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**Oak Ridge Reservation Federal Facility Agreement
Quarterly Report
for the Environmental Restoration Program**

Volume 4. July-September 1993

**Environmental Restoration Program
P.O. Box 2003
Oak Ridge, Tennessee 37831-7298**

Date Issued—October 1993

**Prepared for
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
under budget and reporting code EW 20**

**MARTIN MARIETTA ENERGY SYSTEMS, INC.
managing the**

**Oak Ridge K-25 Site
Oak Ridge Y-12 Plant
Oak Ridge National Laboratory
under contract DE-AC05-84OR21400**

**Paducah Gaseous Diffusion Plant
Portsmouth Gaseous Diffusion Plant
under contract DE-AC05-76OR00001**

**for the
U.S. DEPARTMENT OF ENERGY**

MASTER

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ACRONYMS

APO	Analytical Projects Office
ARAR	applicable or relevant and appropriate requirement
BNI	Bechtel National, Inc.
BRE	Baseline Risk Evaluation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	<i>Code of Federal Regulations</i>
COPC	contaminants of potential concern
CWA	Clean Water Act
D&D	decontamination and decommissioning
DNAPLs	dense, nonaqueous-phase liquids
DOE	Department of Energy
DOE-HQ	DOE Headquarters
DOE-ORO	DOE Oak Ridge Operations Office
DQO	data quality objective
EA	environmental assessment
EFPC	East Fork Poplar Creek
EPA	Environmental Protection Agency
ER	Environmental Restoration
ERWM	Environmental Restoration and Waste Management
FFA	Federal Facility Agreement
FFS	focused feasibility study
FS	feasibility study
FS/EA	feasibility study/environmental assessment
GIS	Government Information System
GPS	Global Positioning System
GWPO	Groundwater Protection Office
GWPP	Groundwater Protection Program
IMIS	Inventory Management Information System
IROD	Interim Record of Decision
LDRIF	Low Dose Rate Irradiation Facility
LLW	liquid low-level radioactive waste
NAA	Neutron Activation Analysis
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
OHF	Old Hydrofracture Facility
ORAU	Oak Ridge Associated Universities
OREIS	Oak Ridge Environmental Information System
ORHSP	Oak Ridge Hydrology Support Program
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OU	operable unit
PA/SI	Preliminary Assessment/Site Inspection
PCB	polychlorinated biphenyl

PWMP	Ponds Waste Management Program
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RMPE	reduction of mercury in plant effluents
ROD	Record of Decision
SAIC	Science Applications International Corporation
SCF	South Campus Facility (ORAU)
SEG	Scientific Ecology Group, Inc.
SWSA	solid waste storage area
TDEC	Tennessee Department of Environment and Conservation
TOA	Tennessee Oversight Agreement
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
UNC	United Nuclear Corporation
UST	underground storage tank
VDRIF	Variable Dose Rate Irradiation Facility
VOC	volatile organic compound
WAG	waste area grouping
WOC	White Oak Creek
WOCE	White Oak Creek Embayment
WOL	White Oak Lake

1. EXECUTIVE SUMMARY

This quarterly progress report satisfies requirements for the Environmental Restoration (ER) Program that are specified in the Oak Ridge Reservation (ORR) Federal Facility Agreement (FFA) established between the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the Tennessee Department of Environment and Conservation (TDEC). The reporting period covered is July through September 1993 (fourth quarter of FY 1993).

Sections 1.1 and 1.2 provide respectively the milestones scheduled for completion during the reporting period and a list of documents that have been proposed for transmittal during the following quarter but have not been approved as FY 1994 commitments.

1.1 DOCUMENTS TRANSMITTED TO THE REGULATORS

The following documents were transmitted to the regulators during the fourth quarter of FY 1993 and are available at the Information Resource Center in Oak Ridge.

- Chestnut Ridge Operable Unit (OU) 1 Remedial Investigation (RI) Work Plan (DOE/OR/01-1173&D1)
- Chestnut Ridge OU 4 RI Work Plan (DOE/OR/01-1152&D1)
- Bear Creek Valley OU 1 Phase I RI Work Plan (DOE/OR/01-1161&D1, Vols. 1 and 2)
- Upper East Fork Poplar Creek (EFPC) OU 3 RI Work Plan (DOE/OR/01-1151&D1)
- Waste area grouping (WAG) 2 Phase I RI Report (DOE/OR/01-1179&D1)
- WAG 7 In Situ Vitrification Treatability Study Work Plan (DOE/OR/01-1158&D1)
- Risk Characterization Data Manuals for Inactive Liquid Low-Level Radioactive Waste (LLLW) Tank Systems at Oak Ridge National Laboratory (ORNL) (DOE/OR/01-1159&D1)
- Active LLLW Tank Lines Leak Detection Plans/Schedules (DOE/OR/01-1129&D1)
- K-770 RI Work Plan (DOE/OR/01-1157&D1)
- K-1070 SW-31 Spring Remedial Design Report (Phase I) (DOE/OR/03-1139&D1, Vols. 1 and 2)
- Record of Decision (ROD) for the K-1407 B & C Ponds at the Oak Ridge K-25 Site (DOE/OR/02-1125&D2)
- WAG 6 Environmental Monitoring Plan (DOE/OR/01-1192&D1)
- K-25 Pond Waste Remedial Action Explanation of Significant Differences (DOE/OR/02-1181&D1)
- Postconstruction Report for the Mercury Tanks Interim Action (DOE/OR/01-1169&D1)

1.2 DOCUMENTS PROPOSED FOR TRANSMITTAL

The following documents have been proposed for transmittal to the regulators during the first quarter of FY 1994.

- K-1407 B & C Ponds Remedial Design/Remedial Action Work Plan
- K-1070 SW-31 Spring Phase II Remedial Design
- WAG 6 Quality Assurance (QA) Project Plan
- K-1407 B & C Remedial Design Report

2. SIGNIFICANT ACCOMPLISHMENTS

The following significant accomplishments are noted for the ER Program during the fourth quarter of FY 1993.

Y-12

- **Mercury Abatement Task Force**

The Y-12 Environmental Restoration Program established a multiprogram task force to address mercury contamination at Y-12 and established a technical basis for a site-specific criterion for mercury in EFPC. The Reduction of Mercury in Plant Effluent (RMPE) Phase II task force will coordinate implementation of the Y-12 integrated mercury strategy, coordinate mercury abatement activities with ongoing plant operations, and help mitigate current sources of mercury from Y-12 buildings and ongoing sources entering surface water. Specific objectives of RMPE work include (1) the cleanup and modification of existing pipes, drains, basements, and other historically contaminated sources of mercury continuing to release small amounts of mercury to surface waters and (2) the continued characterization of such sources. An underlying purpose of the task force is to ensure that decontamination and decommissioning (D&D) activities at Y-12 do not result in the release of mercury to the water systems above treatable limits and to help provide permanent water treatment capacity at the plant for mercury. The RMPE Phase II goal is to provide compliance with the Y-12 Plant National Pollutant Discharge Elimination System (NPDES) permit to proposed limits for mercury in stream concentration. Toward this end, and in support of ongoing NPDES permit negotiations with the state of Tennessee, the task force has proposed an alternative mercury concentration for the creek based on the technical judgment of mercury experts at the plant. (See Y/ER-126, *Site-Specific Water Quality Criterion for Total Mercury in East Fork Poplar Creek Downstream from the Y-12 Plant.*) This proposed site-specific water quality criterion for mercury is now under review by the state.

- **Other Mercury Abatement Activities**

A process line in Building 9201-2 was rerouted and resulted in a significant decrease of loading of mercury to EFPC. Building 9201-2 was historically used in the Colex process for separating isotopes of lithium. This process used large quantities of mercury. Today the building houses the ORNL Fusion Energy Program. Mercury-contaminated storm drains and sumps in the basement of the building will be bypassed, and new ductile iron pipe will connect to existing storm drains outside the building. These actions will mean that clean water will not have to pass through contaminated pipes and thus will further reduce mercury contribution to EFPC.

The postconstruction report for the Mercury Tanks Interim Action was submitted to the regulators.

- **Kerr Hollow Quarry**

Approximately \$16M was saved through the disposal of shredded debris from Kerr Hollow Quarry at the Walk-In Pits. Closure activities on Y-12's Kerr Hollow Quarry were completed after 5 years of cleanup activities that had been characterized by a number of unexpected developments—developments that were primarily the result of incomplete disposal records for the quarry's early years. The unexpected developments

included the discovery of low-level radioactive contamination and intact cylinders of compressed gas, both of which complicated and delayed the project. The ~5,000 ft³ of debris that remains from the quarry cleanup will be disposed of at the Walk-In Pits at a cost savings of ~\$16M. The entire project cost ~\$14M.

Approximately 20,000 items were removed from the quarry following underwater explosive breaching of a variety of containers, ranging from drums to glass vials, to render their contents nonhazardous. Breaching activities involved the use of an unmanned submarine, underwater video-mapping, a grappling arm, and an underwater shredder constructed of half-inch steel and with 2-in.-thick steel teeth. The 2.5-acre flooded limestone quarry, located ~1.5 miles south of the main plant in an area inaccessible to the public, was used from 1951-1988 as a treatment site for water-reactive, corrosive, and ignitable wastes from the Y-12 Plant and ORNL. Few disposal records exist for the period from 1952-1962. The quarry lake is 55 ft deep and is sheltered on three sides by 60-ft high rock cliffs. The site was originally used in the 1940s as a source of building materials for the Manhattan Project and was later abandoned and allowed to flood.

When the site was in operation, containers of waste were rolled into the quarry from a chute on the cliff's edge and punctured by shots fired by security forces on the bluff. This allowed water to enter the containers, react with the waste and render it nonhazardous. Not every container was punctured before sinking, resulting in a number of intact containers resting in jumbled piles on the quarry floor.

In September 1988, TDEC approved a Resource Conservation and Recovery Act (RCRA) closure plan that would bring the site into regulatory compliance. At that time, the plan called for the underwater operations described above and the later sale of the scrap metal removed from the quarry to an outside vendor. However, in January 1991, low levels of radiological contamination, in the form of depleted uranium, were found in the shredded debris removed from the quarry, thus eliminating the option of off-site disposal of the debris. That debris will now be disposed of at the Walk-In Pits.

In early October the submarine and video camera will map the quarry floor to ensure that no containers remain on the lake bottom. Equipment decontamination and demobilization of subcontractors and project personnel should be accomplished by mid-October. RCRA closure of the quarry will then be complete, and remediation will be carried out under the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A CERCLA Preliminary Assessment and Site Investigation (PA/SI) will then be conducted to determine what, if any, additional remediation will be required. The PA/SI will be carried out in cooperation with TDEC, according to the terms of the FFA.

- **Sampling of Upper EFPC OU 1**

Upper EFPC OU 1 consists of surface water runoff from the storm sewer system and of contaminated soil, shallow groundwater, and surface water associated with the Mercury Use areas. The storm sewer system consists of an extensive array of storm drains that gather runoff from the main plant area in catch basins located across the plant. The storm sewer network contains several miles of drainage pipes and culverts that range up to 72 in. in diameter. Upper EFPC begins underground at the west end of the Y-12 Plant, surfaces near the middle of the plant, flows to the northeast along Bear Creek Valley, and exits the valley to the north within 0.5 mile of the plant. Upper EFPC is fed entirely from storm sewer system discharges. Direct surface water runoff from the plant production areas and groundwater seepage are additional sources of Upper EFPC flow.

Because flow originates entirely within the Y-12 Plant, this OU focuses on an evaluation of sources of contamination in surface water flow entering the storm sewer system.

Two dry weather sampling events were undertaken at the storm sewer/surface water. Each event was a synoptic sampling of all outfalls below the north-south pipe and main lines above the north-south pipe. The north-south pipe runs east to west across the Y-12 Plant; it demarcates the point where EFPC begins to flow above ground. West of the north-south pipe the creek is captured by the storm sewer system. This sampling effort is an integration of CERCLA and Clean Water Act (CWA) requirements, using plant NPDES personnel to ensure that an individual sampling effort will satisfy two needs: CERCLA RI sampling requirements and the data needs of NPDES personnel.

ORNL

- **WAG 2**

ORNL WAG 2 includes two sites. The first site consists of the area encompassed by the stream channels of White Oak Creek Embayment prior to confluence with the Clinch River. White Oak Creek/White Oak Lake and its tributaries represent the primary surface water drainage system for ORNL and the surrounding facilities. During this quarter, ORNL WAG 2 groundwater well evaluation, groundwater fieldwork, and groundwater seeps and springs inventory were completed. The WAG 2 Waste Management Plan was submitted for review and approval. The supercomputer groundwater model was extended to include the entire Melton Valley OU. ORNL WAGs 5, 8, and 10 are now included in the model area in addition to WAGs 2, 4, 6, and 7.

- **WAG 5**

ORNL WAG 5 is comprised of 16 remediation sites, including LLLW transfer lines and leak sites, hydrofracture surface facilities, waste storage tanks, a sludge basin and a holding pond, a shallow land burial ground containing radioactive and hazardous wastes [solid waste storage area (SWSA) 5], and a transuranic waste storage area. The major contaminants detected in shallow groundwater are ⁹⁰Sr and tritium. The partial storm sampling event for surface water discharges in support of focused seep area activities for WAG 5 was completed, and the installation of drive point wells in support of the focused seep investigation and the installation of deep wells in support of the groundwater OU were begun. The WAG 5 contaminated seep area C & D will be addressed as a removal action, as per an agreement reached in September among DOE, EPA, and TDEC.

- **Well Plugging and Abandonment**

WAG 6 consists of SWSA 6, the Emergency Waste Basin, and the Explosives Detonation Trench. SWSA 6 is located northwest of White Oak Creek near White Oak Dam and State Highway 95. This 68-acre site is still in operation as a waste burial ground for solid low-level radioactive waste. Contaminants of concern include various radionuclides and hazardous chemicals. Phase IA of the well plugging and abandonment activities for WAG 6 have been completed, with a total of 156 wells having been addressed. Field activities for the Phase IB (trench wells) plugging and abandonment activities have begun, with a total of 77 wells having been addressed.

- **WAG 10**

WAG 10 consists of the injection wells and grout sheets associated with two hydrofracture process experimental locations: the Old Hydrofracture Facility and the New Hydrofracture Facility. The facilities themselves are associated with WAGs 5, 7, and 8. During the quarter just concluded, engineering planning associated with the wellhead closed tapping system and subsequent groundwater sampling activities was completed. The WAG 10 Data Base Management Plan was also completed.

- **WAG 13**

WAG 13 consists of the Cesium-137 Contaminated Field and the Cesium-137 Erosion/Runoff Study Area. The contaminated field is located about 330 ft north of the Clinch River at Clinch River Mile 20.5. The 50-acre area was set aside for the study of the ecological effects of simulated fallout of cesium-137, which would occur in the event of a nuclear war. The contaminant consisted of cesium-137 fused at high temperature to silica particles. After about 20 years (since contamination), about 5.2 curies of activity remains. EPA and TDEC approved the Remedial Action Work Plan in July, and remedial action began on August 30. Cesium-contaminated soil will be packaged in B-25 boxes and transported to SWSA 6 for storage.

- **Inactive LLLW Waste Tanks**

Liquid low-level radioactive wastes have been collected at ORNL since 1943 in tank systems used for storage, transfer, and neutralization. Some of the tanks have been removed from service. Most of these tanks are the responsibility of the ER Program and are in the CERCLA remediation process, but a few of these tanks are owned by Waste Management and LLLW generators. These remaining tanks are being transferred to ER. Liquids and sludges remain in many of the tanks, with several tanks receiving inleakage from rain water. The tanks are located in various WAGs, but mainly in WAGs 1 and 5. Liquid contents for Category D, Group 5, inactive LLLW waste tanks were removed on September 22. The Risk Characterization Data Manual for the Inactive Group 5 and 6 Tanks was submitted to EPA and TDEC for information purposes. Modifications were completed on the W-12 tanks system to bypass a leak in the discharge line from the tank. The tank continues to receive groundwater inleakage, and approval has been received from TDEC to use the new doubly contained discharge line to remove the inleakage water from the tank.

Oak Ridge K-25 Site

- **K-1407 B & C Ponds**

A Remedial Design/Remedial Action Work Plan for the K-1407 B & C Ponds was submitted to EPA and TDEC. The K-1407 B & C Ponds are former waste holding ponds at the K-25 Site. Both ponds were contaminated with residues from K-25's uranium enrichment processes, which DOE discontinued in 1985. None of the contamination is thought to have moved off the plant site. For each unit of the OU, a Remedial Investigation/Feasibility (RI/FS) report, a proposed plan, and a ROD will be prepared. The constituents not addressed in the formal RCRA process will be addressed in the CERCLA process. This will meet the need to address the radionuclide contamination. The above action will achieve complete remediation of the K-1407 B & C units as CERCLA source OUs and as RCRA Interim Status Units.

- **K-1070 SW-31 Spring**

On August 1, an interim remedial action (air stripping and carbon filtration) was initiated in accordance with the Interim Record of Decision (IROD) for the K-1070 SW-31 Spring; on August 24, a Phase I remedial design was submitted to EPA and TDEC. The seep appeared after an attempted reclamation of the area bordering the west end of the K-1070 C/D Classified Burial Ground, which was swampy and had an unpleasant smell. The burial ground was used to dispose of a variety of equipment and waste, including solvents and hazardous chemicals. The seep currently flows into a storm drain that discharges into Mitchell Branch.

- **K-1070 OU**

Field activities for implementation of the RI Work Plan for the K-1070 OU began. Field activities should be completed during the next quarter. The K-1070 OU is located on the eastern edge of the K-25 Site. Practical components are a 22-acre burial ground and three storage dikes. Low-level radioactive and nonradioactive, nonhazardous waste materials and equipment were buried in large trenches at the K-1070 C/D Classified Burial Ground from 1972-1989. Wastes include hazardous chemicals and solvents, including a variety of organics. Heavy metals, including uranium and lead, were also buried there.

- **K-720 Bottom Ash Site**

The revised corrective action plan for the K-720 Bottom Ash Site was submitted to TDEC and DOE. The application of sludge and lime at the K-720 Ash Pile was completed, and drainage modification and placement of soil cover as specified in the corrective action plan were carried out. The K-720 ash pile (coal pile area) is located outside the K-25 Site, south of the plant area and north of the Highway 58 bridge over the Clinch River. Fly ash from the coal-fired steam plant was piled here while the powerhouse was operating. Runoff and leachate from the ~2-acre pile, which is presently unused, have not been controlled. The K-720 Bottom Ash Site consists of fly ash and boiler slag generated in the K-701 Powerhouse from the combustion of pulverized coal. Covering about 5 acres, this site is located ~1 mile southwest of the main plant.

- **K-901 OU**

Approval was received from TDEC on the K-901 OU RI Work Plan contingent upon their receipt of written comment resolution. The final comment resolution on the K-901 OU RI Work Plan was submitted to TDEC and EPA. The procurement package for the K-901 OU RI was submitted to DOE for approval, and TDEC approval of the K-901 OU RI Work Plan was received. The K-901 OU consists of a contaminated burial ground, landfarm, holding pond, and two construction waste disposal areas. The OU is located northwest of the main plant.

- **K-770 OU**

The K-770 OU RI Work Plan was submitted to TDEC and EPA on September 27. The K-770 OU includes a contaminated scrap metal yard and contaminated debris, two buildings used as part of a thermal diffusion plant in the 1940s, and a sewage treatment plant. The unit is located southwest of the main plant area at the Clinch River. Beginning operation times for the various subunits range from 1943 to the early 1960s. The scrap metal yard and sewage treatment plant are still in operation.

- **Public Workshop on the Explanation of Significant Differences for the K-25 Pond Waste Remedial Action**

The Community Relations Program conducted a public workshop on September 16 on the Explanation of Significant Differences for the K-25 Pond Waste Remedial Action and received one set of comments from the public on the Explanation of Significant Differences. The interim cleanup plan involves storing mixed (hazardous and low-level radioactive) waste sludges in aboveground tanks on the pad at the existing site. The sludges, which contain trace quantities of uranium and heavy metals, were removed from two wastewater storage ponds (the K-1407 B & C Ponds) in the mid-1980s.

After their removal from the ponds, part of the sludges were initially stabilized with a fly ash and cement mixture and placed into ~78,000 metal drums. The remainder of the unstabilized sludge was placed in ~32,000 drums, with the expectation that it would ultimately be solidified. To date, 46,000 drums have been treated and moved to indoor, regulation-compliant interior storage areas at the K-25 Site, and 32,000 drums of raw sludge remain on the pad.

In 1990, the storage yard was determined to be out of compliance with federal and state environmental regulations because the physical condition of the remaining drums on the pad had deteriorated. In September 1991, DOE proposed an interim cleanup to bring the site into compliance. The plan involved drying those sludges containing free liquids and repackaging all sludges into approved containers, but a fatal industrial accident in November 1992 led to the suspension of all interim cleanup activities associated with the drum storage yard.

The accident investigation highlighted a number of technical and management concerns, prompting DOE to examine other interim and final disposition actions. Bulk storage of the waste in lined and covered aboveground tanks was chosen because it is a technically and regulation-wise acceptable approach and the most cost-effective of the alternatives considered.

Community Relations

The EFPC Citizens' Working Group continued its ongoing series of meetings on July 21, August 4, and September 14. The group has heard presentations and carried on in-depth discussions devoted to a variety of subjects of their choosing related to the remediation of the EFPC floodplain. These presentations have included such topics as risk assessment and a detailed investigation of several of the likely proposed remedial alternatives.

Dialogue continued with various stakeholders on a DOE proposal to establish a Site-Specific Advisory Board. Public meetings on this question were held in Oak Ridge on July 1, August 10, and September 20. No consensus from the community has been achieved on this question.

Issue 9 of the *Environmental Update* community newsletter was distributed.

A public workshop on the Explanation of Significant Differences for the K-25 Pond Waste Management Project was held on September 16.

Regulatory Commitment Status

Document title	Appendix E commitment date	Transmittal date
Chestnut Ridge OU 1 RI Work Plan	09/30/93	09/30/93
Chestnut Ridge OU 4 RI Work Plan	09/23/93	09/23/93
Bear Creek OU 1 Phase I RI Work Plan	09/30/93	09/30/93
Upper EFPC OU 3 RI Work Plan	08/21/93	08/13/93
WAG 2 Phase I RI Report	09/30/93	09/30/93
WAG 6 Environmental Monitoring Plan	10/01/93	09/10/93
WAG 7 Treatability Study	10/01/93	09/15/93
Risk Characterization of Inactive Group 5 Tanks*	09/30/93	09/15/93
Risk Characterization of Inactive Group 6 Tanks*	09/30/93	09/15/93
Active LLLW Tank Lines Leak Detection Plans/Schedules	09/30/93	09/30/93
K-770 RI Work Plan	09/30/93	09/27/93
K-1407 B&C Remedial Design/Remedial Action Work Plan	09/30/93	10/05/93
K-1407 B&C Remedial Design Report	09/30/93	10/05/93

*Combined in a single report.

3. TECHNICAL STATUS

3.1 Y-12 OPERABLE UNITS (OUs)

The Oak Ridge Y-12 Plant was built by the U.S. Army Corps of Engineers in 1943 as part of the Manhattan Project. The original mission of Y-12 was to separate the fissionable isotope of uranium (^{235}U) by the electromagnetic process. After World War II, the electromagnetic separation process was discontinued in favor of the more economical gaseous diffusion process.

Since the early years of Y-12 operations, the facility has developed into a highly sophisticated manufacturing and developmental engineering facility. It occupies ~800 acres and is located immediately adjacent to the city of Oak Ridge. The total work force consists of ~8000 persons, including employees of ORNL.

Currently, Y-12 produces components for the various nuclear weapons systems in the national defense arsenal. A portion of this effort involves converting ^{235}U compounds to metal and the appropriate casting, rolling, and machining operations required to produce a finished product.

One of the major responsibilities of the Y-12 Plant is to provide engineering support to ORNL and to the gaseous diffusion plants located in Oak Ridge; Paducah, Kentucky; and Portsmouth, Ohio. Approximately 1000 ORNL employees are located at the Y-12 Plant, principally in three divisions: Biology, Fusion Energy, and Engineering Technology. The facilities used by ORNL personnel at Y-12 range from complex animal research laboratories to fusion-energy apparatus. Y-12 fabricates hardware for experimental programs conducted at ORNL and for other research and production operations. In addition, Y-12 supplies a variety of housekeeping and maintenance services to installation groups.

An additional responsibility of the Y-12 Plant is to provide support and assistance to other government agencies whenever time or technology considerations warrant interagency agreements with DOE.

Over 200 contaminated units have been identified at the Y-12 Plant site resulting from past waste management practices. Many of these sites have been grouped into OUs based on priority and common assessment and remediation requirements. Eleven OUs constitute 31 units within the plant area and its surrounding environs. Each of the Bear Creek and Upper East Fork Poplar Creek (EFPC) hydrologic regimes are associated with an integrated surface water and groundwater OU. The Lower EFPC watershed constitutes both a source control and groundwater OU. The remaining eight OUs are source control OUs within the Bear Creek, Upper EFPC, and Chestnut Ridge hydrologic regimes. Groundwater contamination in the Chestnut Ridge hydrologic regime is associated with each source OU.

The remaining units have been grouped into the Y-12 Study Area and constitute lower priority units that will be investigated as preliminary assessment/site inspections (PA/SIs). New OUs or additions to existing OUs will be made if the degree of contamination determined by the PA/SI warrants further conduct of a remedial investigation/feasibility study (RI/FS).

Two OUs have been defined for groundwater and surface water contained within the Bear Creek and Upper EFPC hydrologic regimes. Groundwater will be investigated separately because of the overlapping nature of source plumes and the observation that most plumes share a common hydrologic unit for off-site transport. Also, many releases to groundwater are historical, and the resulting plumes are no longer likely to be associated with the original source. As the groundwater plumes are defined, they will be associated with sources to the extent practical.

3.1.1 Upper East Fork Poplar Creek OU 1 (Groundwater)

Description

Upper EFPC OU 1 consists of both surface water and groundwater components of the hydrogeologic system within the Upper EFPC hydrologic regime. This coupled groundwater and surface water regime is bounded by the crests of Chestnut and Pine ridges and extends east from a topographic high near the west end of the Y-12 Plant to the point where Lake Reality discharges to Lower EFPC. This OU is concerned with the surface water, including minor amounts of sediment in the Upper EFPC channel, and groundwater pathways that have the potential to transport contaminants to off-site receptors.

Numerous sources of contamination to both the surface water and groundwater flow systems exist within the plant area. Infiltration from the S-3 Ponds Waste Management Area dominates groundwater contamination in the western portion of the hydrologic regime. In addition to potential surface water and groundwater contamination sources identified in Upper EFPC OUs 1, 2, and 3, the majority of the potentially contaminated units making up the Y-12 Study Area are within the Upper EFPC hydrologic regime. Potential surface water contamination associated with the Storm Sewer System and Mercury Use Areas is of primary interest and will be addressed in this OU.

The Storm Sewer System consists of an extensive array of storm drains that gather runoff from the main plant area in catch basins located across the plant. In addition, this drainage system, which was once connected to process equipment, discharged untreated waste streams. The storm sewer network contains several miles of drainage pipes and culverts that range up to 108 in. in diameter. Upper EFPC begins near the middle of the Y-12 Plant and is fed primarily from Storm Sewer System discharges. Surface-water runoff from the Y-12 production areas and groundwater seepage are additional sources of Upper EFPC flow.

From 1955 through 1963, a column-exchange process involving large quantities of mercury was employed to separate lithium isotopes. The Mercury Use Areas include buildings and other facilities that have been designated as possible sources of mercury contamination because of known, suspected, or presumed releases. The area of investigation includes drainages associated with the following buildings and adjoining areas: 9201-2, 9201-5, 9204-4, 9202, 9733-1, 9733-2, and mercury flask storage areas and deflasking facilities. Additional mercury use areas are being addressed in Sect. 3:1.4.

Surface water and groundwater within the Upper EFPC hydrologic regime will be characterized and treated as an integrator OU distinct from source term OUs contributing contamination. This approach is warranted because (1) efforts to establish the horizontal and vertical extent of groundwater contaminant plumes from individual sites indicate that the plumes are significantly intermingled, making assessment and potential remedial actions of

individual plumes impractical and (2) the units share a common exit pathway from the hydrologic system which is best addressed by a comprehensive approach. Where site-specific groundwater or surface water data are needed to better identify the source or to support a screening-level risk assessment, groundwater or surface water assessment activities (e.g., piezometers or well points) may be conducted during the RI/FS process for the source control OUs.

The Y-12 Plant Health, Safety, and Environmental Accountability Division is currently implementing a comprehensive groundwater monitoring program within the Upper EFPC watershed. Features of this monitoring program include exit pathway monitoring wells located near off-site groundwater discharge points and a grid network to characterize groundwater contamination within the plant area.

Accomplishments

Two dry-weather sampling efforts were undertaken at the storm sewer/surface water.

Concerns

Concern: The Lower EFPC RI/FS has identified current releases from the Y-12 Plant as significant to ecological risk. **Impact:** The full CERCLA process may not provide a quick enough turnaround to please the public and the state. **Action:** The schedule for the CERCLA process in the plant may need to be accelerated and for more aggressive RMPE project schedules.

Scheduled Activities for Next Quarter

The RI field sampling for storm sewer/surface water will be completed.

Planning will be completed for wet weather sampling, and the sampling will be initiated.

3.1.2 Upper East Fork Poplar Creek OU 2

Description

Upper EFPC OU 2 is the Abandoned Nitric Acid Pipeline, which was used between 1951 and 1983 to transport a waste stream made up of nitric acid and depleted uranium from Building 9215 to the S-3 Ponds for disposal. The S-3 Ponds consisted of four unlined surface impoundments that underwent Resource Conservation and Recovery Act (RCRA) closure in 1988. The pipeline was constructed of 1.5- to 3.0-in.-diam stainless steel pipe and was buried at an average of 5 ft below the ground surface. Numerous leaks have been determined, with the earliest in 1951 at a weld about 350 ft east of the discharge point.

The primary exposure pathways associated with the Nitric Acid Pipeline are soil contamination resulting from adsorption from leaked solutions, groundwater contamination resulting from waste solutions infiltrating to the groundwater table, and surface-water contamination resulting from groundwater seeps. Nitrate and uranium are the primary contaminants of concern. Upper EFPC OU 2 will primarily address soil contamination along the length of the pipeline. Groundwater and surface water will be addressed within this OU

only to identify potential sources of groundwater contamination along the length of the pipeline and to support a screening-level risk assessment. Evaluation of the extent of groundwater and surface water contamination and consideration of remedial alternatives will be conducted within Upper EFPC OU 1.

Accomplishments

Laboratory results have been received and validated, and these data are being loaded into the Y-12 Site Oak Ridge Environmental Information System (OREIS) data base. A preliminary site characterization summary has been prepared. Minimal contamination was found. This activity was originally scheduled as a phased RI. The second phase of sampling has been deleted.

Concerns

None.

Scheduled Activities for Next Quarter

The Phase I site characterization study will be completed.

Data loading to the Y-12 OREIS data base will be completed.

An approach to the risk assessment will be developed.

3.1.3 Upper East Fork Poplar Creek OU 3

Description

Upper EFPC OU 3 consists of the S-2 Site; the area around Building 81-10; the Coal Pile Trench; the Salvage Yard Oil and Oil/Solvent Storage Areas, Scrap Metal Storage Area, and Drum Deheader; and the Machine Coolant Storage Tanks and Waste Coolant Processing Facility.

S-2 Site. The S-2 Site is located in the southeastern area of the plant, south of Building 9720-32. The unit was used from about 1943 to 1951 to dispose of corrosive and toxic liquid wastes generated from Y-12 operations. The unit originally consisted of a 45- by 128-ft unlined earthen reservoir that was ~20 ft deep. The reservoir was filled and stabilized when disposal operations ended. Heavy metals, including mercury in soil, are the contaminants of concern.

Building 81-10. Building 81-10 was used from 1957 until 1982 for mercury recovery operations by physical separation or distillation in a furnace. Mercury releases associated with handling during physical separation and from operation of the furnace have been documented. Initial assessments of the site indicate mercury contamination of soil surrounding the building and storage pad.

Coal Pile Trench. The Coal Pile Trench is a 50,000 ft³ earthen trench located beneath a coal pile west of the Y-12 Steam Plant (Building 9401-3). The trench was used to dispose of uranium and depleted uranium alloys, molybdenum, thiourea, carbon support forms, and

other nonuranium materials. Because of the presence of the coal pile, there is no access to the soil overlying the trench. The primary concern at this time is groundwater contamination from trench leachate, which will be addressed in Upper EFPC OU 1.

Salvage Yard. The Salvage Yard has been operating at the northwestern portion of the Y-12 Plant since 1950, when it was used solely for storage of uranium-contaminated and noncontaminated scrap metal. The total area of the Salvage Yard is ~2.2 acres, of which about 75% is covered with scrap metal and other salvage materials. Waste oils containing PCBs were stored between 1980 and 1987 in two storage tanks located in the northern portion of the yard. The Salvage Yard Oil/Solvent Drum Storage Area was used to store waste oils contaminated with uranium and/or beryllium and chlorinated organic solvents. The Salvage Yard Oil/Solvent Drum Storage Area had a capacity of about 3200 fifty-five-gallon drums and was in operation from 1976 until its RCRA closure in 1988. The Salvage Yard Drum Deheader is also located in the northern portion of the Salvage Yard and has been in use since 1959. Soil contamination, resulting from uranium-contaminated salvage materials and solvents associated with the drum handling/storage operations, is of primary concern.

Machine Coolant Storage Tanks. Three 14,000-gal steel storage tanks that store waste machine coolant are located within concrete dikes. Two of these tanks have leaked. This project will remove the sludge, decontaminate the tanks, dismantle them, and dispose of them as salvage.

Waste Coolant Processing Facility. Operations at the Waste Coolant Processing Facility have been ongoing since 1985. The facility processes waste coolants from the plant which are transferred from within the plant and discharged into concrete unloading pits. Waste coolants can be contaminated with chlorinated organics, methyl ethyl ketone, cadmium, chromium, lead, and depleted uranium. The treatment area of the facility is fully contained inside concrete dikes; however, spills may have been associated with the unloading and storage areas.

Accomplishments

The RI Work Plan was issued for regulator review and comment.

Concerns

None.

Scheduled Activities for Next Quarter

Comments from TDEC and EPA on the RI Work Plan will be incorporated.

3.1.4 Reduction of Mercury in Plant Effluents

Description

Building 9201-2 Pipe Reroute. Mercury-contaminated storm drains and sumps in the basement of Building 9201-2 will be by-passed, and the installation of new ductile iron pipe will connect to existing storm drains outside of the building.

Mercury Tank Remediation. A storm water sewer system drains the Y-12 site and discharges directly to Upper EFPC. Three concrete settling tanks (2100-U, 2101-Y, and 2104-U) that receive flow from fan room sumps in the basements of Buildings 9201-4 and 9201-5 are tied into the storm sewer system. The tanks are divided into two or more compartments, and the wall dividing the compartments is open at the top, allowing liquids to flow between the compartments when the tank is full. Tank 2100-U is located southwest of Building 9201-4, tank 2101-U is located southeast of Building 9201-4, and tank 2104-U is located southeast of Building 9201-5.

Because of past spills and wastewater discharges, mercury-contaminated sediment has filled these tanks, and recent sampling indicates that finely divided, mercury-contaminated sediment is still being discharged to two of the three tanks. Tank 2101-U no longer receives water from the fan room sumps, but all three tanks have been identified as contributing mercury to Upper EFPC. The sediments contained in Tanks 2100-U and 2101-U are denoted as special nuclear material because the percent of ^{235}U is greater than 0.7%. The material in all three tanks is classified as mixed waste due to the presence of both radioactive and hazardous constituents.

Building 9201-5 Pipe Reroute. Mercury-contaminated storm drains and sumps in the basement of Building 9201-5 will be by-passed by the installation of new ductile iron pipe which will connect to existing storm drains outside of the building.

Mercury Treatment Facility. A new on-line effluent treatment facility will be constructed to remove mercury from the Y-12 Plant storm water. The preconceptual design is for a 50-gpm ion-exchange facility with associated pumps and piping to collect the contaminated water from four storm sewer outfalls and transport it for treatment.

Accomplishments

Planning for the next RMPE subproject—the Mercury Treatment Facility—began. This subproject will include planning, design, and construction activities for a Mercury Treatment Facility at the Y-12 Central Pollution Control Facility. An interim solution of carbon filters is being installed for 9201-2 sumps.

The postconstruction report for the Mercury Tanks Interim Action was submitted to the regulators.

Detailed investigations of the mercury use building sumps and piping systems continued. The sampling plan for the mercury use buildings and associated sumps and piping systems was implemented.

Testing of ion exchange resins and carbon filters for the treatment facility continued.

Concerns

Concern: NPDES permits are being negotiated for Y-12 at this time. **Impact:** Specific discharge limits for mercury, which do not currently exist, will be established. **Action:** Outfalls 49 and 55 will be targeted by the regulators for special consideration.

Concern: Regulators are asking that mercury remediation have a quicker turnaround than is currently projected in the CERCLA process. **Impact:** Possible NPDES violations and/or public disfavor could result. **Action:** More aggressive schedules may be required due to this concern. A cooperative effort between the Health, Safety, and Environment organization and the Energy Systems ER and Environmental Sciences divisions has been initiated to provide alternative strategies for NPDES compliance to present to TDEC. Projects are being analyzed for possible schedule acceleration, and input will be provided into compliance schedules anticipated in the NPDES permit.

Scheduled Activities for Next Quarter

Planning activities will continue for the Mercury Treatment Facility subproject. Activities include, but are not limited to, preparing the systems requirement document, continuing treatability studies, developing health and safety criteria, and preparing design criteria.

The data collection phase of evaluation of the mercury use building will be completed.

The interim solution for Outfalls 49 and 55 will be initiated along with some additional rerouting to reduce contaminated flows. This requires procurement, installation, and testing of the modular treatment units.

3.1.5 RCRA Closures

Description

This subproject consists of three areas: (1) Building 9409-5 Tank Storage Area; (2) the Garage Underground Storage Tanks; and (3) the Interim Drum Yard.

YS-017 Building 9409-5 Diked Tank Storage Area. The Building 9409-5 Diked Tank Storage Area is a RCRA outdoor, concrete, diked area having a capacity of ~238,000 gal. This facility was constructed in 1942 as a four-cell cooling tower basin, but it was modified in 1980 for use as a secondary containment facility for tanks and drums of liquid waste. These tanks and drums have contained, at various times, liquid waste coolant, solvents, and waste oils, all of which may have contained PCBs. Some of the waste liquids stored in this facility were known to have contained uranium and beryllium. Chromium may be present as a result of the water treatments used during cooling tower operations. One tank, now empty, remains in the westernmost cell, but it will be removed prior to closure activities.

YS-019 Garage Underground Tanks. The Garage Underground Tanks were part of an on-site facility for servicing motor vehicles. This facility included a gas station with associated underground fuel tanks, underground piping, dispensing pumps, a building, and ancillary fixtures. Two tanks were previously used to store unleaded gasoline (a 20,000-gal tank) and leaded gasoline (a 10,000-gal tank). The tanks were subsequently diverted from their initial use to the storage of waste oils containing the spent solvents perchloroethylene and Freon-113 and measurable quantities of PCB and uranium. A third empty tank in the same dirt emplacement with the two RCRA tanks contained waste oil that was not hazardous under current regulations.

Surface soil shows evidence of spills/leaks that occurred during sampling and transfer operations. These tanks were originally gasoline storage tanks and were later converted to store the following:

Largest tank: unleaded gasoline, 1975 to 1979
waste oil, 1980 to present

Smaller tanks: gasoline, 1962 to 1979
waste oil, 1980 to present

Clean closure of the tanks began in 1988 by the excavation and decontamination of the tanks, sampling of surrounding soil, and removal of contaminated soil.

YS-030 Interim Drum Yard. The Interim Drum Yard west of Building 9720-32 was a RCRA outdoor storage facility for containerized hazardous waste. Drums were stored on wooden pallets placed on gravel lined with a plastic tarp covering native soil.

Wastes stored at the facility consisted of mercury, metals, acrylonitrile, methylene chloride, organics, Freon-113, cyanide, PCBs, uranyl nitrate, penetrant solution and emulsifiers, asbestos, and sodium hypochlorite.

Soil sampling indicated that the underlying surface soil and gravel were contaminated.

The facility is due to be closed (expected clean closure) under RCRA. All wastes stored in the yard have been removed. A small area of the south side was previously closed. Soil contamination of the northern part of the drum yard will be addressed at closure. A preliminary site characterization will be conducted.

Accomplishments

All of the three contaminated tanks have now been cleaned on the Garage Underground Storage Tanks subproject. Approval has not yet been received for the remainder of the site.

Subproject negotiations were completed for the Interim Drum Yard and the Diked Tank Storage Area.

Concerns

None.

Scheduled Activities for Next Quarter

Field sampling will be conducted on the Diked Tank Storage Facility and Interim Drum Yard.

3.1.6 Rust Fuel Facility

Description

The Rust Fuel Facility is located in the western end of the plant and originally consisted of three steel underground tanks in a single bay north of Building 9831 and a smaller tank south of Building 9720-15. These tanks consisted of one 12,000-gal diesel tank and a 12,000- and an 8000-gal gasoline tank. The tank south of Building 9720-15 contained 1000 gal of gasoline. The leakage of these tanks and connecting pipeline is well documented. The tanks, piping, and all free liquid gasoline have been removed and disposed of. Clean closure will be accomplished in accordance with UST regulations by excavation and decontamination of affected soil, which will then be returned to the approximate original contour.

Accomplishments

The design criteria for the Rust Fuel Facility have been approved.

Concerns

Concern: The area projected for remediation may be larger than necessary. **Impact:** This may result in remediation of more soil than is necessary. **Action:** Soil characterization data will be reviewed and additional samples collected if necessary.

Scheduled Activities for Next Quarter

The design criteria and statement of work for the Rust Fuel Facility will be issued to the architect-engineer. The title II design will be initiated with the architect-engineer.

3.1.7 Study Areas

Description

The Study Areas of Upper EFPC consist of ~180 individual sites within the Y-12 Plant which have been identified as potentially containing or having contained one or more hazardous substances or materials. Most of these sites lie in the western exclusion area of the plant.

The scope of work is currently defined as those tasks required to conduct PA/SIs of all sites to determine if further action is necessary in a new OU or under one of the existing OUs. For those sites requiring further action, the balance of the CERCLA RI, FS, and remedial action, as necessary, will be conducted.

It is anticipated that ~60% of these sites will be determined to require "no further investigation" subsequent to the conclusion of a formal PA/SI. The balance of the sites are expected to be subject to various degrees and extents of the complete CERCLA process, with ~10 to 20% of the originally defined sites requiring a comprehensive remedial action under that regulatory process.

As the PA/SIs progress and more information is accumulated and assimilated relative to the current and historic operations in selected areas of the plant, it is anticipated that there will be additions to and deletions from the list of sites for this activity.

Accomplishments

The selected prioritization methodology has been used to score the study area sites.

Concerns

None.

Scheduled Activities for Next Quarter

The top five study areas will be identified on the basis of the prioritization methodology and historical evidence.

3.1.8 Bear Creek OU 1

Description

Bear Creek OU 1 comprises the following units: S-3 Ponds, Sanitary Landfill I, Boneyard/Burnyard, Oil Landfarm, and Bear Creek Burial Grounds, including Oil Retention Ponds 1 and 2. These units were used until the 1980s as the primary area for the disposal of various types of hazardous and nonhazardous wastes generated at the Y-12 Plant.

S-3 Ponds. The S-3 Ponds were constructed in 1951 and consisted of four unlined surface impoundments covering an area of roughly 400 ft on each side with a total storage capacity of about 10 million gal. During its operation, up to 5500 gal/d of effluent was pumped to the pond. The S-3 Ponds underwent RCRA closure in 1988. Primary contaminants were nitrates and uranium, with lesser concentrations of heavy metals and organic solvents.

Sanitary Landfill I. Sanitary Landfill I received various types of nonhazardous waste from the Y-12 Plant. Waste disposal at Sanitary Landfill I was terminated in 1982; and the site was graded, capped, and closed in 1983.

Boneyard/Burnyard. The Boneyard/Burnyard consists of ~8 acres used from 1943 to 1970 as a disposal site for waste from the Y-12 Plant. Burning and disposal of debris and sanitary, metallic, chemical, and radioactive wastes are known to have occurred. The site has been abandoned and is predominately covered with grassy vegetation. The southeastern portion of this site is overlain by the Hazardous Chemical Disposal area, now considered to be part of the Burnyard/Boneyard. The Hazardous Chemical Disposal area was ~2 acres in size and was used to burn or neutralize liquid and gaseous wastes from 1975 until 1981. The Hazardous Chemical Disposal area is presently covered with a RCRA-type cap.

Oil Landfarm. The Oil Landfarm was used for the land application of waste oils and coolants that contained beryllium compounds, depleted uranium, PCBs, and chlorinated organic compounds. Disposal operations were discontinued in 1982. Final RCRA closure of the site was certified by TDEC in December 1990.

Bear Creek Burial Grounds Waste Management Area. The Bear Creek Burial Grounds Waste Management Area, located on the southern slope of Pine Ridge ~2 miles west of the Y-12 Plant, comprises a series of waste disposal units covering an area of about 5000 by 3000 ft. Each disposal unit consists of a series of trenches excavated to depths of 14 to 25 ft below grade. The trenches received a variety of hazardous and nonhazardous solid and liquid wastes. All hazardous waste disposal operations were discontinued in 1981. All trenches known to have received RCRA hazardous material have been capped as part of a RCRA closure. Oil Retention Ponds 1 and 2 were constructed to intercept seepage from burial trenches. Both ponds were RCRA-closed in 1990. A wide range of contaminants may have been disposed of in the Bear Creek Burial Grounds. Volatile organic compounds (VOCs) in soil resulting from groundwater transport are of primary concern.

The nature and extent of soil contamination within each of the listed units in Bear Creek OU 1 and the nature and extent of sediment and surface water contamination within each associated tributary to Bear Creek will be determined during the CERCLA investigation.

Accomplishments

The Phase I RI Work Plan for Bear Creek Valley OU 1 was delivered to the EPA and TDEC on September 30, 1993.

Concerns

Concern: A health and safety concern related to drilling or digging through hazardous or radioactive waste exists at the Bear Creek Burial Grounds and to a lesser extent at the S-3 Ponds because of many uncertainties at these sites. **Impact:** Investigations will focus on the periphery of the sites. **Action:** Existing waste inventory data will be used as the primary source of site characterization of the Burial Grounds.

Scheduled Activities for Next Quarter

None.

3.1.9 Bear Creek OU 2

Description

Bear Creek OU 2 consists of the Rust Spoil Area, Spoil Area 1, and the SY-200 Yard.

Rust Spoil Area. The Rust Spoil Area is located in Bear Creek Valley less than 0.5 mile west of the Y-12 Plant on Old Bear Creek Road. The Rust Spoil Area was used from 1975 to 1983 for disposal of spoil material generated during various renovation, maintenance, and construction operations at the Y-12 Plant. Disposed material was periodically graded, resulting in changes in topography and in filling of part of the Bear Creek channel. Approximately 100,000 yd³ of nonuranium-contaminated construction spoils were disposed of at the site. Small quantities of solvent-contaminated material and material containing asbestos, mercury, and uranium may have been disposed of in this area. Soil contamination is of primary concern.

Spoil Area 1. Spoil Area 1 is located near the southwest end of the Y-12 Plant, bounded by Old Bear Creek Road and West Patrol Road. Spoil Area 1 was used for the disposal of ~100,000 yd³ of nonhazardous, nonradiologically contaminated construction debris. Although plant controls eliminated the disposal of hazardous and radioactive wastes, past plant practices indicate that some of the construction material may have been contaminated with trace amounts of asbestos, mercury, beryllium, thorium, and uranium.

SY-200 Yard. The SY-200 Yard is a 200- by 300-ft aboveground storage area located adjacent to Old Bear Creek Road. Materials from several Y-12 and ORNL divisions included PCB transformers, lead shielding plates, and radioactively contaminated materials. Soil contamination is of primary concern.

Accomplishments

A contract was negotiated for implementation of field sampling at OU 2. Field mobilization began on September 7, 1993.

Concerns

None.

Scheduled Activities for Next Quarter

Field sampling activities will continue through December 1993.

3.1.10 Bear Creek OU 4 (Groundwater)

Description

The hydrologic system at the Y-12 Plant has been subdivided into three distinct hydrologic regimes based on topography, surface-water drainage, and groundwater flow. Bear Creek OU 4 addresses contamination within the coupled groundwater/surface water system and downstream transport of Bear Creek channel deposits. The area of interest within Bear Creek Valley extends west from a topographic high near the west end of the Y-12 Plant (S-3 Waste Management Area) to the point where Bear Creek exits the valley near State Highway 95. Potential sources of groundwater, surface water, and sediment contamination are being addressed in Bear Creek OUs 1, 2, and 3.

Groundwater and surface water within the Bear Creek hydrologic regime will be characterized and remediated as an integrator OU distinct from the contaminated units. This approach is warranted because (1) efforts to establish the horizontal and vertical extent of groundwater contaminant plumes from individual sites indicate that the plumes are significantly intermingled, making assessment and remediation of individual plumes impractical, and (2) the sites share a common exit pathway from the hydrologic system which is best addressed by a comprehensive approach. Where site-specific groundwater or surface water data are needed to better identify the source or to support a screening-level risk assessment, groundwater or surface water assessment activities (e.g., piezometers or well points) may be conducted during the RI/FS process for the source control OUs. The primary groundwater contaminants in the Bear Creek hydrologic regime are nitrates, VOCs, radionuclides, and to a lesser extent, trace metals. Dense, nonaqueous-phase liquids

(DNAPLs) have been discovered at a depth of 270 ft below the Bear Creek Burial Grounds. DNAPLs consist primarily of perchloroethylene, trichloroethylene, 1,1,1-trichloroacetic acid, and high concentrations of PCBs.

Channel sediments are included in this integrator OU rather than in Bear Creek OU 3 because, once in the stream channel, sediments are directly coupled with the surface water flow pathway. Floodplain sediments are considered a source term for contaminants entering Bear Creek and not part of the pathway to be monitored.

Accomplishments

Strategies and plans for this OU were discussed with representatives from TDEC and EPA IV.

Concerns

None.

Scheduled Activities for Next Quarter

Regulator comments will be incorporated into the RI Work Plan.

Installation of Westbay Monitoring equipment will be completed.

The FFA Appendix C will be modified to incorporate Bear Creek OU 3 into Bear Creek OU 4.

3.1.11 Chestnut Ridge OU 1

Description

Chestnut Ridge OU 1 is the Chestnut Ridge Security Pits Hazardous Waste Disposal Unit located on the crest of Chestnut Ridge, southeast of the central portion of the Y-12 Plant. Operated since 1973, the unit consists of a series of trenches that were used for the disposal of classified hazardous and nonhazardous wastes until December 1984 and November 1988, respectively. Ten major categories of unclassified wastes have been identified: acids, fiberglass, beryllium, biological material, debris, heavy metals, inorganics, organics, thorium, and uranium. Other classified waste forms are present. The unit was closed in 1988 in accordance with a TDEC-approved closure plan consisting of a low-permeability, low-maintenance cover over the trenches. Groundwater impacts from the disposal operations are the primary focus of this OU.

Accomplishments

The RI Work Plan for Chestnut Ridge OU 1 was delivered to the EPA and TDEC on September 30, 1993.

Concerns

None.

Scheduled Activities for Next Quarter

None.

3.1.12 Chestnut Ridge OU 2**Description**

Chestnut Ridge OU 2 consists of the Filled Coal Ash Pond and Upper McCoy Branch. The Filled Coal Ash Pond is situated within the McCoy Branch watershed about 0.5 miles south of the Y-12 Plant. The pond was constructed in 1955 to serve as a settling basin for coal ash from the Y-12 steam plant. By 1967, the pond filled, spilling sediments directly into McCoy Branch. From 1967 to 1989, ash was carried within McCoy Branch to Rogers Quarry, about 0.5 mile downstream of the Coal Ash Pond. Impacts to surface water, stream sediments, and groundwater from metals, including uranium and major ions, are of concern.

Impacts to surface water, stream sediments, and groundwater from metals, including uranium and major ions, are of concern. Biomonitoring of aquatic organisms in McCoy Branch and Roger's Quarry has shown a biological impact potentially from the ash pond operations.

Accomplishments

Phase II field sampling activities were completed.

Concerns

None.

Scheduled Activities for Next Quarter

Sample analysis will be completed, and preparation of the RI Report will begin.

3.1.13 Chestnut Ridge OU 4**Description**

Chestnut Ridge OU 4 consists of Rogers Quarry and Lower McCoy Branch. Rogers Quarry is situated within the McCoy Branch watershed about 1 mile south of the Y-12 Plant. The quarry, which is approximately 1150 x 250 x 275 ft, was the source of construction materials in the 1940s and 1950s. The quarry filled with water and was abandoned with quarrying equipment in place in the early 1960s. Disposal of flyash and bottom ash from the Y-12 steam plant into the quarry began in the 1960s, and bottom ash continues to be disposed of in the quarry via a sluice pipe across Chestnut Ridge. The quarry was also used for disposal of other plant process materials.

Lower McCoy Branch begins at the surface water discharge point of Rogers Quarry and ends at the McCoy Branch embayment in the Clinch River/Melton Hill Lake.

Impacts to surface water, stream sediments, and groundwater from metals, including uranium and major ions, are of concern. Biomonitoring of aquatic organisms in Rogers Quarry has shown a biological impact potentially from ash disposal operations.

Accomplishments

The RI Work Plan for Chestnut Ridge OU 4 was submitted to the EPA and TDEC on September 23, 1993.

Concerns

None.

Scheduled Activities for Next Quarter

A concept design study for characterization of underwater waste at Roger's Quarry will be completed.

3.2 OAK RIDGE NATIONAL LABORATORY

ORNL occupies ~3560 acres in Melton Valley and Bethel Valley, 10 miles southwest of downtown Oak Ridge, Tennessee. ORNL's mission is to conduct applied research and engineering development in support of DOE programs in nuclear fusion and fission, energy conservation, fossil fuels, and other energy technologies and to perform basic scientific research in selected areas of the physical, life, and environmental sciences. The laboratory was built in 1943 as part of the World War II Manhattan Project. Its original mission was to produce and chemically separate the first gram quantities of plutonium as part of the national effort to produce the atomic bomb. ORNL's remediation sites are organized into WAGs based on drainage area and similar waste characteristics.

3.2.1 ORNL WAG 1

Description

ORNL WAG 1 (the main plant area) comprises 167 remediation sites consisting of low-level liquid waste collection and storage tanks, leak and spill sites and contaminated soils, ponds and impoundments, waste treatment facilities, shallow land burial and other solid waste storage areas (SWSAs), and other miscellaneous chemical and sanitary waste facilities. A variety of contaminants, including radionuclides, heavy metals, and organics, are present within this WAG.

Accomplishments

A kick-off meeting was held with EBASCO to begin an alternatives assessment study for the D&D of Buildings 3506 and 3515, which is being integrated with the Gunitite and Associated Tanks remediation.

Work was initiated on the RI Report for the Surface Impoundment OU. The report will be prepared using existing data if possible.

Concerns

None.

Scheduled Activities for Next Quarter

An observational approach workshop for the surface impoundment OU will be held, and preparation of the RI Report will continue.

Planning for a potential removal action for the Corehole 8 plume will be initiated.

3.2.2 Inactive Liquid Low-Level Radioactive Waste Tanks

Description

Liquid low-level radioactive wastes (LLLW) have been collected at ORNL since 1943 in tank systems used for storage, transfer, and neutralization. Some of the tanks have been removed from service and are no longer in use. The majority of these tanks are owned by ER and are in the CERCLA remediation process. However, a few of these tanks are owned by Waste Management and LLLW generators. These remaining tanks are in the process of being transferred to ER. Liquids and sludges remain in many of the tanks, with several tanks receiving leakage from rainwater. The tanks are located in various WAGs, but primarily in WAGs 1 and 5.

Accomplishments

Liquid contents removal for Category D, Group 5, tanks was completed on September 22, 1993.

The Risk Characterization Data Manual for the Inactive Group 5 and 6 Tanks was submitted to EPA and TDEC for information purposes. Modifications were completed on the W-12 tank system to bypass a leak in the discharge line from the tank. The tank continues to receive groundwater leakage, and approval has been received from TDEC to use the new doubly contained discharge line to remove the leakage water from the tank.

Concerns

Concern: Requests to TDEC and EPA to place tank W-12 back into active service pending completion of the Bethel Valley LLLW Phase II project have been denied by EPA based on the current wording of the FFA. **Impact:** Planned decontamination operations at Building 3525 will produce waste that will increase the number of tanker truck transfers to the central LLLW system, and this method of LLLW transport increases the risk of accidental spills and personnel exposure. Modifying and returning tank W-12 to service has been determined to be the best way to eliminate the requirement for trucking LLLW from Building 3525. **Action:** Multiple documented discussions with EPA and TDEC on returning W-12 to service have all been positive over the past year. The recent denial of this request

is indicative of the need to quickly resolve the impasse currently being experienced on modifying the FFA wording.

Scheduled Activities for Next Quarter

The Inactive Group 6 Tanks will have their liquid contents removed by installed equipment, and the responsibility for these tanks will be transferred to the ER Program.

3.2.3 Active Liquid Low-Level Radioactive Waste Tanks

Description

Although the FFA addresses the entire ORR, specific requirements are set forth for the LLLW tanks at ORNL. Liquid low-level radioactive wastes have been collected at ORNL since 1943 in tank systems used for storage, transfer, and neutralization. The stated objective of the FFA as it relates to the tank systems is to ensure structural integrity, containment, detection of releases, and source control pending final remedial action at the site. The FFA requires that leaking LLLW tank systems be immediately removed from service. It also requires that LLLW tank systems that do not meet the design and performance requirements established for secondary containment and leak detection be either upgraded or replaced.

Accomplishments

The Detailed Leak Detection Test Plan and Schedule for the ORNL LLLW Active Pipelines were submitted to the EPA and TDEC.

Routine monthly leak testing has been established for two additional active singly contained LLLW tanks. (The initiation of monthly leak testing for the first three tanks was reported in the quarterly report for October–December 1992.) Leak testing methodology demonstration continues for the remaining singly contained active LLLW tank systems.

Regulatory approval was received to resume transfers from the WC-10 Tank following repairs to the leak reported in the WC-10 tank system discharge line.

Concerns

None.

Scheduled Activities for Next Quarter

Leak testing demonstrations will continue on singly contained LLLW tanks and pipelines.

3.2.4 ORNL WAG 2

Description

ORNL WAG 2 includes two sites. The first site consists of the area encompassed by the stream channels of White Oak Creek (WOC) and Melton Branch; the second site includes White Oak Lake (WOL), White Oak Dam, and the White Oak Creek Embayment (WOCE)

prior to confluence with the Clinch River. WOC/WOL and its tributaries represent the major drainage system for ORNL and the surrounding facilities.

WOC and its tributaries are located in Melton Valley and Bethel Valley. WOC flows into the Clinch River at river mile 20.8, about 1.5 miles north of the junction of Interstate 40 and State Highway 95. WOL is located upstream of WOL Dam and just south of the ORNL main complex. WOCE encompasses the area downstream of WOL Dam to the confluence of WOC with the Clinch River (0.6 miles). WOL is a surface impoundment that serves as a final settling basin for particle-reactive contaminants from ORNL operations and waste storage areas. Contaminants of concern identified to date are ^{90}Sr , ^{137}Cs , ^{60}Co , thorium, uranium, transuranics, metals (mercury, zinc, and chromium), and some organic compounds (including PCBs) located primarily in bottom sediments.

Accomplishments

The WAG 2 Waste Management Plan was submitted for review and approval. This plan elaborates on the Waste Management Plan presented in the WAG 2 RI Plan and will be published as an addendum to the RI Plan.

The supercomputer groundwater model was extended to include the entire Melton Valley OU.

The WAG 2 Phase I RI Report was submitted to the EPA and TDEC.

The ORNL groundwater well evaluation was completed.

Groundwater fieldwork was completed.

The groundwater seeps and springs inventory was completed.

Concerns

None.

Scheduled Activities for Next Quarter

Routine field sampling/field characterization and monitoring activities will continue.

3.2.5 ORNL WAG 5

Description

ORNL WAG 5 is composed of 16 remediation sites, including LLLW transfer lines and leak sites, hydrofracture surface facilities, waste storage tanks, a sludge basin and a holding pond, a shallow land burial ground containing radioactive and hazardous wastes (SWSA 5), and a transuranic waste storage area. The major contaminants detected in shallow groundwater are ^{90}Sr and ^3H .

Accomplishments

Scoping and planning for the trench and seep area sampling were completed.

The partial storm sampling event for surface water discharges in support of focused seep area activities was completed.

The installation of drive point wells in support of the focused seep investigation and the installation of deep wells in support of the groundwater OU were begun.

Contaminated seep area C & D in WAG 5 will be addressed as a removal action. The agreement to plan this was reached in September between DOE, EPA, & TDEC.

Concerns

Concern: Final approval of the Ecological Assessment Plan revision from the regulators is needed. **Impact:** This may delay the final report. **Action:** Interface between WAG 5 Ecological Assessment Plan and future Oak Ridge Reservation Ecological Plan needs refinement. Regulatory group working sessions will be scheduled to address the technical aspects of potential increase to scope of the RI. The potential need for an additional RI phase needs to be addressed.

Scheduled Activities for Next Quarter

The refinement of the remedial investigation low base sampling event will continue using the results of validated high base sampling events and information from sampling the seep areas. Coordination between the groundwater program, environmental compliance sampling, active site monitoring program, and the integrator WAG at ORNL has improved the technical aspects of the remedial investigation.

The development of the RI Report will be initiated for WAG 5. The focused seep area investigation will continue. Installation of deep wells and drive point wells will be completed. The low base seasonal sampling event will be completed. Planning for documentation of seep areas C & D removal action will be initiated.

3.2.6 ORNL WAG 6

Description

ORNL WAG 6 consists of SWSA 6, the Emergency Waste Basin, and the Explosives Detonation Trench. SWSA 6 is located northwest of WOC near White Oak Dam and State Highway 95. This 68-acre site is still in operation as a waste burial ground for solid low-level radioactive waste. Contaminants of concern include various radionuclides and hazardous chemicals.

The Emergency Waste Basin is located north of SWSA 6. It is a 2-acre basin constructed as an LLLW or process-waste holding basin for use when ORNL might be unable to release wastes to WOC. The basin has never been used, and no releases have been detected in the stream leaving the basin; however, surface contamination has been found in the basin.

The Explosives Detonation Trench is located in the northern part of SWSA 6. It was used to detonate explosives and shock-sensitive chemicals requiring disposal. Explosive wastes were laid in the bottom of the trench and detonated with a small plastic explosive charge. No releases are believed to have occurred.

Accomplishments

The Phase IA well plugging and abandonment activities were completed. A total of 156 wells were completed.

Field activities were initiated for the Phase IB (trench wells) plugging and abandonment activities. A total of 77 Phase IB wells have been completed to date.

The WAG 6 Environmental Monitoring Plan and responses to the public's comments were submitted to the regulators for review.

A Title I Engineering Summary report for the interim remedial design package was completed.

A design criteria study consisting of the results of two-dimensional and three-dimensional groundwater flow modeling was completed.

The revised WAG 6 proposed plan was submitted to EPA and TDEC on September 9, 1993.

The WAG 6 response to public comments was submitted on September 14, 1993.

Concerns

Concern: The form in which the agreement for the deferred action alternatives will be documented has not been resolved. **Impact:** The justification for WAG 6 monitoring efforts and technology development efforts is not clear and the interface with RCRA is not resolved. **Action:** Prepare a letter of agreement.

Scheduled Activities for Next Quarter

The QA plan will be submitted to the regulators for review.

Preparations for the public meeting on October 21, 1993, will continue.

The initial phases of the WAG 6 Environmental Monitoring Plan will begin.

Phase II of the well plugging and abandonment will be completed.

Tumulus I & II cover construction will be initiated.

Title III services will be provided for the installation of characterization wells and maintenance/upgrade of existing wells that are to be retained.

A cost evaluation for replacement of the existing Interim Corrective Measures caps will be prepared.

The charter for the R&D steering group will be completed.

3.2.7 ORNL WAG 7

ORNL WAG 7 comprises 17 units: 7 LLLW seepage pits and trenches, the Homogeneous Reactor Experiment fuel wells, experimental hydrofracture injection areas and surface contamination, shielded transfer tanks, and a decontamination facility.

These units are located in the vicinity of SWSA 4 (in Melton Valley about 0.5 mile southwest of the main ORNL complex and bounded on the northern side by Lagoon Road). Several radioactive contaminants of concern have been identified to date.

Accomplishments

The treatability study work plan was transmitted to the regulators for their review and comment.

A briefing on this ISV treatability study was presented to the Energy Systems Environmental Restoration and Waste Management Industry Forum in Oak Ridge.

Site preparation work was completed.

All project environmental, health, and safety documentation has been approved, and field activities in Phase I of site characterization can begin.

Concerns

None.

Scheduled Activities for Next Quarter

Phase I site characterization field activities will be initiated.

3.2.8 ORNL WAG 10

Description

ORNL WAG 10 consists of the injection wells and grout sheets associated with two hydrofracture process experimental locations: the Old Hydrofracture Facility (OHF) and the New Hydrofracture Facility. The facilities themselves are associated with WAGs 5, 7, and 8.

Hydrofracture Experiment Site 1 is located within the boundary of WAG 7 (south of Lagoon Road) and was the first experimental injection of grout (October 1959) as a testing program for observing the fracture pattern created in the shale and identifying potential operating problems. Waste injected was water tagged with ^{137}Cs and ^{141}Ce . Grout consisted of diatomaceous earth and cement. No hazardous waste constituents or LLLW should have been present in the grout.

Hydrofracture Experiment Site 2 is located about 0.5 mile south of the 7500 (experimental reactor) area (WAG 8). The second hydrofracture experiment was designed to duplicate, in scale, an actual disposal operation. However, radioactive tracers were used instead of actual waste. Water tagged with ^{137}Cs , cement, and bentonite was used in formulating the grout. No nonradioactive hazardous constituents should be contained in the grout.

The OHF is located about 1.0 mile southwest of the main ORNL complex, west of SWSA 5. The facility, commissioned in 1963, served as a pilot plant to demonstrate the feasibility of permanent disposal of liquid radioactive waste in impermeable shale formations by hydrofracture methods. Wastes used in the experiments included concentrated LLLW, ^{90}Sr , ^{137}Cs , ^{244}Cm , TRU, and other unidentified radionuclides.

The New Hydrofracture Facility is located 900 ft southwest of the OHF on the south side of Melton Branch. The facility was constructed to replace the OHF and serve as the operational LLLW waste disposal system for ORNL. Wastes used in the injections were concentrated LLLW and sludge removed from the gunite tanks, ^{90}Sr , ^{137}Cs , ^{244}Cm , TRU, and other nuclides.

Accomplishments

Engineering planning associated with the wellhead closed tapping system and subsequent groundwater sampling activities was completed.

The WAG 10 Database Management Plan was completed.

Concerns

Concern: No reply has been received from the regulators regarding responses to review comments on the WAG 10 Sampling and Analysis Plan that were submitted in June 1993. **Impact:** WAG 10 fieldwork cannot proceed until regulatory concurrence is received. Further delay will disrupt scheduling of subcontractor wellhead tapping and sampling activities and follow-on geophysical logging work. **Action:** Regulatory response is needed.

Scheduled Activities for Next Quarter

The wellhead tapping and sampling effort will be initiated. Geophysical logging work will be initiated. (Initiation of these activities is predicated on receipt of regulatory concurrence with responses to review comments noted under the previous concern.)

3.2.9 ORNL WAG 11

Description

ORNL WAG 11 is the White Wing Scrap Yard located at the west end of East Fork Ridge between State Highway 95 (White Wing Road) and the Oak Ridge Turnpike. The site, which covers about 30 acres, was used to store contaminated materials from the three Oak Ridge plants. Wastes (equipment, tanks, and trucks) were stored above ground. Much of the stored materials and contaminated soil was removed between 1966 and 1971; however, smaller

quantities of contaminated debris (e.g., scrap metal and concrete) remain at the site. Contaminants of concern identified to date are ^{137}Cs , ^{234}Th , ^{235}U , and PCBs.

Accomplishments

EPA and TDEC approval of the Remedial Action Work Plan was received on July 23, 1993.

Concerns

Concern: The need for proper Department of Transportation characterization of surface debris is needed. **Impact:** It is not economically feasible. **Action:** Discussions with regulators concerning the issue will hopefully resolve the problem.

Scheduled Activities for Next Quarter

Interim remedial activities are planned to start on November 1, 1993. This includes removing all surface debris, containerizing the debris, and transporting the material to SWSA 6 for storage.

3.2.10 ORNL WAG 13

Description

ORNL WAG 13 consists of the Cesium-137 Contaminated Field and the Cesium-137 Erosion/Runoff Study Area. The contaminated field is located about 330 ft north of the Clinch River at Clinch River Mile 20.5. The 50-acre area was set aside to study the ecological effects of simulated fallout of ^{137}Cs , which would occur in the event of a nuclear war. The contaminant consisted of ^{137}Cs fused at high temperature to silica particles. After ~20 years (since contamination), about 5.2 Ci of activity remains.

The Erosion/Runoff Study Area is located due north of the confluence of the WOC and the Clinch River. The purpose of this study area was to use the field contamination to study runoff, erosion, and infiltration of ^{137}Cs on a silt-loam soil. The unit was contaminated on October 20, 1964, and is still under study.

Accomplishments

EPA and TDEC approval of the Remedial Action Work Plan was received on July 23, 1993.

Remedial action was begun on August 30, 1993.

Concerns

None.

Scheduled Activities for Next Quarter

Interim remedial activities commenced on August 30, 1993. The cesium-contaminated soil will be packaged in B-25 boxes and transported to SWSA 6 for storage. Plans are to excavate the cesium plots to a depth of 2 ft, place a geotextile liner in the plots, and backfill with clean soil.

3.3 OAK RIDGE K-25 SITE

3.3.1 K-1407 OU

Description

The K-1407 OU contains seven SWMUs: K-1407-A Neutralization Pit, K-1407-B Holding Pond, K-1407-C Retention Basin, K-1407-C and K-1417 Soil, K-1070-B Old Classified Burial Ground, K-1700 Stream (Mitchell Branch), and K-1202 Hazardous Waste Storage Tanks. The K-1407 OU is located east of the K-25 building at the northern edge of the K-25 Site.

K-1407-A Neutralization Pit is a 33,000-gal reaction pit where sulfuric acid and calcium hydroxide are added to neutralize corrosive waste streams. The neutralization pit has processed various cleaning solutions and has received heavy metals.

K-1407-B Holding Pond received neutralized cleaning solutions from the cleaning of nickel-plated steel pipes. The pond also received a variety of organic and radioactive wastes from other sources. The K-1407-C Retention Basin was used for storing sludges from the B pond. Both ponds are RCRA Interim Status Units and are awaiting closure. Since sludge removal in 1987-88, radionuclides are the only remaining contaminants.

K-1407-C and K-1417 Soil is located north of the K-1407-C pond. Uranium is the only suspected contaminant.

Buried at K-1070-B Classified Burial Ground is a collection of materials, equipment, and scrap taken from the S-50 thermal diffusion plant, K-1131 feed plant, and K-25/K-27/K-29 diffusion buildings. Contaminants include lead, uranium, and other metals.

K-1700 Stream (Mitchell Branch) has received wastes from a variety of sources, including the K-1407-B pond and several area underground storm drain systems.

The K-1202 Hazardous Waste Storage Tanks consist of two elevated storage tanks of 15,000 gal each. The tanks originally contained processing equipment lubricating oils, but in recent years the tanks have been used for the interim storage of mixed wastes.

For each unit, an RI/FS report, a Proposed Plan, and a ROD will be prepared. The constituents not addressed in the formal RCRA process will be addressed in the CERCLA process. This will meet the need to address the radionuclide contamination. The above actions will achieve complete remediation of the K-1407-B and K-1407-C units as CERCLA source OUs and as RCRA Interim Status Units. Because the CERCLA actions at both the K-1407-B and K-1407-C units will be the same, one set of CERCLA documents will be produced which will address both units.

Accomplishments

The *Record of Decision for the K-1407-B/C Ponds, Oak Ridge, Tennessee* (DOE/OR-1125&D2) was submitted to EPA, TDEC, and DOE-HQ for concurrent review on July 16, 1993.

TDEC and DOE-HQ comments on the ROD were received on August 20, 1993, and EPA comments were received on August 30, 1993.

The signed *Record of Decision for the K-1407-B/C Ponds, K-25 Site, Oak Ridge, Tennessee* (DOE/OR-1125&D3) was transmitted to TDEC and EPA on September 30, 1993.

Concerns

None.

Scheduled Activities for Next Quarter

The Remedial Design/Remedial Action Work Plan will be submitted to EPA and TDEC.

The Remedial Design Report will be submitted to EPA and TDEC.

3.3.2 K-1070 OU***Description***

The K-1070 OU consists of the K-1070-C/D Classified Burial Ground, located on a hill at the eastern edge of the K-25 plant. The burial ground is composed of three major disposal areas: large trenches, small pits, and three earthen dike areas. Both low-level radioactive and nonradioactive, nonhazardous waste materials and equipment were buried in the large trenches. The small pits were used for the disposal of hazardous liquid wastes and glass. The earthen dike areas were used for storing drums of hazardous waste. Contaminants of concern at the burial ground are volatile and semivolatile organics, uranium-contaminated scrap metal, uranium compounds, lead, and other metals. In addition, an interim corrective action is planned for the SW-31 leachate seep, likely contaminated by the burial ground, immediately west of the site.

Accomplishments

Field activities for implementation of the RI Work Plan were initiated.

Concerns

None.

Scheduled Activities for Next Quarter

Field activities for implementation of the RI Work Plan will be completed.

3.3.3 K-1070 SW-31 Spring

Description

This FY 1993 project will implement an interim remedial action for the K-1070 Leachate seep (SW-31) to reduce risk to human health and the environment and to achieve compliance with pending regulations. The seep appeared after an attempted reclamation of the area bordering the west end of the K-1070-C/D Classified Burial Ground, which was swampy and had an unpleasant smell. The K-1070-C/D Classified Burial Ground was used to dispose of a variety of equipment and waste, including solvents and hazardous chemicals. The seep currently flows into a storm drain which discharges into Mitchell Branch. The preferred remedial action involves air stripping the discharged water to remove volatile contaminants after pretreatment to remove iron, followed by carbon filtration (polishing) to remove semivolatiles. The effluent, after acceptance criteria are met, would be diverted to the Central Neutralization Facility for final treatment and discharge in compliance with the facility's National Pollutant Discharge Elimination System (NPDES) permit.

Accomplishments

The Notice of Availability for the K-1070 SW-31 Spring Explanation of Significant Differences was published on July 11, 1993.

The Remedial Action was initiated in accordance with the IROD on schedule on August 1, 1993.

The *Phase I Remedial Design for the K-1070 OU SW-31 Spring* (DOE/OR/03-1139&D1, Vols. 1 and 2) was submitted to EPA and TDEC on August 24, 1993.

Concerns

None.

Scheduled Activities for the Next Quarter

None.

3.3.4 K-720 Bottom Ash

Description

The K-720 ash pile (coal pile area) is located outside the K-25 Site, south of the plant area, and north of the Highway 58 bridge over the Clinch River. Fly ash from the coal-fired steam plant was piled here while the powerhouse was operating. Runoff and leachate from this ~2-acre pile, which is presently unused, have not been controlled. Groundwater quality has been monitored from four adjacent wells, and no suspected contaminants above background have been detected to date. However, NPDES violations are currently occurring as a result of the low pH in the surface runoff from the bottom ash pile.

The K-720 Bottom Ash site consists of fly ash and boiler slag generated in the K-701 Power House from the combustion of pulverized coal. Covering ~5 acres, this site is located

~1 mile southwest of the main K-25 Site. The ash pile is ~1000 ft east of the K-700 Power House area, just south of an elongated discharge flume.

The general characteristics of coal combustion by-products indicate that the K-720 Bottom Ash site may contain hazardous constituents. The principal ions contained in any leachate formed are calcium and sulfate. Free lime accounts for part of the soluble calcium. The soluble sulfate is approximately half the total sulfate present in fly ash.

Accomplishments

The revised corrective action plan was submitted to TDEC.

The application of sludge and lime at the K-720 Ash Pile was completed. In addition, drainage modifications and placement of soil cover were completed, as specified in the corrective action plan.

Concerns

None.

Scheduled Activities for Next Quarter

None.

3.3.5 K-901 OU

Description

K-901 OU consists of a contaminated burial ground, landfarm, holding pond, and two construction waste disposal areas. The OU is located northwest of the main plant.

K-1070-A Old Contaminated Burial Ground, northwest of Building K-33, was used for the disposal of several types of material from the 1940s to 1976. The burial ground contains about 35,575 ft³ of uranium-contaminated material and 2430 ft³ of thorium-contaminated material. Other material includes UF₆ cylinders, beryllium chips, boron, radioactive NaF, oil, rags, etc. The K-1070-A landfarm received ~5000 ft³ of fuller's earth between 1979 and 1985. The fuller's earth was laden with concentrated acids, sludges, and other degradation products from uranium enrichment cascade oil.

K-901-A Holding Pond received chromated, cooling-tower water blowdown and a variety of other wastes from barrels drained into the pond in the late 1950s. The K-901 Waste Disposal Area and K-901-A Sanitary Disposal areas each received construction wastes beginning in the 1940s. Small pockets of radioactive contamination have been found at the K-901-A Sanitary Disposal Area.

Accomplishments

An approval letter was received from TDEC on the K-901 OU RI Work Plan pending receipt of the comments resolved in writing.

The revised K-901 OU RI Work Plan was submitted to TDEC and EPA.

Concerns

Concern: K-901 OU funding was pulled to be utilized on a DOE prime contract. Funding should be replaced on October 1, 1993. ***Impact:*** Any delays in acquiring funding for the project will result in delays in the start of mobilization and the field activities. The RI schedule and the ongoing Ecological Risk Assessment schedule will be directly impacted. ***Action:*** A potential resolution is to incrementally fund the project.

Scheduled Activities for Next Quarter

None.

3.3.6 K-770 OU

Description

The K-770 OU includes a contaminated scrap metal yard and associated contaminated debris, two buildings used as part of a thermal diffusion plant in the 1940s, and a sewage treatment plant. The unit is located southwest of the main plant area near the Clinch River. Operation time frame for the various subunits ranged from 1943 to the early 1960s. The scrap metal yard and sewage treatment plant are still in operation.

The K-770 Scrap Metal Yard contains ~20,000 ft³ of asbestos-containing metal along with waste materials contaminated with uranium, transuranics, mercury, and asbestos. Building K-726, located within the K-770 Scrap Metal Yard, was used for storing PCBs. Suspected contaminants of concern in Buildings K-722 and K-725 are beryllium, mercury, asbestos, and uranium. In 1950, a transformer exploded at the K-709 switchyard, releasing PCB-contaminated oil onto the area. Sewage that may contain traces of radioactive contaminants is present at the K-710 sewage treatment plant.

Accomplishments

The K-770 OU RI Work Plan was submitted to TDEC and EPA on September 27.

Concerns

None.

Scheduled Activities for Next Quarter

None.

3.3.7 Ponds Waste Management Project

Description

The K-1417 Drum Storage Yard is a RCRA-permitted waste storage area. There were ~67,000 drums stored on K-1417 and ~10,000 drums stored in the K-25 vaults containing

sludge from the K-1407-B Holding Pond and the K-1407-C Retention Basin. The sludge contains inorganic, organic, and radioactive contamination and was removed from the ponds during RCRA closure activities in 1988. Prior to storage at K-1417, the sludge was either drummed or stabilized in a concrete grout mixture at the K-1419 Sludge Fixation Facility.

Accomplishments

The recommended alternatives were presented to the EPA and TDEC for their review, and the alternatives were concurred with by EPA and TDEC.

Project schedules and performance specifications and drawings have been developed for the Cure Shed Demolition, Pool Repackaging, Loading and Unloading Equipment and Water Treatment System.

The Environmental Monitoring and Inspection Plans were submitted on schedule to the state of Tennessee.

The K-25 Pond Waste Remedial Action Explanation of Significant Differences (DOE/OR/02-1181&D1) was submitted to the regulators on August 20, 1993.

Regulator comments on the Explanation of Significant Differences were received on September 17, 1993.

The Public Workshop on the Explanation of Significant Differences was held on September 16, 1993.

Concerns

Concern: An acceptable restart plan cannot be generated until the detailed scope (including waivers and specific design parameters) and schedule of the selected alternative are negotiated with the federal and state regulators. **Impact:** The project end date will be affected by the suspension of work. **Action:** An acceptable restart plan will be generated based upon which a new completion date must be negotiated between DOE and federal and state regulators.

Scheduled Activities for Next Quarter

A restart plan and schedule for bringing the remaining raw sludge drums into compliant storage based upon the selected alternative and negotiated schedule will be generated.

If an alternative with interim bulk storage is selected, work on the design and procurement processes will continue while enhanced surveillance and maintenance of the deteriorating drums continues.

3.4 LOWER EAST FORK POPLAR CREEK OU

Description

The Lower EFPC OU extends from the outfall at Lake Reality at the Y-12 Plant boundary downstream to the stream's confluence with Poplar Creek. Upper EFPC originates within the Y-12 Plant and extends to the Lake Reality outfall. The Lower EFPC site consists of the 23-km stream and an associated 550-acre floodplain.

As a result of the loss to the environment of contaminants associated with lithium processing operations at the Y-12 Plant, EFPC became contaminated with mercury and trace levels of other metals, organics, and radionuclides. Since 1953, as much as 170,000 lb of mercury are thought to have been released. Approximately 75 metric tons of this material may still be in the floodplain soils.

The Sewer Line Beltway was constructed by the city of Oak Ridge in 1982-83 and contains over 10 miles of sanitary interceptor sewers and force mains. In certain instances, EFPC floodplain soils were used to provide topsoil. No records were kept to document the backfill procedures and locations. (However, all accessible areas of the Sewer Line Beltway have been sampled.)

Accomplishments

RI Report comments were received from EPA and TDEC. Meetings were conducted with both agencies to clarify and resolve comments.

Two contracts were awarded for the conduct of a Low Temperature Thermal Desorption Pilot Demonstration that would remove mercury from EFPC floodplain soil.

The EFPC Citizens' Working Group continued to provide public input into the alternative selection process for the feasibility study. This group toured EFPC; heard presentations from the EPA, Agency for Toxic Substances Disease Registry, and Energy Systems on the human health risk assessment process; and thoroughly examined the seven possible remediation alternatives.

The Environmental Sciences Division, ORNL, started a study to determine the mechanism of mercury/PCB uptake by periphyton and stoneroller minnows in EFPC.

Radian and Science Applications International Corporation started a sampling and analysis effort to determine contaminant uptake in wetlands and trees growing within the Lower EFPC floodplain. Both of these studies were initiated to complete identified data gaps noted in the RI Report.

Concerns

None.

Scheduled Activities for Next Quarter

Meetings will continue with the Citizens' Working Group.

Analytical results from the wetlands and tree corings should be received.

A 60-day extension for resolving EPA comments on the draft RI Report will be requested.

The feasibility study and environmental impact statement will be submitted to DOE-HQ for review and comment.

EFPC floodplain soil will be shipped to vendors so that the pilot demonstration may be undertaken.

3.5 CLINCH RIVER

Description

The Clinch River RI focuses on the portions of the Clinch and Tennessee rivers that may have been adversely affected by contaminants released from the mid 1940s to the present from the DOE ORR. The Melton Hill Reservoir and the Clinch River, downstream from Melton Hill Dam, form the southern and eastern boundaries of the ORR. The Clinch River enters the Tennessee River system of multipurpose impoundments near Kingston, Tennessee, 34 km downstream from the Oak Ridge complex. Watts Bar Reservoir is located on the Tennessee River just below its confluence with the Clinch River and is the first impoundment downstream of the ORR. This WAG/OU/study area includes Melton Hill Reservoir, the Clinch River (from Melton Hill Dam to Kingston), and the Watts Bar Reservoir.

The contaminants released from the ORR originate from research, industrial, and waste disposal activities conducted at ORNL, Y-12, and K-25. The contaminants released from these facilities include a variety of radionuclides, metals, and organic compounds. Some liquid wastes are discharged to streams on the ORR, which drain into the Clinch River; however, much of the waterborne contamination is derived from seepage into the shallow groundwater from old waste-storage pits and trenches. The contaminants of concern in the river/reservoir system were determined by preliminary human-health-risk screening using a variety of exposure pathways and nonconservative screening. PCBs were identified as contaminants of concern through fish ingestion. Arsenic, chromium, mercury, selenium, zinc, ¹³⁷Cs, and ⁶⁰Co constitute a risk only if deep-channel sediments are dredged and dredged spoils are placed on land.

Accomplishments

A readiness assessment for Phase II sampling and analysis was conducted for the Clinch River RI. Readiness was demonstrated, pending resolution of seven action items.

A comprehensive QA audit of the Clinch River ER Program was conducted during June 26–July 22, 1993. This audit covered QA management, training, procedures, records, self assessment, field activities, acquisition and oversight of analytical services, data validation, and development of data quality objectives. The overall grade was good, with no major issues identified.

The report on the preliminary screening of remediation alternatives for the Clinch River-Watts Bar Reservoir OU was finalized.

The Memorandum of Understanding between WAG 6 and the Clinch River ER Program was approved for the development of an integrated and comprehensive data management system that can be used for both projects.

An audit was conducted to assess the capabilities of the ORNL-ESD Toxicology Laboratory to provide toxicity testing support for the Clinch River ER Program Phase II RI in accordance with the ORNL-ESD Toxicology Laboratory QA Program Manual. The audit was used to identify any areas where corrective measures were needed to meet or exceed the intent of the Energy Systems ER Program's QA Program Plan ES/ER/TM-4/R2.

Water toxicity tests with flathead minnows and *Ceriodaphnia* were completed for six sites on Poplar Creek and three sites on the Clinch River. Sediment toxicity tests with mussels, *Hyalella azteca*, *Daphnia magna*, and *Microtox* were completed for five sites on Poplar Creek and three sites on the Clinch River.

A presentation was made to Tennessee Wildlife Resources Agency (TWRA) staff on contaminants in the Clinch River-Watts Bar Reservoir and on the Clinch River RI. The purpose of the presentation was to provide TWRA with information useful for responding to questions from the public about contamination in the Clinch River-Watts Bar Reservoir.

Concerns

Concern: DOE-ORO, TDEC, and EPA Region IV are considering dividing the Clinch River-Watts Bar Reservoir system into two OUs, which would require separate RODs. An early ROD is being discussed for Lower Watts Bar Reservoir. The RI will continue for the Clinch River area of Watts Bar. ***Impact:*** This differs from the original plan and will impact cost, schedule, and scope for the program. ***Action:*** If an agreement is reached, a baseline change will be required.

Scheduled Activities for Next Quarter

Phase II sampling and analysis will continue.

The assessment of arsenic distribution will be completed.

3.6 OAK RIDGE ASSOCIATED UNIVERSITIES

3.6.1 South Campus Facility OU

Description

The Oak Ridge Associated Universities (ORAU) South Campus Facility (SCF) OU is located within the city limits of Oak Ridge, Tennessee. It is bounded by Bethel Valley Road to the north, State Highway 62 to the east, Haw Ridge and the Clinch River to the south, and the western section of Bethel Valley to the west.

A research facility operated by ORAU, SCF was originally established in 1945 to study the accidental irradiation of cattle which occurred during the testing of the first atomic bomb near Alamogordo, New Mexico. The scope of research soon included studies on the introduction and migration of radioisotopes in the food chain and various other agricultural problems.

The boundaries of SCF encompass ~25 buildings and 130 acres of pasture land, but there is no enclosing fence. Access to the SCF property is generally unrestricted. Although several signs are posted to limit access, no fences or barriers exist to preclude access.

No documented evidence is available as to waste composition or quantity that may have been released to the environment at this location. Limited data exist, however, that identify potential hazardous waste sources and pathways. In addition, previous analytical data indicate the presence of target compound list organics in the groundwater.

SCF areas to be investigated include the wastewater treatment plant, ponds, various laboratories, and animal containment facilities. Contaminants of concern include radionuclides and target compound list and target analyte list metals.

Accomplishments

The drilling subcontractor completed all boreholes during the last week of July 1993.

The Quality Control Program identified a potential source of acetone contamination using the decontamination procedure.

A copy of the *Historical Assessment of Buildings at the South Campus Facility and the Freels Bend Area* was obtained for the project file to satisfy the NEPA requirement for this activity.

All field sampling for the RI was completed, including well installation and sampling.

The Neutron Activation Analysis metals results obtained at North Carolina State University and the boring and monitoring well drilling and construction information were entered into an ORACLE data base for later transfer to OREIS.

Concerns

None.

Scheduled Activities for Next Quarter

None.

3.6.2 Freels Bend Area OU

Description

The ORAU Freels Bend Area was used to support research conducted at the ORAU SCF. This area is located southwest of the SCF and is bounded on three sides by the Clinch River. Control herds of some animals were maintained on pasture land here with ancillary barns and outbuildings. The research facilities included the Low Dose Rate Irradiation Facility (LDRIF) and the Variable Dose Rate Irradiation Facility (VDRIF). Each of these facilities was used to expose and irradiate test animals that were subsequently observed over a period of time for exposure effects. The sources were removed from the LDRIF; however, six sealed ⁶⁰Co sources still remain stored at the VDRIF.

There are three reported disposal areas for animal carcasses and miscellaneous wastes in the Freels Bend Area. These areas have been termed Animal Burial Sites I, II, and III. Access to the 70 acres of the Freels Bend Area is restricted and not open to the general public, although the area is not fenced and is accessible from the Clinch River. The entrance to the access road is blocked with a locked bar gate.

Freels Bend Area areas to be investigated include those associated with the irradiation facility and animal burial locations. Contaminants of concern include radionuclides, organics, and metals.

Accomplishments

The SI Work Plan was approved with authorization to proceed on July 23, 1993.

A site-specific health and safety meeting was held at the South Campus Facility Command Post on July 26, and final field staff training was completed on July 30.

The status of the Freels Bend Area sampling and field screening data was reviewed. Some of the Freels Bend Area Low Dose Rate Irradiation Facility wells were found to contain water with low concentrations of volatile organics and ¹³⁷Cs.

All samples collected by August 24 and scheduled for ¹⁴C analysis were shipped to the Radian-Austin Laboratory for analysis.

The Freels Bend Area SI field effort was initiated on August 3.

A subcontract was signed with Chemrad Tennessee Corporation for Ultrasonic Ranging and Data System work at the Freels Bend Area. The work was performed August 4-11.

The Freels Bend Area SI effort was completed on September 1, and all equipment was demobilized.

All land surveying at the Freels Bend Area was completed on September 25. This activity documented the Oak Ridge Associated Universities grid system coordinates for all sample collection.

Concerns

None.

Scheduled Activities for Next Quarter

An EPA and TDEC briefing on Freels Bend is scheduled for November 9, 1993. This briefing will be presented to the FFA project managers with the expectation that a decision on No Further Investigation for the Freels Bend Area will be made by that group.

3.7 TECHNICAL OVERSIGHT AND TECHNICAL PROGRAMS**3.7.1 Background Soil Characterization Project*****Description***

The Background Soil Characterization Project provides background concentration data on potential contaminants (organic compounds, metals, and radionuclides) in natural soils on the ORR. The project addresses variability of concentration levels in terms of soil types occurring in different geologic formations, soil sampling horizons within a specific soil profile, and natural variations in soils developed in the same geologic formations. The objectives of the project are to provide baseline data for contaminated site assessment and estimates of potential human health and environmental risks associated with background concentrations of hazardous and other constituents in ORR native soils.

Accomplishments

Validation and verification of the remaining NAA, ICP/MS, PAH, and technetium-99 data were completed.

Also completed were integrated Phase I and Phase II statistical analysis, data interpretation, and risk assessment activities.

Concerns

None.

Scheduled Activities for Next Quarter

The final report on the Background Soil Characterization Project will be completed and delivered on schedule.

The determination of records management/storage requirements will be completed and the project closed out.

3.7.2 Oak Ridge Environmental Information System

Description

The Oak Ridge Environmental Information System (OREIS) is mandated by DOE-ORO to fulfill the environmental data base requirements established by both the FFA and Tennessee Oversight Agreement (TOA). At the direction of DOE-ORO, OREIS is being developed as a consolidated data base for environmental measurements for all facilities managed by Energy Systems. These facilities include ORNL, the Y-12 Plant, and the K-25 Site, located in Oak Ridge, and the gaseous diffusion plants located at Paducah, Kentucky, and Portsmouth, Ohio. The environmental data include data generated pursuant to the FFA and data generated under federal and state environmental permits. All data used in compiling regulatory reports will be included in OREIS.

Accomplishments

The recent stage of OREIS development has been focused on preparing the system for user evaluation in the Fall 1993. To support this status, several procedures, standards, instructions, and reports that define the development and operation of OREIS have been completed or submitted as a draft. These documents include the following:

- The OREIS Functional System Design Document (draft report ES/ER/TM-66)
- The OREIS Operations Plan (draft report ES/ER/TM-83)
- The OREIS User Guide (revised version 2, ES/ER/TM-93)

The FY 1993 capital equipment (three additional workstations and a file storage system) were received. The workstations have been installed to support system development and user services. The file system will be installed to support large image and GIS data sets.

A response plan for OREIS was prepared for review by DOE-HQ.

The revision of the OREIS data base structure was completed to improve the structure's reliability and performance. Processes for loading, recording, and reviewing the data loaded into the data base have been developed. Data from portions of ER reports have been loaded into the data base.

Initial versions of the computer programs that provide the integration of the data analysis tools and user interface for OREIS were completed. These programs allow the users to work with common data subset specifications in all of the analysis tools. The storage of subset specifications for later usage is also now supported.

Meetings were held with several organizations that are implementing similar or related systems. A meeting was also held with TDEC Oversight staff to demonstrate specific data analysis scenarios. Communications technology was discussed with TDEC and waste tracking staff to determine if common solutions could be identified.

A contract with Battelle (PNL-Hanford) was established to evaluate the potential for technology sharing in data processing. The issues associated with transferring a GIS user interface between PNL and Oak Ridge will be evaluated.

OREIS staff contributed information for plans and proposals being worked on for the development of site- and project-level data management systems for ER. Plans for establishing formally coordinated data management for ER are also being prepared.

The regulators were provided with electronic submissions of GIS data for the EFPC RI Report. These data will facilitate the regulatory review of the RI Report.

OREIS supported several interactions with other organizations that are implementing GIS capabilities. OREIS staff are meeting monthly with personnel from Engineering and Planning to identify common data formats, documentation, and processing issues.

Concerns

Concern: Data generated by the site ER Programs are often deficient in several basic data management principles, making it extremely difficult to incorporate such data into OREIS in a timely manner. ***Impact:*** The loading of ER project data into OREIS is being delayed, thereby affecting the ability to provide data to the regulators on schedule. ***Action:*** Central ER has established a data management program that will define a data management policy, the process, and the procedures to be executed for all ER projects. The roles and responsibilities of the ER project, site program, and OREIS data management personnel will be clearly defined. Consistency for data management activities throughout the ER Program will be implemented by regular reviews by this central data management program. The operational effectiveness of OREIS will be significantly enhanced when the data management program is fully implemented.

Concern: The development of numerous project and site systems is significantly more active than has been the case in previous time periods. The staff time required for coordinating and supporting these systems is increasing. ***Impact:*** Staff time required for these development efforts will take away from the user evaluation of OREIS and development of user training. ***Action:*** A proposal for the formal coordination of data management and system development is being prepared. This proposal will clarify and consolidate the interactions between OREIS and the other developments.

Concern: DOE-HQ conducted a "management review" of OREIS. The report from the review recommends significant changes and additions from the current course for OREIS development. ***Impact:*** Changes in the course of OREIS development will delay the attainment of operational status by the system. Responding to analyses of OREIS development also impacts the management resources available for near-term supervision of the program. ***Action:*** Changes in the course of OREIS development have been evaluated to determine their effects on the development approach. A revised schedule and task description are being developed for the first part of FY 1994 while the OREIS response to the review is being approved by DOE-HQ.

Scheduled Activities for Next Quarter

Task and schedule control will be implemented to guide OREIS during the first part of FY 1994.

The installation of FY 1993 capital equipment will be completed.

The external review of the OREIS data management plan, which includes data model and dictionary revisions, will be completed.

The current phase of testing the OREIS software integration and user interface will be completed.

Procedures will be developed for the installation of version 2.0 of the OREIS data base and for user interface on the site workstations.

A training plan for OREIS will be developed. Training will provide users with a general orientation on OREIS.

OREIS user and system owners groups will be formed.

Work will continue on coordinating data management and system development activities across the ER Program.

3.73 Aerial Remote Sensing Surveys

Description

Remote sensing technologies provide efficient means for acquiring data for site characterization, change detection, and identification of potential areas of previous waste activities and acquiring updated information to support geographic data bases (e.g., facility data, land cover, and topography). The objectives of the Aerial Remote Sensing Survey Program are to promote and manage routine examinations of the ORR and associated off-site areas and to provide screening-level site characterization data and aerial photography to the ER site programs. The Aerial Remote Sensing Survey Program is dedicated to providing an experienced team of individuals to DOE and other federal agencies to demonstrate and test emerging remote sensing characterization technologies and technologies being transferred from other industries that may prove to be useful tools in environmental restoration and waste management characterization activities.

Accomplishments

A high resolution aerial radiological (gamma) survey of the Portsmouth Gaseous Diffusion Plant was conducted. The survey was conducted by EG&G Energy Measurements, Inc. (EG&G), Washington, D.C. Operations Office. Preliminary results from the survey suggest that no new radiological (gamma) concerns have arisen since the last gamma survey was conducted by EG&G in 1990.

A proposal was submitted to Vice President Al Gore's Environmental Task Force for conducting an analysis of national technical means on the ORR. The proposal contained general information about the ORR facilities and the ER Program. The proposal also contained detailed information about several sites located on the ORR that may be of interest to the task force in determining the relevance of using classified imagery for environmental restoration purposes.

The acquisition of solar reflectance data at the Filled Coal Ash Pond was completed. The Desert Research Institute, Reno, Nevada, conducted tests concerning vegetation stress due to heavy metal contamination.

The acquisition of solar reflectance data at the Walnut Grove Loblolly Pine Tree Plantation was completed. The Desert Research Institute, Reno, Nevada, conducted tests in support of previously collected laser induced fluorescence measurements.

Dr. J. E. Nyquist chaired a session entitled "Case Histories" at the International Workshop on Airborne Electromagnetic Methods held in Tucson, Arizona, September 13-16, 1993.

A paper by W. E. Doll, et al., "Environmental Characterization of the Oak Ridge Reservation Using Helicopter Geophysics," was presented by Dr. J. E. Nyquist at the same International Workshop on Airborne Electromagnetic Methods held in Tucson.

A paper by Dr. J. E. Nyquist and W. E. Doll, "Comparison of Surface and Aerial Geophysics for Characterizing a Hazardous Waste Site: A Case Study," was presented by Nyquist at the Society of Exploration Geophysicists 63rd Annual Meeting, held in Washington, D.C., September 26-30, 1993.

W. E. Doll organized and chaired a workshop entitled "The Advancement of Environmental Geophysics" at the same Society of Exploration Geophysicists 63rd Annual Meeting.

The processing of color background images for the three ORR plants was completed. First-order rectified color image mosaics for Y-12, ORNL, and K-25 were generated in two coordinate systems. These images were transformed into the Administrative Grid coordinate system and into the NAD83 State Plane coordinate system. They are 24-bit RGB images to which color clustering procedures are now being applied for compression to 8-bit images for use on normal workstations. These images can serve as underlays for all types of ER geographic and facility data. Users are encouraged to migrate from the Administrative Grid coordinate system to State Plane since the State Plane will be the Reservation-wide standard in the future.

Concerns

None.

Scheduled Activities for Next Quarter

Sites will be chosen for the conduct of the high resolution data acquisition portion of the airborne geophysical survey of the ORR.

Two abstracts will be presented at the 1993 American Geophysical Union Fall Meeting to be held in December in San Francisco. The first abstract is entitled "Interpretation of AEM Data at Oak Ridge Reservation" and was written by L. P. Beard, J. E. Nyquist, and W. E. Doll. The second abstract is entitled "Noise Characterization in Airborne Environmental Magnetic Surveys" and was written by W. E. Doll and J. E. Nyquist.

The report *Strategic Plan for the Utilization of Remote Sensing Technologies in the Oak Ridge Environmental Restoration Program* will be issued.

Extensive processing of the airborne geophysical reconnaissance data for the ORR will begin.

The study of miniaturized airborne sensor platforms in support of EM-50 activities will begin.

3.7.4 Risk Assessment Program

Description

A risk assessment, as defined in the DOE-ORO *Interim Policy Guidance on Environmental Restoration Risk Assessment Initiation, Implementation, and Interaction*, is the process of identifying, defining, and characterizing the adverse consequences of exposure to hazardous and radioactive materials. Under the ER Division, risk assessment includes a baseline risk assessment, refinement of preliminary remediation goals, and risk evaluation of remedial alternatives. Risk assessment may have both a human health risk assessment component and an environmental risk assessment component where the human health risk assessment identifies, analyzes, and characterizes adverse health effects in human receptors and an environmental risk assessment identifies, analyzes, and characterizes adverse impacts on other environmental receptors (i.e., local flora and fauna, etc.).

The Risk Assessment Council was established to ensure consistent implementation of established methodology and technical defensibility of all risk assessments produced as part of the remedial activities on the ORR and for the other DOE-ORO facilities, Paducah and Portsmouth. The Risk Assessment Council is a multidisciplinary team of site risk assessment team leaders and other Energy Systems personnel with expertise in the following areas: human health risk, ecological risk, toxicology information and data bases, risk model validation, sensitivity/uncertainty analyses, and risk assessment project implementation. As outlined in the DOE-ORO interim policy guidance, the Risk Assessment Council is responsible for the following:

- providing advice and guidance on appropriate risk assessment methodology and procedures;
- developing appropriate methods, procedures, models, and/or data needed to fulfill risk assessment needs of the site programs;
- providing appropriate review of site programs' risk assessment implementation to ensure consistent application and interpretation of risk assessment guidance and methodology; and
- supporting ER Division risk assessment needs through the research and development of critical risk assessment data gaps.

Accomplishments

The human health and ecological risk assessment strategies for Y-12 Chestnut Ridge OU 1 and OU 4 were presented at the EPA/DOE/TDEC/Y-12 ER meeting held in Chattanooga on July 21, 1993.

The human health and ecological risk assessment strategies for Bear Creek Valley and for Bear Creek Valley OU 1 were presented at the Region IV EPA/DOE/TDEC/Y-12 ER meeting held in Chattanooga on August 18, 1993.

The risk calculations to be included in the evaluation of the final data set for the Background Soil Characterization Project were completed.

The risk assessment methodology section for the Lower Watts Bar Reservoir white paper was completed. This section was sent to the regulators on September 10, 1993.

The results of the human health risk evaluation of the ingestion of mercury/methylmercury-contaminated fish were presented at the Region IV EPA/TDEC/DOE/Y-12 ER monthly meeting in Oak Ridge and to TDEC in Nashville. The NPDES Permit for Station-17 of EFPC is currently being written.

The risk assessment strategy for the D&D Program was presented at the DOE Model Conference.

The data evaluation of Upper EFPC OU 2 (the Abandoned Nitric Acid Pipeline) was completed, and summary statistics for the contaminants of potential concern (COPC) were produced.

A working group was established to address data quality issues associated with ER. In the first meeting, issues of concern were identified, and the QA level of historical (compliance) data was discussed. The objective of this group is to develop guidance for ER project managers on the acquisition and use of analytical data.

Concerns

Concern: No risk assessment strategy is currently in place for addressing the following issues: the role of risk assessment in the RI/FS process prior to the PA/SI (e.g., the prioritization of study areas based on risk); the criteria for determining whether no further investigation is warranted at a site; or the interface with ecological risk assessment in the expedited RI/FS activities. **Impact:** The inconsistent approach to addressing these issues could result in significant loss of time and increased cost. **Action:** A document entitled *The Role of Risk Assessment in the RI/FS Process on the ORR* is currently under development to address these concerns.

Scheduled Activities for Next Quarter

The toxicity value tables will be updated and submitted to the Risk Assessment Council for distribution.

The list of priority ER Program chemicals will be updated.

Four new toxicity profiles for contaminants of concern will be submitted.

3.7.5 Federal Facility Agreement and Tennessee Oversight Agreement

Description

Section 120 of CERCLA requires federal facilities listed on the National Priorities Listing to enter into an FFA with EPA. The ORR was added to the National Priorities List in the fall of 1990. Subsequently DOE, EPA, and TDEC entered into this agreement. The primary purpose of the FFA is to establish a procedural framework and schedule to investigate and remediate contaminant releases at a site (the ORR) that pose a threat to human health and the environment.

The TOA obligates Tennessee to pursue a "program of independent monitoring and oversight," primarily related to DOE compliance with environmental laws, DOE radiation protection programs, and joint Tennessee-DOE emergency preparedness and response activities. The TOA obligates DOE to provide technical and financial support for Tennessee's oversight of and participation in the FFA, in addition to establishing and maintaining complaint programs.

Accomplishments

Work was initiated on the ORR strategy chapter for the Site Management Plan.

An FFA project managers (DOE, EPA, and TDEC) meeting was held on September 14, 1993. Meaningful discussions were held concerning data quality objectives for each OU, HSWA permit modifications, the FFA Appendix C, and the FY+1 and FY+2 enforceable commitments. FFA operating instructions are being prepared to support the need to determine the data quality objectives for each OU.

The negotiated ORR FY 1994 and FY 1995 prioritized work activities agreed to in last May's regulatory meeting were updated and discussed with the FFA parties.

The FFA Appendix C update was completed and is being reviewed for inclusion in the FFA.

Three FFA operating instructions were prepared for review and approval by the FFA project managers. These instructions concern the RI Work Plan scoping meeting, primary document reference lists, and the generating of an OU bibliography.

Concerns

Concern: A Memorandum of Understanding has been generated by DOE Classification to identify the working requirements between DOE and TDEC on Tennessee access and handling of classified documents. The Memorandum of Understanding identifies the three site TOA coordinators as the points of contact for the state to work through for receiving any documents. It does not address ER or Waste Management roles. ***Impact:*** The site TOA coordinator will not be aware of the classified documents used in the preparation of ER and/or Waste Management documents sent to the regulators for review. ***Action:*** Discussions have been held concerning the need to cover ER and Waste Management in the Memorandum of Understanding. An agreement was reached on generating a separate classification review protocol. A waiver from DOE-HQ is being sought requesting the inclusion of titles of classified documents in the ER primary document reference lists.

Scheduled Activities for Next Quarter

The ORR Site Management Plan will be submitted to the regulators.

4. RESPONSE ACTION CONTRACTOR ASSIGNMENTS

Each FFA quarterly report includes a listing of the identity and assigned tasks of each of the DOE contractors performing work under the FFA. The primary contractors—MK-Ferguson, Radian Corporation, EBASCO, and Energy Systems—will be performing work at all locations within the ORR. The following is included to satisfy this requirement.

4.1 OAK RIDGE Y-12 PLANT

Camp, Dresser, and McKee—Development of an addendum sampling plan for Chestnut Ridge OU 2.

CH2M Hill—Provision of comments on previous RI plans for the Filled Coal Ash Pond.

Colorado State University—Consulting concerning the DNAPLs in the Bear Creek Burial Ground. *[Closed]*

The Earth Technology Corporation—Development of the RI plan and RI of the S-2, Coal Pile Trench, Salvage Yard, and Building 81-10 sites. Sub-subcontractors include *Singleton Labs and A. L. Clark* for drilling, *IT Corporation* for analytical support, *H&R Technical* for data management and health and safety support, and *International Waste Management Systems* for engineering support. *[Closed]*

ETE Consulting Engineering Inc.—Professional services.

Geraghty & Miller, Inc.—Support in preparation of all postclosure permit applications and preparation of Bear Creek Valley OU 4 RI plan.

Highland Drilling Company—Characterization well drilling.

IT Corporation—Sampling and analysis.

SAIC—Development of an RI plan for Bear Creek Valley OUs 2 and 4, fieldwork for Upper EFPC OU 2 RI, data management support, support for ER strategic plan development and field mobilization, and assistance to on-site laboratories with implementation of Contract Laboratory Protocol reporting.

SONSUB—Underwater surveying of Rogers quarry. There is a separate subcontract for the closure of Kerr Hollow Quarry.

University of Kansas—Support for geophysical studies concerning DNAPL migration. *[Closed]*

University of Tennessee—Hydrogeological support.

University of Waterloo—Consulting concerning the DNAPLs in the Bear Creek Burial Ground and PCB experiments.

4.2 OAK RIDGE NATIONAL LABORATORY

Advanced Sciences, Inc. (ASI)—Administrative support, field coordination, and technical integration.

Analysas—Administrative support.

Automated Sciences Group—Biological data analyst, support for management, analysis, and interpretation of biological data from laboratory and field studies.

Battelle Pacific Northwest Laboratory—Design and fabrication services for an ISV off-gas hood and filtration system.

Bechtel National, Inc. (Team members also include CH2M Hill; PEER; ERC, Inc.; and IT Corporation)—RI activities for WAGs 1, 5, 6, and 10. Conduct assessments on inactive tanks required by FFA.

CDM Federal Programs—Preparation of a regulatory review and sampling and analysis plan for the WAG 6 performance monitoring activity.

CER—Assistance in preparing the WAG 6 well plugging and abandonment plan.

Dr. David Daniel—Assistance in evaluating suitability of soil for caps.

EBASCO—Remedial design activities.

ECOTECH—Assistance in the analysis of surface water.

Environmental Consulting Engineers—Preparation of remediation and postremediation monitoring plans for WAG 6 and monitoring in WAG 2.

ERC, Edge—Geotechnical tests.

ETE Consulting Engineers—Survey services.

Geotek Drilling—Drilling services.

Gilbert Commonwealth—Preparation assistance for cost account plans and project documentation such as project management plans, health and safety plans, waste management plans, current year work plans, and configuration control support.

Highland Drilling Company—Construction, well plugging and abandonment.

H&R Technical Associates, Inc.—Technical and administrative support such as assembling reports, preparing minutes of meetings, and reviewing reports.

Hydrocomp—Expert review of field monitoring and modeling of contaminated sediment transport in WOC.

JAYCOR—Sampling and analysis support for benthic macroinvertebrate samples from White Oak Creek and tributaries.

Knoxville College—Data base support and technical support for sample collections.

Lockheed—Analytical services.

MK-Ferguson—Construction management.

Midwest Technical, Inc.—Assistance in budgeting, planning, and cost tracking; to provide laboratory and field technical support.

North Carolina State University—Assistance in biological monitoring and abatement tasks.

Oak Ridge Associated Universities—Field services coordination.

OGDEN—Geotechnical services as required to support the remedial design architect-engineer and the Performance Assessment Program.

Peer Consultants—Administrative support (team member of SAIC).

Radian—Preparation of environmental assessments and CERCLA decision documents.

SAIC—Monitoring coordination, performance assessment and hydrologic modeling activity for the WAG 6 Performance Assessment Program.

Southwest Research—Outside laboratory services.

Temp Systems—Assistance in administrative functions and surface water monitoring.

Tennessee Valley Authority Interagency Agreement—Technical supervision of FY 1992 drilling activities, including drilling three coreholes and instrumenting them with multiport measuring systems (Westbay systems) and selecting monitoring intervals using core data, geophysical logs, and flowmeter data via the agreement.

TMA Eberline—Outside laboratory analytical services.

University of California—Assistance in biological monitoring and abatement.

University of California Davis—Histopathological analyses of fish tissues.

University of Tennessee—Assistance in performing data collection; data compilation; development of performance criteria, maintenance programs, and quality assurance plans; and oversight of surface-water monitoring station upgrade activities.

U.S. Geological Service—Assistance in surface water monitoring.

Vista Research, Inc.—LLLW tank system leak testing methodology development.

4.3 OAK RIDGE K-25 SITE

Adams Craft Hertz Walker—Site survey (PWMP).

Advanced Sciences, Inc.—Data validation.

Analyzas Corporation—Records management (PWMP).

Battelle, Columbus Laboratories—Preparation of a simplified EA (PWMP).

CDM Federal Programs—PA/SI and RCRA Facility Investigation work plan preparation.

COR, Inc.—Inventory Management Information System prototype development support (PWMP).

Dennis Weiter Assoc.—Study of available filter press operations (PWMP).

ESE Biosciences Group—Bioremediation of a former underground storage tank site.

ETE Consulting Engineers—Surveying.

Geraghty and Miller—Technical support [K-25 Site Groundwater Protection Program (GWPP)].

GH Cofer—Professional services.

Gilbert Commonwealth—Estimating support.

Highland Drilling—Characterization well drilling; drilling services for K-25 Site GWPP.

HSW Environmental Consultants, Inc.—Technical support (K-25 Site GWPP).

IT Corporation—Analytical support.

Labat-Anderson—Assistance for Radian Corporation with environmental assessment for K-1407 B&C Ponds.

Lockwood Greene—On-site project engineering support and Title II design (PWMP).

A. L. Lotts—Operational Readiness Review Board; independent member (PWMP).

PAI—Technical consulting; generation of a project management plan and operational oversight management plan (PWMP).

SAIC—Professional services; RI subcontractor for K-770 and K-1070 OUs.

Tenerra—Technical consulting; conduct of operations (PWMP).

University of Tennessee, Industrial Engineering Department—Assistance in planning for storage layout and warehousing (PWMP).

4.4 ORAU AND EFPC

Alcon Corporation—Quantitative uncertainty analysis.

Brooks Rand Laboratories—Analytical support.

CompuChem Laboratories—Analytical laboratory services.

EBASCO—Baseline support for ORAU.

ETE Consulting Engineers—Surveying.

GEOTEK—Field investigation support.

Labat-Anderson—National Environmental Policy Act (NEPA) support, FS support, Administrative Record support.

MK-Ferguson—Baseline planning support for ORAU.

Radian—Development and preparation of CERCLA/RCRA/NEPA integrated decision documents (feasibility study/corrective measures study/environmental assessment or Environmental Impact Statement, Proposed Plan, and ROD) including documents for interim actions; conduct of assessments and investigations for off-site locations; DOE support for community relations and Administrative Record.

SAIC—EFPC RI/FS, data management, quality assurance, community relations, NEPA support.

Singleton Laboratories—Geotechnical laboratory services.

University of Tennessee—Technical support of bioremediation and consulting.

4.5 CLINCH RIVER-WATTS BAR RESERVOIR

Advanced Sciences, Inc. (ASI)—Laboratory and field support.

Analytical Projects Office (APO) at Martin Marietta Energy Systems, Oak Ridge—Processing of all contracts for analyses of samples collected. The APO determines which labs will perform the analyses.

Army Corps of Engineers—Hydro-acoustic studies of the Clinch River arm of the Watts Bar Reservoir to determine the distribution, thickness, and type of bottom sediments.

Automated Sciences Group—Support for various tasks in the management, collection, analysis, and interpretation of biota, water, and sediment samples; also program management assistance.

Battelle Pacific Northwest Laboratory—Technical support with water, sediment, contaminant modeling tasks.

CDM Federal Programs—Regulatory compliance support on the WOCE time-critical CERCLA removal action. *[Closed]*

Gilbert Commonwealth—Assistance, through a subcontract with Central Engineering, in the publishing the first Lifecycle Baseline document. *[Closed]*

JAYCOR—Support of data management activities and document maintenance in the production of risk assessment documents.

Michigan State University—Breeding and raising of mink in conjunction with the Clinch River ER Program's study of reproductive effects of ingesting fish from the Clinch River-Watts Bar Reservoir System.

Midwest Technical, Inc.—Support of data management activities and document maintenance in the production of risk assessment documents. *[Closed]*

ORAU—Radioanalytical support for Phase I of the RI.

PEER Consultants—Computer programming and bar coding support.

Radian—Preparation of a preliminary alternatives assessment for the Clinch River ER Program.

SAIC—Technical support and assistance in compilation of data packages, validation and verification of data packages, and analytical services coordination.

SENES, Oak Ridge—Support for human health risk assessment.

Skidaway Institute of Oceanography, University of Georgia—Analysis of speciation of arsenic. *[Closed]*

Southern Illinois University—Assistance in biological data collection and sample design.

TVA—Support for the sedimentation range cross-sections *[Closed]*; aerial photography and topographic mapping of White Oak Creek Embayment *[Closed]*; numerical modeling of water, sediment, and contaminant transport in Clinch River-Watts Bar Reservoir; sampling and analysis of water and sediment from potential sources of contaminants; review of TVA sediment-disturbing activities; sampling and contaminant analysis of key fish species in the Tennessee River System; sediment and water toxicity studies; and

benthic macroinvertebrate community study at monitoring stations within the Clinch River and Poplar Creek.

University of California-Davis—Quantitative histopathological analysis of target organs of fish.

University of Tennessee—Assistance in data collection; data compilation; data base development and management; development of procedures and maintenance/coordination of training; coordination of the Clinch River/WAG 2 document management center with the other document centers in Energy Systems Oak Ridge; study of pollutant material transport, distribution, and characterization; and program management.

4.6 ENERGY SYSTEMS ER CENTRAL DIVISION

Analysis—Technical integration support and DOE Model Conference support. *[Closed]*

Authorization Systems, Inc.—Subcontract with Wye Technologies for support of the Intelligent Document Control System for the FFA. *[Closed]*

Automated Compliance Systems, Inc.—Analysis of sample management and data handling. *[Closed]*

CDM Federal Programs—Regulatory compliance support and waste analysis support on the Portsmouth project.

Ecotect Laboratory Services, Inc.—Laboratory sample analysis.

ERC, Inc.—Support for a feasibility study.

H&R Technical Associates, Inc.—Consultation on cost/schedule control systems and groundwater data base management.

Lockheed Engineering and Sciences Company—Laboratory sample analysis.

Maxima Corporation—Project management.

Micro-Frame Technologies—Off-site training and professional training support.

ORAU—5-year plan review. *[Closed]*

Penn Accord—Facilitation training. *[Closed]*

SAIC—Site-specific plan support for the development of the Oak Ridge Environmental Information System; training support; activity data sheet support; cost/schedule control system training; scheduling and technical support; waste management treatment, storage, and disposal analysis; analytical needs assessment; support services for preparation of the 5-year plan; and data management support.

S. M. Stoller Corporation—Video preparation. *[Closed]*

University of Tennessee—Soil characterization and computer monitor plan data base support.

4.7 TECHNICAL INTEGRATION

Dr. Stanley N. Davis—Groundwater consulting at Paducah. *[Closed]*

EcoTek LSI—Radiological/analytical data analysis.

D. A. Lietzke—Soil consulting services.

Lockheed Analytical Services—Chemical/analytical data analysis.

University of Tennessee—Data base management, hydrogeology, soil characterization field operations support.

University of Waterloo (Canada)—Groundwater modeling.

Dr. William B. White—Consulting for karst hydrogeology on the ORR. *[Closed]*

4.8 RADIAN CORPORATION CENTRAL

Brooks-Rand Laboratory—Mercury speciation analyses.

Chemrad Tennessee Corporation—Ultrasonic Ranging and Data System support.

CompuChem Laboratories—Chemical/radiological analyses.

Controls for Environmental Pollution, Inc.—Chemicals/biomonitoring analyses.

Enterprise Advisory Services, Inc.—Management systems support.

ETE Consulting Engineers—Field surveying.

GEOTEK—Field investigation support.

Labat-Anderson—NEPA support, FS support, Administrative Record.

North Carolina State University—Neutron activation analysis and gamma-ray spectrometry.

SAIC—Data management, quality assurance, community relations, NEPA support, RI/FS support.

Singleton Laboratories—Soil, geochemical, and geophysical analyses.

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