues at the plant?

11 Dennis Hill
8 Jimmy Massey/Jimmy Hodges/Steve Polston
5 Plant
4 Friends/family
2 Department of Energy
2 Environmental Protection Agency
2 Public Affairs Office
1 Waste Management Department, Fish and Wildlife Division
1 Danny Giminski
1 Lockheed-Martin Utility Services
1 No-one at the plant
1 Susan Zimmerman
1 Lockheed Martin
1 Jeannie Brandstetter
1 Debbie Wattier

17) How would you rate the credibility of the following?

Groups/Agencies/Organizations	**(Circle one) Not credible**				**Very credible**
Department of Energy (DOE)	**1**	**2**	**3**	**4**	**5**
	3	5	10	10	10
Environmental Protection Agency (EPA)	**1**	**2**	**3**	**4**	**5**
	3	5	10	7	13
Kentucky EPA	**1**	**2**	**3**	**4**	**5**
	1	3	10	10	9
Lockheed - Martin	**1**	**2**	**3**	**4**	**5**
	1	2	5	15	10

Paducah Public Affairs personnel	**1**	**2**	**3**	**4**	**5**
	1	1	4	12	17
Paducah Plant Workers	**1**	**2**	**3**	**4**	**5**
	0	0	11	7	15

Additional Comments:

1 Get technical documents to a more readable level. People won't read.

1 Many stories about improper disposal practices. Probably about half the plant didn't trust Union Carbide (12 years ago). Worker's daughter contracted leukemia. He was eventually fired for stirring things up.

1 Feels like a lot of money is wasted.

1 Could do more for minorities as far as hiring practices.

1 Plant should involve workers and improve management.

1 Kentucky Department of Environmental Protection works too closely with plant.

1 Who do you call for what? Plant's internal management structure is not clear.

1 Never had a tour of plant – would like one.

1 Residents are conservative. May be more concerned by environmental issues than stating they are, but don't want to rock the boat and make the plant (and jobs) leave.

Thank you for your participation.

ADDITIONAL QUESTIONS FOR NEIGHBORHOOD COUNCIL, EAC, SSAB, AND LOCAL OFFICIALS

18) Do you get calls or questions from community members regarding the plant? Yes / No

Yes 8 No 11

18a) If yes, what type of issues are they concerned with?

3 Health.
3 Environment.
1 Property values.
1 Hear complaints/reports about people in Tyvek suits.
1 Who and what will be done at the plant?
1 Plant personnel should do as much of the work as possible.
1 Occasional letter regarding nuclear waste disposal.
1 Are deer safe to eat?

19) How do you rate public perception about the plant?

a)
- □ **High awareness** 8
- □ **Average awareness** 9
- □ **Low awareness** 3

b)
- □ **High Concern** 8
- □ **Average Concern** 9
- □ **Low Concern** 2

20a) Do you think the community at large is getting information about the environmental efforts at the plant? Yes / No

Yes 15 No 5

3 Information is out there, community needs to act on it.
2 Not sure public is seeking information.
2 Pollution prevention measures.
1 Make community feel PGDP is part of the community.
1 DOE doesn't know what the public takes seriously.

20b) Do you have any suggestions for improvement?

2 Make information less technical.
2 Plant tours.
1 Environmental monitoring and surveillance.
1 More public awareness.
1 Tell the public where to get information.
1 Try harder.
1 Ads that are sent are too technical. Turn off the general public.
1 More media coverage.

1 Improve information dissemination.
1 Speakers bureau - talk to schools, groups, etc.

21) What issues do you think need to be addressed regarding the environmental activities at the plant?

2 More comprehensive explanation of ecological contamination.
2 Will the AVLIS plant result in the closing of PGDP?
1 More public awareness.
1 What will be cleaned up and how?
1 Future plans (beyond 1999).
1 What preventative measures will be taken?
1 What's wrong, or could be wrong, and how will it be fixed?
1 Timetable off remediation activities.
1 Long-term cleanup for the environment. Is it feasible?
1 Is the plant in danger of closing due to cheaper Uranium being produced in Russia?
1 Are Plant's infrastructure and processes still strong?

Neighborhood Council and SSAB only

22) How has your attitude changed regarding the efforts and activities at the plant since you've been involved with the Neighborhood Council or SSAB?

□ **More positive / Why?** 3

1 Used to only receive information through "hearsay."
1 Have learned more and understand more.

□ **More negative / Why?** 1

1 Fear of DOE and other agencies dominating work of SSAB

□ **No change** 7

End

Appendix F

List of Contacts and Interested Parties

LIST OF CONTACTS AND INTERESTED PARTIES

Media

Newspapers

Paducah Sun
408 Kentucky Avenue
(P.O. Box 2300)
Paducah, Kentucky 42002-2300

Advance Yeoman
100 Ohio Street
(P.O. Box 8)
Wickliffe, Kentucky 42087

West Kentucky News
P.O. Box 1135
Paducah, Kentucky 42002-1135

Louisville Courier Journal
P.O. Box 1116
1619 Jefferson
Paducah, Kentucky 42001

Television Stations

KFVS (Channel 12, CBS)
P.O. Box 100
Cape Giardeau, Missouri 63702

WPSD-TV (Channel 6, NBC)
P.O. Box 1197
Paducah, Kentucky 42002-1197

WSIL (Channel 3, ABC)
Route 13
Carterville, Illinois 62918

Comcast Cablevision of Paducah
800 Broadway
Paducah, Kentucky 42001

Radio Stations

WCBL
P.O. Box 387
Benton, Kentucky 42025

WDDJ-FM (96.9)
1700 N. 8th Street
Paducah, Kentucky 42001

WKMS (91.3)
Fine Arts Building
Murray State University
Murray, Kentucky 42071

WKYQ-FM (93.3)
6000 WKYQ Road
Paducah, Kentucky 42003

WKYX-AM (570)
Box 2397
Paducah, Kentucky 42002-2397

Elected and Appointed Officials, Business Groups, and Agencies

Local

Honorable Danny Orazine
McCracken County Judge Executive
McCracken County Courthouse
301 South Sixth Street
Paducah, Kentucky 42003

Honorable Coy Creason, Mayor
Benton Town Hall
1009 Main Street
Benton, Kentucky 42025

Honorable Bill Kommer, Mayor
Metropolis Town Hall
106 West Fifth Street
Metropolis, Illinois 62960

Honorable Albert Jones, Mayor
City of Paducah
P.O. Box 2267
Paducah, Kentucky 42002

Honorable Bill Graves
Ballard County Judge Executive
Ballard County Courthouse
P.O. Box 276
Wickliffe, KY 42087-0276

Mark Payton, District Director
Purchase District Health Department
P.O. Box 2657
Paducah, Kentucky 42002-2357

Charles Logsdon, Manager
West Kentucky Wildlife Management Area
10535 Ogden Landing Road
Kevil, Kentucky 42053

Ms. Melodie Shrader
Paducah Area Chamber of Commerce
P.O. Box 810
Paducah, Kentucky 42002-0810

Ms. Kristin Reese, President & CEO
Greater Paducah Economic
Development Council
2000 McCracken Boulevard
Paducah, Kentucky 42002

Commonwealth of Kentucky

Dr. John A. Volpe, Manager
Radiation Control Branch
275 East Main Street
Frankfort, Kentucky 40621
(502) 564-3700

Jack Wilson, Director, Water Division
KY Dept. for Environmental Protection
14 Reilly Road
Frankfort, Kentucky 40601
(502) 564-3410

Air Quality Division
KY Dept. for Environmental Protection
316 Saint Clair Mall
Frankfort, Kentucky 40601

Mr. Robert H. Daniell, Director
Waste Management Division
KY Dept. for Environmental Protection
14 Reilly Road
Frankfort, Kentucky 40601

John E. Hornback, Director
1607 Sycamore
Murray, Kentucky 42071

Representative J. R. Gray
3188 Mayfield Highway
Benton, Kentucky 42025

Representative Kathy Hogancamp
300 Acorn Lane
Paducah, Kentucky 42003

Representative Charles Geveden
P.O. Box 518
Wickliffe, Kentucky 42087

Senator Jeff Green
Kentucky State Senate
Capital Annex Room 21
Frankfort, Kentucky 40601

Representative Freed Curd
Senator Bob Leeper
Legislative Offices
Capital Annex Building
Frankfort, Kentucky 40601

Representative Frank Rasche
2929 Jefferson Street
Paducah, Kentucky 42001

Federal

Mr. Steve Wyatt, Manager
U.S. Department of Energy
P.O. Box 2001
Oak Ridge, Tennessee 37831

Mr. Carl Froede, Jr.
Remedial Project Manager
Environmental Protection Agency
Region IV
100 Alabama Street
Atlanta, GA 30303

Ms. Carol Connell
Agency for Toxic Substances and
Disease Registry
1600 Clifton Road
Atlanta, Georgia 30333

Robert C. Sleeman, Director
U.S. Department of Energy
Oak Ridge Operations
P.O. Box 2001
Oak Ridge, Tennessee 37831-8541

Representative Fred Nesler
P.O. Box 323
Mayfield, Kentucky 42066

Honorable Wendell H. Ford, U.S. Senate
173A Russell Senate Building
Washington, DC 20510-1701

Honorable Mitch McConnell, U.S. Senate
120 Russell Senate Building
Washington, DC 20510-1702

U.S. Representative Ed Whitfield
643 Winchester Drive
Hopkinsville, Kentucky 42240

Other

Ms. Corinne Whitehead
Coalition for Health Concern
Route 9, Box 25
Benton, Kentucky 42025

Site Specific Advisory Board

Ex-officio members
Mr. Wayne L. Davis - Environmental Section Chief, KY Dept. of Fish & Wildlife Resources
Mr. Carl Froede, Jr. - U.S. Environmental Protection Agency Region IV
Ms. Annette Hayden - Division of Waste Management, KDEP
Mr. Jimmie Hodges - DOE Paducah Site Manager
Dr. John Volpe, Ph.D - Manager, Radiation Control Branch, KDEP

Community members
Ms. Nola Courtney
Mr. Mark Donham
Mr. Tommy Fletcher
Mr. David Fuller
Mr. W.G. Harvey, Sr.
Mrs. Vicki Jones
Mr. William L. Kressenberg
Mr. Ronald Lamb
Ms. Linda Long
Ms. Connie J. Sykes
Mr. Gregory Waldrop

Environmental Advisory Committee

Dr. Gary W. Boggess
Mr. Bob Gresham
Mr. Leonard P. Grief
Mr. Gary D. Jackson
Dr. Charles G. Smith
Mr. Robert Thomas Walden

Neighborhood Council

Mr. Dylan Gipson
Mr. Benny F. Heady
Mr. Ronald Lamb
Mr. Philip Milner
Mr. Warren Smith
Mr. Charles Warford

Appendix G

Glossary

Glossary

This glossary defines terms often used by DOE and EPA staff in describing activities under **CERCLA** (commonly called "Superfund"), **RCRA**, or DOE's **Environmental Management and Enrichment Facilities (EMEF)** Program. The definitions that apply specifically to the CERCLA or RCRA programs may have other meanings when used in different circumstances. **Words in bold type are defined elsewhere in the glossary.**

Administrative Consent Order (ACO) - A legal agreement between EPA and **potentially responsible parties (PRPs)** under which PRPs agree to perform or pay the cost of a site **cleanup.** The agreement describes actions to be taken at a site and may be subject to a public **comment period.**

Administrative Record - A file that is maintained and that contains all the information used by the lead agency to make its decision on the selection of a **response action** under **CERCLA.** The file is to be available for public review, and a copy is to be available at or near the site, usually at one of the **information repositories.**

Agreement in Principle (AIP) - Funded by DOE, the AIP is an agreement with the University of Kentucky and the Kentucky Division of Waste Management to provide state oversight of DOE activities at PGDP.

Air Stripping - A treatment system that removes or strips volatile organic compounds from contaminated **groundwater** or **surface water** by forcing an airstream through the water and causing the compounds to evaporate.

Aquifer - An underground rock formation composed of materials such as sand, soil, and gravel that can store **groundwater** and supply **groundwater** to wells and springs.

Carcinogen - A substance that causes cancer.

Categorical Exclusion (CX) - A category of actions that does not have a significant effect on the environment and that normally does not require the preparation of an **EA** or an **EIS** under **NEPA.** DOE and other federal agencies define the actions that qualify as **categorical exclusions** in their implementing regulations for **NEPA.**

Cleanup - Actions taken to deal with a release or a threatened release of **hazardous substances** that could affect public health or the environment. The term often is used broadly to describe various response actions or phases of **remedial responses**, such as the **remedial investigation** and the **feasibility study**.

Comment Period - A time period for the public to review and comment on various documents and EPA or DOE actions. For example, a **comment period** is established when EPA proposes to add sites to the **National Priorities List.** A minimum 30-day **comment period** is held to allow community members to review and comment on a draft **RI/FS** and a **proposed plan;** the period must be extended an additional 30 days upon timely request. A **comment period** is required to amend the **ROD.** Similarly, a 30-day **comment period** is established when EPA proposes to delete a site from the **NPL.**

Community Relations (CR) - EPA's program for informing and involving the public in the **Superfund** process and for responding to community concerns.

Community Relations Plan (CRP) - The formal plan for EPA **community relations** activities at a **Superfund** site.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - A federal law passed in 1980 and modified in 1986 by the **Superfund Amendments and Reauthorization Act** that establishes procedural, substantive, and administrative requirements for responding to releases of **hazardous substances**. The act created a special tax that goes into a Trust Fund, commonly known as **"Superfund,"** to investigate and clean up abandoned or uncontrolled hazardous waste sites. Monies from the trust fund are not available to federal facilities.

Corrective Measures Study (CMS) - The study performed under **RCRA** to identify and screen **cleanup** alternatives and to analyze the costs and technology of the alternatives. The CMS is analogous to the **feasibility study** under **CERCLA**.

Decontamination and Decommissioning (D&D) - The process of removing a facility from operation, followed by decontamination (removing unwanted material, usually radioactive, by washing, chemical action, mechanical cleaning or other techniques), entombment, dismantlement, or conversion to another use.

Environmental Assessment (EA) - A concise public document prepared under **NEPA** that contains sufficient information and analysis for determining whether an agency needs to prepare an **EIS** or a **FONSI** for a proposed action.

Engineering Evaluation/Cost Analysis (EE/CA) - An analysis of **removal** alternatives for a site, similar to a **feasibility study**. Upon completion, the EE/CA must be made available for a 30-calendar-day public **comment period**. The **comment period** must be extended by at least 15 days upon timely request.

Environmental Impact Statement (EIS) - A detailed public document prepared under **NEPA** that discusses potentially significant environmental effects of a proposed action by a federal agency. An EIS informs agency decision-makers and the public about reasonable alternatives that would prevent or lessen adverse effects, and serves as a planning and decision-making tool for the agency.

Environmental Management and Enrichment Facilities (EMEF) - DOE program for cleaning up and restoring sites contaminated by **hazardous substances** during past production or disposal activities and managing waste from past operations and wastes generated by environmental restoration activities.

Finding of No Significant Impact (FONSI) - A public document, prepared by a federal agency under **NEPA**, presenting the reasons that a proposed action will not have a significant effect on the environment and thus an **EIS** will not be prepared.

Feasibility Study (FS) - See **remedial investigation and feasibility study**.

Groundwater - Water found beneath the earth's surface that fills pores between materials such as sand, soil, or gravel. In **aquifers**, **groundwater** occurs in sufficient quantities that it can be used for drinking water, irrigation, and other purposes.

Hazard Ranking System (HRS) - A scoring system used to evaluate potential relative risks to public health and the environment from releases or threatened releases of **hazardous substances**. EPA and states use the HRS to calculate a site score (0 to 100) on the basis of actual or potential release of hazardous substances from a site through air, **surface water**, or **groundwater**. The score is the

primary factor used to decide if a hazardous waste site should be placed on the **National Priorities List**.

Hazardous Substance – Any material that poses a threat to public health or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.

Hydrology – The science dealing with the properties, movement, and effects of water found on the earth's surface, in the soil and rocks below, and in the atmosphere.

Incineration – Burning of certain types of solid, liquid, or gaseous materials under controlled conditions to destroy hazardous waste.

Information Repository – A file containing current information, technical reports, reference documents, and **TAG** application information on a **Superfund** site. The **Information Repository** usually is in a public building that is convenient for local residents, such as a public school, the city hall, or a library.

Kentucky Pollutant Discharge Elimination System (KPDES) – A state program under Section 402 of the Clean Water Act that establishes standards under which a permit for discharges to water may be granted.

Leachate – A liquid resulting when water percolates, or trickles, through waste materials and collects components of those wastes. Leaching may occur at landfills and may result in **hazardous substances** entering soil, **surface water**, or **groundwater**.

Monitoring Wells – Special wells drilled at specific locations on or off a hazardous waste site where **groundwater** can be sampled at selected depths and studied to determine the direction of **groundwater** flow and whether the **groundwater** is contaminated. If contamination is detected, **monitoring wells** also can determine the types and amounts of contamination.

National Oil and Hazardous Substances Pollution Contingency Plan (NCP) – The federal regulation that guides the **Superfund** program. The NCP was revised in February 1990.

National Priorities List (NPL) – EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term **remedial response** using money from the **Superfund**. The list is based, primarily, on the score a site receives on the **Hazard Ranking System (HRS)**. EPA is required to update the NPL at least once a year. Federal facilities do not qualify for **Superfund** money.

National Environmental Policy Act (NEPA) – A federal law that requires federal agencies to conduct environmental reviews of actions that have the potential for adverse effect on the human environment.

Operable Unit – An action taken as one part of an overall site **cleanup**. For example, a system could be installed to halt rapidly spreading **groundwater** contaminants during the more comprehensive and long-term **remedial investigation** and **feasibility study**. A number of operable units can be used in the course of a site **cleanup**.

Parts Per Billion (ppb) – Units commonly used to express low concentrations of contaminants. For example, one ounce of trichloroethene (TCE) in one billion ounces of water is one ppb. If one drop of TCE is mixed in a competition-size swimming pool, the water will contain about 1 ppb of TCE.

Potentially Responsible Party (PRP) – An individual or a company (such as owners, operators, transporters, or generators of hazardous waste) potentially responsible for, or contributing to, the contamination problems at a **Superfund** site.

Preliminary Assessment (PA) – The process of collecting and reviewing available information about a known or suspected hazardous waste site or release. EPA or states use this information to determine if the site requires further study. If further study is needed, a **site inspection** is undertaken.

Proposed Plan – A public-participation requirement of **CERCLA** in which EPA summarizes for the public the preferred **cleanup** strategy, rationale for the preference, alternatives presented in the detailed analysis of the **remedial investigation and feasibility study**, and waivers to **cleanup** standards of §121(d)(4) that may be proposed. The plan may be prepared either as a fact sheet or a separate document. In either case, it must actively solicit public review and comment on all alternatives under consideration.

RCRA Facility Investigation (RFI) – Analytical studies performed under **RCRA** to determine the extent of hazardous waste contamination, similar to the **CERCLA remedial investigation.**

Record of Decision (ROD) – A public document that explains which **cleanup** alternative will be used at **National Priorities List** sites. The **record of decision** is based on information and technical analysis generated during the **remedial investigation** and **feasibility study** and on consideration of public comments and community concerns.

Remedial Action (RA) – The construction or implementation phase that follows the **remedial design** of the selected **cleanup** alternative at a site and during response actions.

Remedial Design (RD) – An engineering phase that follows the **record of decision**, when technical drawings and specifications are developed for the subsequent **remedial action** at a site on the **National Priorities List**.

Remedial Investigation and Feasibility Study (RI/FS) – Investigative and analytical studies usually performed at the same time in an interactive, iterative process. They are intended to do the following:

- Gather the data necessary for determining the type and extent of contamination at a **Superfund** site
- Establish criteria for cleaning up the site
- Identify and screen **cleanup** alternatives for **remedial action**
- Analyze in detail the technology and costs of the alternatives

Remedial Response – A long-term action that stops or substantially reduces a release or threatened release of **hazardous substances** that is serious but does not pose an immediate threat to public health or the environment.

Remediation – Cleanup or other methods used to remove or contain a toxic spill or hazardous materials from a **Superfund** site.

Removal Action – An immediate action taken over the short term to address a release or a threatened release of **hazardous substances**.

Resource Conservation and Recovery Act (RCRA) - A federal law that established a regulatory system for tracking **hazardous substances** from their generation to disposal. The law requires that safe and secure procedures be used in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed to prevent new uncontrolled hazardous waste sites.

Response Action - A **CERCLA**-authorized action at a **Superfund** site involving either a short-term **removal action** or a long-term **remedial response** that may include, but is not limited to, the following activities:

- Removing hazardous materials from a site to an EPA-approved, licensed hazardous waste facility for treatment, containment, or destruction
- Containing the waste safely on the site to eliminate additional problems
- Destroying or treating the waste on the site using **incineration** or other technologies
- Identifying and removing the source of **groundwater** contamination and stopping further movement of the contaminants

Responsiveness Summary - A summary of oral and written public comments received by EPA during a **comment period** on key EPA documents and EPA's responses to those comments. The **responsiveness summary** is a key part of the **ROD**, highlighting community concerns for EPA decision-makers.

Selected Alternative - The **cleanup** alternative selected for a site on the **National Priorities List** on the basis of technical feasibility, permanence, reliability, and cost. The **selected alternative** does not require EPA to choose the least expensive alternative. The requirement is that if there are several **cleanup** alternatives available that deal effectively with the problems at a site, EPA must choose the remedy on the basis of permanence, reliability, and cost.

Site Inspection (SI) - A technical phase that follows a **preliminary assessment** and is designed to collect more extensive information on a hazardous waste site. The information is used to score the site by using the **Hazard Ranking System** to determine whether a **response action** is needed.

Superfund - The common name used for the **Comprehensive Environmental Response, Compensation, and Liability Act**.

Superfund Amendments and Reauthorization Act (SARA) - Modifications to **CERCLA** enacted on October 17, 1986.

Surface Water - Bodies of water that are above ground, such as rivers, lakes, and streams.

Technical Assistance Grant (TAG) Program - A grant program that provides funds for eligible citizens' groups to hire independent technical advisors to help them understand and comment on technical decisions relating to **Superfund cleanup** actions.

Treatment, Storage, and Disposal Facility (TSDF) - A building, structure, or installation where a **hazardous substance** has been treated, stored, or disposed of. TSDFs are regulated by EPA and states under the **Resource Conservation and Recovery Act**.