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

**Volume 4. July-September 1994**



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

**Volume 4. July–September 1994**

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

Date Issued—October 1994

Prepared for the  
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  
Environmental Restoration and Waste Management Programs at  
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

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## ACRONYMS

APO	Analytical Projects Office
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
D&D	decontamination and decommissioning
DNAPLs	dense, nonaqueous-phase liquids
DNFSB	Defense Nuclear Facilities Safety Board
DOE	Department of Energy
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
FFA	Federal Facility Agreement
FS	feasibility study
GWPP	Groundwater Protection Program
LDRIF	Low Dose Rate Irradiation Facility
LLW	liquid low-level radioactive waste
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
ORAU	Oak Ridge Associated Universities
OREIS	Oak Ridge Environmental Information System
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
OU	operable unit
PA/SI	Preliminary Assessment/Site Inspection
PCB	polychlorinated biphenyl
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RMPE	reduction of mercury in plant effluents
ROD	Record of Decision
SWSA	solid waste storage area
TDEC	Tennessee Department of Environment and Conservation
TOA	Tennessee Oversight Agreement
TVA	Tennessee Valley Authority
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 herein is July through September 1994 (fourth quarter of FY 1994).

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 1995 commitments.

## 1.1 DOCUMENTS TRANSMITTED TO THE REGULATORS

The following documents were transmitted to the regulators during the fourth quarter of FY 1994 and can be requested from the Information Resource Center in Oak Ridge.

- Waste Area Grouping (WAG) 11 Treatability Study Work Plan (DOE/OR/01-1288&D1)
- Upper East Fork Poplar Creek (EFPC) Operable Unit (OU) 2 Record of Decision (ROD) (DOE/OR/02-1265&D1)
- Lower EFPC Proposed Plan (DOE/OR/02-1209&D1)
- K-1070 SW-31 Spring Phase 2 Remedial Action (RA) Work Plan (DOE/OR/01-1242&D1)
- Lower Watts Bar Reservoir Remedial Investigation (RI)/Feasibility Study (FS) (DOE/OR/01-1282&D1)
- Lower Watts Bar Reservoir Proposed Plan (DOE/OR/02-1294&D1)
- Bear Creek Valley OU 2 RI Report (DOE/OR/01-1273&D1/V1 and -1273&D1/V2)
- Chestnut Ridge OU 2 RI/FS Report (DOE/OR/02-1238&D1)
- South Campus Facility Sampling and Analysis Plan (DOE/OR/02-1293&D1)
- Oak Ridge Reservation (ORR) Ecological Risk Assessment (DOE/OR/01-1298&D1)
- South Campus Facility RI/FS Report (DOE/OR/02-1274&D1)
- Active Liquid Low-Level Radioactive Waste (LLLW) Tanks Annual Compliance Status Report (DOE/OR/01-1291&D1)
- WAG 2 Sampling and Analysis Plan (Addendum)\* (DOE/OR/01-1292&D1)
- WAG 2 Annual Monitoring (ERMA Report) (DOE/OR/01-1290&D1)

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\*This document was renamed *FY 1995 RI Work Plan* by the FFA project managers.

- WAG 1 Core Hole 8 Plume Engineering Evaluation (EE)/Cost Analysis (CA) (DOE/OR/02-1303&D1)
- WAG 1 Gunite and Associated Tanks (GAAT) Treatability Study Work Plan (DOE/OR/02-1300&D1)

### Regulatory Commitment Status

Document title	Appendix E commitment date	Transmittal date
WAG 11 Treatability Study Work Plan	07/10/94	07/08/94
Upper EFPC OU 2 ROD	07/15/94	06/09/94
Lower EFPC Proposed Plan	08/29/94	08/29/94
K-1070 SW-31 Spring Phase 2 RA Work Plan	08/04/94	08/03/94
Lower Watts Bar Reservoir RI/FS	08/05/94	08/04/94
Lower Watts Bar Reservoir Proposed Plan	08/05/94	08/04/94
Bear Creek Valley OU 2 RI Report	08/22/94	08/19/94
Chestnut Ridge OU 2 RI/FS Report	08/24/94	08/22/94
South Campus Facility Sampling and Analysis Plan	08/29/94	07/29/94
ORR Ecological Risk Assessment	08/30/94	08/29/94
South Campus Facility RI/FS Report	09/16/94	09/14/94
Active LLLW Tanks Annual Compliance Status Report	09/30/94	09/25/94
WAG 2 FY 1995 RI Work Plan	09/30/94	09/28/94
WAG 2 Annual Monitoring (ERMA Report)	09/30/94	09/28/94
WAG 1 Core Hole 8 Plume EE/CA	09/30/94	09/14/94
WAG 1 GAAT Treatability Study Work Plan	09/30/94	09/30/94

## 1.2 DOCUMENTS PROPOSED FOR TRANSMITTAL

The following documents have been proposed for transmittal to the regulators during the first quarter of FY 1995.

- WAG 1 Core Hole 8 Plume Action Memorandum
- Bear Creek Valley OU 2 FS
- Freels Bend No Further Investigation (NFI) Report
- Bear Creek Valley OU Sampling and Analysis Plan

## 2. SIGNIFICANT ACCOMPLISHMENTS

The following significant accomplishments are noted for the ER Program during the fourth quarter of FY 1994.

- **Y-12 Plant**

*Lower East Fork Poplar Creek (EFPC).* 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 near Oak Ridge, Tennessee, EFPC became contaminated with mercury and trace levels of other metals, organics, and radionuclides. Since 1953, a little over 2,000,000 lb of mercury are thought to have been either not accounted for or released to the environment. Approximately 733,000 lb are known to have been released. Of the remaining mercury not accounted for, it has been speculated that 645,000 lb were either not received or were held up in building structures, etc. Considerable amounts of the released mercury may still be in the floodplain soils.

The Sewer Line Beltway was constructed by the city of Oak Ridge during 1982 and 1983 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.

Waste Management committed to arranging for a disposal site for Lower EFPC soils generated during proposed remedial activities. The Proposed Plan was also issued to the regulators for comment.

- **Oak Ridge National Laboratory**

*Oak Ridge National Laboratory (ORNL) WAG 1, Core Hole 8 Plume Removal Action.* ORNL WAG 1 consists of 96 individual contaminated areas requiring, or potentially requiring, remediation. The unit consists of low-level radioactive liquid waste collection and storage tanks; leak and spill areas 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. These areas are located in the main plant area. A variety of contaminants of concern—including radionuclides, heavy metals, and organics—are present within this WAG. WAG 1 has been broken into ten OUs to address the concerns within the ORNL operations area.

DOE, EPA, and TDEC have agreed to perform a non-time-critical removal action for a <sup>90</sup>Sr groundwater contaminant plume in WAG 1 at ORNL. The plume is located in the western part of WAG 1 and discharges to First Creek at the western WAG boundary by both direct discharges and by seepage into the ORNL storm sewer system. First Creek is a tributary to White Oak Creek (WOC), which flows to White Oak Lake (WOL) and the Clinch River. The plume was discovered during the Phase 1 Groundwater RIs at WAG 1.

Preparations for performing the removal action continued during the reporting period. Construction is scheduled to begin in FY 1995. The objectives of the removal action are to immediately reduce contaminant levels in First Creek and to reduce overall contaminant levels in the plume over the longer term. Available and proven contaminant treatment methods are the principal technologies under consideration. The application of these technologies for the removal action is considered an interim measure at present but is considered to be consistent with overall groundwater remediation options for groundwater in WAG 1 in the future.

The EE/CA for this removal action was submitted to the regulators for review on September 14.

*ORNL WAG 1, Gunitite and Associated Tanks OU 1.* OU 1 consists of the underground steel and gunitite tanks associated with the tank farms located in the center of the ORNL main plant area. The Gunitite and Associated Tanks OU includes the tanks located in the North and South Farms as well as Tanks TH-4 and W-11. The solid waste management units within this OU are primarily the large gunitite tanks installed in 1943 to store liquid wastes and subsequently used as the main holding tanks for the low-level liquid radioactive waste system at ORNL. A number of steel tanks associated with the North Tank Farm are also included in this OU. The strategy of this grouping is to allow those tanks that are geographically similar to be remediated as a group.

The Gunitite and Associated Tanks OU is commonly referenced as three separate tank groups: South Tank Farm Waste Tanks (W-5, W-6, W-7, W-8, W-9, and W-10); North Tank Farm Waste Tanks (W-1, W-2, W-3, W-4, W-13, W-14, W-15, and W-1A); and Building 3550 Laboratory Waste Tanks (TH-4 and W-11).

At the request of the regulators, the RI Report, including the Baseline Risk Assessment, was separated from the FS, and the FS was put on hold pending the results of the treatability study.

In the quarter just concluded, the WAG 1 Gunitite Tanks Treatability Study Work Plan was submitted for regulator review.

*ORNL WAG 2.* ORNL WAG 2 includes two sites. The first site consists of the area encompassed by the stream channels of WOC and Melton Branch; the second site includes 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 <sup>90</sup>Sr; <sup>137</sup>Cs; <sup>60</sup>Co; thorium; uranium; transuranics; metals (mercury, zinc, and chromium); and some organic compounds [including polychlorinated biphenyls (PCBs)] located primarily in bottom sediments.

The FY 1995 RI Work Plan and Annual Monitoring Report were submitted to the regulators on September 29. The RI Work Plan was submitted in lieu of the Site Sampling and Analysis Plan.

*ORNL WAG 11.* 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 ~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  $^{137}\text{Cs}$ ,  $^{234}\text{Th}$ ,  $^{235}\text{U}$ , and PCBs.

The PCB Treatability Study Work Plan was submitted for regulator review last quarter.

- **Oak Ridge K-25 Site**

*K-901 OU.* 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.

The 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 ~35,575 ft<sup>3</sup> of uranium-contaminated material and 2430 ft<sup>3</sup> of thorium-contaminated material. Other materials include UF<sup>6</sup> cylinders, beryllium chips, boron, radioactive NaF, oil, rags, etc. The K-1070-A landfarm received ~5000 ft<sup>3</sup> 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.

The 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 Area each received construction wastes beginning in the 1940s. Small pockets of radioactive contamination have been found at the K-901-A Sanitary Disposal Area.

During the past 3 months, the technical scope for the K-1070-A Old Contaminated Burial Ground and K-901-A Holding Pond for the K-901 OU was finalized for these refocused investigations. Field activities were begun for the groundwater-focused RI/FS on the K-1070-A Burial Ground and the risk screening evaluation of the K-901-A Holding Pond, beginning with a seep and spring survey.

*K-1070 SW-31 Spring Project.* This project will implement an interim remedial action for the K-1070 Leachate Seep (SW-31) to reduce any risk posed 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 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 previously flowed into a storm drain that discharges into Mitchell Branch. The recommended remedial action involves air-stripping the discharged water (to remove volatile contaminants) after pretreatment to remove iron, followed by carbon filtration (polishing) to remove PCBs. Required unit processes will be added to the Central Neutralization Facility as an upgrade for the Phase 2 design.

In the quarter just concluded, the Phase 2 Remedial Action Work Plan was submitted to the regulators for approval.

*K-1407 OU.* The K-1407 OU contains seven solid waste management units: the K-1407-A Neutralization Pit, the K-1407-B Holding Pond, the K-1407-C Retention Basin, K-1407-C and K-1417 soil, the K-1070-B Old Classified Burial Ground, the K-1700 Stream (Mitchell Branch), and the 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.

For each unit, an RI/FS Report, a Proposed Plan, and a Record of Decision (ROD) will be prepared. The constituents not addressed in the formal Resource Conservation and Recovery Act (RCRA) process will be addressed in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process. This will meet the need to address the radionuclide contamination. These actions will achieve complete remediation of the K-1407-B and K-1407-C units both 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, only one set of CERCLA documents was produced to address both units.

On July 15, concurrence was received from TDEC regarding RCRA closure certifications signifying clean closure. Remedial construction activities were begun on July 13 for the CERCLA aspects of the K-1407 B&C Ponds. K-1407 B&C Ponds construction is scheduled to be completed on December 27, 1994.

- **Off-Site Programs**

*Clinch River OU.* The Clinch River RI focuses on the portions of the Poplar Creek and 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 eastern and southern boundaries of the ORR. Poplar Creek drains the K-25 Site and receives inflow from EFPC. The Clinch River enters the Tennessee River system of multipurpose impoundments near Kingston, Tennessee, 34 km downstream from the Oak Ridge complex. This WAG/OU/study area includes Poplar Creek, Melton Hill Reservoir, and the Clinch River from Melton Hill Dam to Kingston.

The contaminants released from the ORR originated from research, industrial, and waste disposal activities conducted at ORNL, the Y-12 Plant, and the K-25 Site. The contaminants released from these facilities included 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 water-borne contamination has been 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 non-conservative screening. PCBs were identified as contaminants of concern through fish ingestion. TDEC has a fish consumption advisory in effect for Melton Hill Reservoir and the Clinch River arm of Watts Bar Reservoir. Arsenic, chromium, mercury, selenium, zinc,  $^{137}\text{Cs}$ , and  $^{60}\text{Co}$  constitute a risk only if deep-channel sediments are dredged and dredge spoil is used for agriculture.

During the last quarter, TDEC and EPA approved recombining the Clinch River and Poplar Creek OUs and established milestone dates to fit the recently approved FFA document review protocol.

*Lower Watts Bar Reservoir OU.* Watts Bar Reservoir is the first Tennessee River impoundment located downstream of the ORR. The Tennessee Valley Authority's (TVA's) Watts Bar Dam, completed in 1942, is situated at Tennessee River kilometer 853.6 (river mile 530.5). The reservoir receives inflow from both the Tennessee and Clinch rivers. This WAG/OU/study area consists of that portion of the reservoir that extends from TRK 913.1 (river mile 567.5, mouth of the Clinch River at Kingston) to Watts Bar Dam.

The source of ORR contaminants in this OU is the Clinch River. Because the dam was completed prior to the start of operations at ORR and also because the reservoir acts as an efficient trap for sediments and any associated particle-reactive contaminants, much of these contaminants have accumulated in the bottom of Watts Bar Reservoir over the years. The contaminants of concern and exposure pathways are the same as for the Clinch River OU, with PCBs in fish posing the greatest risk. TDEC has issued a fish consumption advisory for Watts Bar Reservoir. A fish consumption advisory is also in effect for the Fort Loudoun and Tellico reservoirs, located upstream of Watts Bar Reservoir and the ORR. Sediment contaminant concentrations, because of dilution by the Tennessee River and the greater spatial extent of the reservoir as compared to the Clinch River, are generally lower in Watts Bar Reservoir than in the Clinch River. Screening-level human health risk analyses indicate that contaminants in sediment pose a risk only if deep channel sediments are dredged and the dredge spoil is used for agriculture.

On August 4, the Lower Watts Bar Reservoir RI/FS and the Lower Watts Bar Reservoir Proposed Plan were submitted to EPA and TDEC for comment. On August 15, TDEC and EPA, Region IV, were briefed on the results of the RI/FS and Proposed Plan for the Lower Watts Bar Reservoir OU.

*South Campus Facility OU.* The South Campus Facility (SCF) 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 Oak Ridge Associated Universities (ORAU), SCF was originally established in 1945 to study the accidental irradiation of cattle that 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 as well as 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 and the results of an inspection at this site indicate the presence of target compound list organics in the groundwater.

An RI at SCF was initiated in FY 1993. SCF areas included in the RI are the wastewater treatment plant, ponds, various laboratories, and animal containment facilities. Contaminants of concern include radionuclides, volatile organics, and penta-chlorophenols.

Last quarter the RI/FS was submitted on schedule to meet an FFA milestone of September 16. The Sampling and Analysis Plan was submitted to the regulators on July 29.

- **Community Relations**

*EFPC Citizens' Working Group.* On July 21, a meeting was held with Citizens' Working Group members to further discuss the Human Health Risk Assessment process for EFPC. On September 7, a technical briefing was held to update the many interested or affected local, state, and federal agencies on progress made on the project since the 1993 technical briefing.

*Common Ground Process (Stakeholder Involvement in Considering Future Land Use Options).* A plan for comprehensive stakeholder involvement was drafted that explains how both internal and external stakeholders will be sought, informed, and invited to participate in a series of workshops to be held in late October/early November. Letters have gone out to targeted stakeholders asking for their responses to questions about land use issues on the ORR. Various outreach programs and information products are being produced to educate stakeholders about the land use decision-making process and how stakeholders can get involved. Planning also began on preparations for hosting the national DOE Future Use working group meeting to be held in January 1995.

*Proposed Citizens' Advisory Board.* A steering committee comprised of various stakeholders (volunteers from the public) submitted a proposal for a Citizens' Advisory Board to improve dialogue and provide input into environmental decision-making associated with ER Program work taking place on the ORR. The steering committee presented their recommendations regarding the formation of the advisory board for the ORR at a public meeting on July 12, beginning a 30-day public comment period on the report. All comments received during that period were sent to DOE Headquarters as input on the decision regarding the formation of the Oak Ridge advisory board. The crux of the pending decision is centered on the DOE Headquarters policy that all such advisory boards must be chartered under the Federal Advisory Committee Act; a necessary decision will also have to be made about whether the advisory board should be organized under the DOE-funded Local Oversight Committee or whether it should be viewed as an independent board.

*Miscellaneous.* The summer edition of the *Environmental Update* newsletter was distributed to persons on the Community Relations mailing list. In addition, a comprehensive overview, updating, and redesign of all Community Relations fact sheets were completed during the quarter. A 20-page special supplement to *The Oak Ridger* entitled *Managing the Oak Ridge Environment: A Guide to Environmental Restoration and Waste Management Activities on the Oak Ridge Reservation* was published on July 28. Staff working under the auspices of The Community Relations Program provided *The Oak Ridger* with stories, graphics, and photographs for the supplement.

### 3. TECHNICAL STATUS

#### 3.1 OAK RIDGE Y-12 PLANT

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 the Y-12 Plant was to separate the fissionable isotope of uranium ( $^{235}\text{U}$ ) 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 the Y-12 Plant 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.

The Oak Ridge Y-12 Plant is located on the DOE ORR immediately adjacent to the city of Oak Ridge, Tennessee. Until 1993, the primary mission of the Y-12 Plant was the production and fabrication of nuclear weapon components. Activities associated with these functions included the production of lithium compounds, recovery of enriched uranium from scrap material, and fabrication of uranium and other materials into finished parts. Fabrication operations included vacuum casting, arc melting, powder compaction, rolling, forming, heat treating, machining, inspection, and testing.

Currently, personnel are refocusing the technical capabilities and expertise at the Y-12 Plant to serve the DOE and other DOE-approved customers. The Y-12 Plant is a key manufacturing technology center for the development and demonstration of unique materials, components, and services of importance to DOE and the nation. Specific focus areas for the Y-12 Plant in coming years include: (1) weapons dismantlement and storage; (2) enriched uranium material warehousing and management; (3) nuclear weapons process technology and development support; (4) Y-12 Plant management/landlord activities, including the renovation of stand-by or shut-down facilities by decontamination and decommissioning (D&D); (6) the provision of unique capabilities and technologies not found in the private sector on DOE-approved tasks; (7) the transfer of technology developed at DOE facilities to enhance the United States's industrial competitive edge in world-wide markets; and (8) the maintenance and support of the National Security Program Office for DOE.

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.

A number of areas of concern have been identified at the Y-12 Plant site resulting from past waste management practices. Many of these areas have been grouped into OUs based on priority and common assessment and remediation requirements. Numbers of areas have been grouped into prioritized study areas for additional assessment within the plant boundaries and surrounding environs.

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. Groundwater contamination in the Chestnut Ridge hydrologic regime is associated with each source OU.

### 3.1.1 Upper EFPC 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.

**Surface Water and Groundwater.** 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 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.

**Storm Sewer System.** 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. No untreated waste streams are currently discharged into the storm sewer system. 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 entirely from Storm Sewer System discharges. Surface-water runoff from the Y-12 Plant production areas and groundwater seepage are additional sources of Upper EFPC flow.

**Mercury Use Areas.** 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, 9202, 9204-4, 9733-1, 9733-2, and mercury flask storage areas and deflasking facilities.

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 areas 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.

### *Accomplishments*

Tentative agreement was reached with TDEC and EPA representatives on a new strategy for these RI efforts. The current schedule calls for a September 1995 delivery of a combined ground/surface water RI Plan or delivery of an enhanced Sampling and Analysis Plan. Wet weather activities have been put on hold.

The RI/FS strategy for this integrator unit that would encompass the entire hydrogeologic regime was refined. A flow chart showing tasks for the upcoming data quality objective (DQO) process was developed to focus on the RI Work Plan and data collection activities that will integrate and directly support FS activities.

Sampling was initiated of off-site wells to determine the extent of possible groundwater contamination in the Union Valley plume.

The dry weather sampling of the surface water for the Phase 1 RI effort and laboratory analysis of the 1400 water samples were completed. Data validation packages are expected soon.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

The RI of groundwater will be accelerated due to the recent monitoring of groundwater wells that indicates a possible contaminated plume leaving the east end of Y-12. An FFA milestone will be established for delivery of the RI Work Plan or an enhanced Sampling and Analysis Plan to the regulators for review on September 30, 1995.

Work on the FS will continue with the development of the FS strategy for Upper EFPC as a whole. Preliminary alternatives will be developed to support the DQO Workshop.

#### **3.1.2 Upper EFPC 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 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 evaluated with the Nitric Acid Pipeline were related to potential 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 were the primary contaminants of concern. However, biased soil sampling data collected in early spring 1993 do not indicate detectable concentrations of these contaminants, and this OU will be proposed as a no further action ROD. A comprehensive evaluation of the extent of groundwater and surface water contamination within the watershed will be conducted as part of Upper EFPC OU 1.

### *Accomplishments*

As a result of work accomplished in working groups with the regulators, the Risk Assessment has been combined with the Site Characterization Report to create an abbreviated RI Report that was approved by TDEC and EPA.

The No Further Action ROD was submitted to TDEC and EPA on June 9 for review and comment 2 months ahead of the Appendix E milestone date. The ROD was issued to the regulators for approval on July 19. The lack of technical complications associated with the site resulted in a significant cost savings. The No Further Action ROD was approved by all FFA parties on September 12, 1994.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

All activities have been suspended as a result of the No Further Action ROD.

## **3.1.3 Upper EFPC OU 3**

### *Description*

Upper EFPC OU 3 is a source term OU composed of seven areas in the western portion of the Y-12 Plant. For the most part, the Upper EFPC OU 3 areas served unrelated purposes and are geographically removed from one another. The seven areas include Building 81-10, S-2 Site, Salvage Yard Oil Storage Tanks, Salvage Yard Oil/Solvent Drum Storage Area, Tank Site 2063-U, Salvage Yard Drum Deheader, and the Salvage Yard Scrap Metal Storage Area. Three other areas (Waste Coolant Processing Facility, Machine Coolant Storage Tanks, and the Coal Pile Trench) were originally placed in the Upper EFPC OU 3 but have been transferred from the OU to the Upper EFPC study areas. The Coal Pile Trench was removed from the OU because it is located beneath an active Coal Pile; the other areas were removed because they are currently active facilities.

**S-2 Site.** The S-2 Site is in the southwestern portion of the main Y-12 Plant area, south of Building 9720-32 and on the southern side of Third Street at the base of Chestnut Ridge. The unit was an unlined earthen reservoir that was operated from approximately 1943 to 1951 to dispose of corrosive and toxic liquid wastes generated by the Y-12 Plant. The unit originally consisted of a 45- by 128-ft reservoir that was ~ 20 ft deep. The reservoir was back-filled,

leveled, and stabilized when disposal operations ended during the 1950s. Heavy metals (including mercury in soil), volatile organic compounds (VOCs), and radioactive chemicals are contaminants of concern.

**Building 81-10.** The Building 81-10 site is within the Y-12 Plant at the northwest corner of the intersection of "G" Road and Third Street, south of Upper EFPC. Included as part of the site are two sumps. One sump (Building 9822) is on the east side of "G" Road, and the other sump is 25 ft east of the northeast corner of Building 81-10. Building 81-10 was built in 1943 as a tin shop. In 1957, Building 81-10 was converted for mercury recovery operations by physical separation or distillation by furnace. The furnace was in operation for approximately 5 years, closing in 1962. Mercury releases associated with handling during physical separation and from furnace operations have been documented. In 1984, the site was used as a storage area to stockpile mercury-contaminated soil. Use of the site to stockpile soil was discontinued and the soil was removed; however, the date of soil removal is unknown. Initial assessments of the site indicate mercury contamination of soil surrounding the building and storage pad.

**Salvage Yard Area.** The Salvage Yard Area is in the northwestern area of the plant, south of Bear Creek Road and North of Second Street. The Salvage Yard Area is about 11 acres and contains five separate OU 3 areas. The following areas are contained within the Salvage Yard Area.

- Salvage Yard Oil Storage Tanks
- Salvage Yard Oil/Solvent Drum Storage Area
- Salvage Yard Drum Deheader
- Salvage Yard Scrap Metal Storage Area
- Tank 2063-U Site

**Salvage Yard Oil Storage Tanks.** The Salvage Yard Oil Storage Tanks consist of two tanks surrounded by a rip-rap earthen dike in the northwest corner of the Salvage Yard Area. Waste oils stored in the Salvage Yard Oil Storage Tanks were generated by various operations within the Y-12 Plant. The southern tank with a capacity of 6000 gal was put into service in 1978 and stored automotive crankcase oils, vacuum pump oils, hydraulic systems, and machining oils. The northern tank with a capacity of 5000 gal was put into service in 1980 and contained mineral oils generated from transformer oil changeout. In 1986 use of the tanks were discontinued, and their contents were emptied. The tanks are still at the site and contain bottom sludges contaminated with polychlorinated biphenyls (PCBs) and chlorinated solvents.

**Salvage Yard Oil/Solvent Drum Storage Area.** The Salvage Yard Oil/Solvent Drum Storage Area is in the northwest portion of the Salvage Yard and operated from 1976 to 1989. It has since been closed under RCRA. Originally, the drum storage area consisted of two compacted gravel areas on top of soil. Each area had a dike constructed of clay and gravel on the downgradient side. The combined storage area had a capacity of up to 175,000 gal of drummed waste oils and solvents. These drums rested on pallets and contained waste oils contaminated with chlorinate organics, uranium, and/or beryllium; chlorinated organic solvents; and nonchlorinated flammable solvents. In 1986 the western dike portion was closed and approved by the Tennessee Department of Health and Environment (now

TDEC). No soil removal was required to satisfy closure criteria. Closure of the eastern portion began in 1988, when soil was removed to a depth of 1 to 2 ft and replaced with clean clay backfill and covered with a polyethylene membrane. The closure was approved by Tennessee Department of Health and Environment after soil and groundwater analysis data showed arsenic below ORR background levels and PCBs below the health based criteria values. The area is included in OU 3 until completeness of closure can be determined and, if appropriate, no further action can be pursued.

**Salvage Yard Drum Deheader and Tank 2063-U Site.** The Salvage Yard Drum Deheader is in the northwest portion of the Salvage Yard and operated from 1959 until 1989. It was used to cut the tops off empty drums that had contained oils and solvents. Operations of the drum deheader ceased in March 1989, and all drums have since been removed. The drum deheader and crusher were removed from the site in 1991. Residual materials present in the drums at the time of crushing were transferred to the Tank 2063-U site. This site was used to store the liquid waste until it could be removed and treated elsewhere at the Y-12 Plant. Tank 2063-U consisted of three concrete and cinder block tanks separated by a rubber baffle for water separation. In March 1989, the tanks failed a hydrostatic hold test and were excavated under federal underground storage tank (UST) regulations in July 1989. The excavated soil was returned to the pit after a plastic geomembrane liner was installed. Possible contaminants at the drum deheader include volatiles, PCBs, and heavy metals.

**Salvage Yard Scrap Metal Storage Area.** The Salvage Yard Scrap Metal Storage Area has been operating in the northwestern portion of the Y-12 Plant since 1950, when it was used solely for storage of uranium-contaminated and noncontaminated scrap metal. Visual evidence of surface soil contamination has been observed on aerial photographs taken over the past few years. Soil contamination resulting from uranium-contaminated salvage materials is of primary concern at this site.

### *Accomplishments*

During the March 16, 1994, FFA project managers' meeting, DOE recommended a deferral of Upper EFPC OU 3 work due to FY 1994 reprioritization of MSA funds. A Baseline Change Proposal has been processed to revise the schedule for all OU 3 activities, starting with RI field activities, out to year 2001.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

None.

## **3.1.4 Bear Creek OU 1**

### *Description*

Bear Creek OU 1 comprises the following units: S-3 Ponds, Oil Landfarm Waste Management Area, and Burial Grounds Waste Management Area. The Oil Landfarm Waste Management Area consists of the Oil Landfarm Hazardous Waste Disposal Unit, Sanitary

Landfill I, the Boneyard/Burnyard, and the Chemical Storage Area. The Burial Grounds Waste Management Area consists of Burial Grounds A, B, C, D, E, and J and 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 are part of the S-3 Waste Management Area. They 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 were pumped to the pond. Primary contaminants were nitrates and uranium, with lesser concentrations of heavy metals and organic solvents. In 1988, the S-3 Ponds were closed as a RCRA landfill. An asphalt parking lot was constructed over the cap to complete site closure.

**Oil Landfarm Hazardous Waste Disposal Unit.** The Oil Landfarm Hazardous Waste Disposal Unit 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. In 1990, the site was closed as a landfill with a multilayered engineered cap.

**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 in accordance with TDEC regulations for sanitary landfills.

**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.

**Chemical Storage Area.** The Chemical Storage Area overlays the southeastern portion of the Burnyard/Boneyard. The Chemical Storage Area was ~2 acres in size and was used to burn or neutralize liquid and gaseous wastes from 1975 until 1981. The Chemical Storage Area is presently covered with a RCRA-type cap.

**Burial Grounds.** Burial Grounds A, B, C, D, E, and J, located on the southern slope of Pine Ridge ~2 miles west of the Y-12 Plant, cover 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.** 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. 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*

A contract was negotiated for the implementation of the RI Work Plan. Field mobilization began in late August.

### *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 for the Burial Grounds.

### *Scheduled Activities for Next Quarter*

Field sampling activities will be conducted.

### 3.1.5 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 yd<sup>3</sup> 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 yd<sup>3</sup> 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*

The RI Report was submitted to the regulators for review on August 19.

### *Concerns*

*Concern:* The RI characterization activities indicated that the Rust Spoil Area is contributing to groundwater contamination. *Impact:* Since groundwater is being addressed as a separate operable unit, efforts to evaluate the effectiveness of the remedial alternatives were inconclusive. *Action:* It was suggested during a monthly working group meeting that the Rust Spoil Area be removed from OU 2 and combined with the other source units in Bear Creek Valley. Consensus needs to be reached on whether to implement this solution.

### *Scheduled Activities for Next Quarter*

The FS Report will be submitted to the regulators for review by November 22.

### **3.1.6 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 floodplain sediments. 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 and 2.

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 that 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., monitoring wells, 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. The DNAPLs consist primarily of perchloroethylene, trichloroethylene, 1,1,1-trichloroacetic acid, and high concentrations of PCBs.

#### *Accomplishments*

A dry weather seep and spring survey of Bear Creek Valley was completed.

The new FS strategy that addresses Bear Creek Valley as a single, unified system of source units and transport media was developed and approved by the regulators. The Jacobs ER team worked with DOE, Energy Systems, and Energy Systems subcontractors and organized three technical teams tasked with directing and coordinating modeling, treatability

studies, and risk assessments. TDEC and EPA will stay apprised of the evolving technical direction of the overall project and will provide input.

A DQO Workshop for Bear Creek Valley was held August 1-3. During the DQO Workshop a new strategy that incorporates source term units, groundwater, surface water, and floodplain sediments into a single OU was agreed upon. The new OU will be called Bear Creek Valley OU. Major action items that resulted from the Workshop included the following. A proposal for a Pump and Treat Study at the S-3 plume will be developed. A Sampling and Analysis Plan that addresses data gaps associated with the Bear Creek Valley OU will be developed. A study will be conducted to evaluate the application of in situ grouting technology at the Bear Creek Burial Grounds. And a groundwater modeling effort will be conducted to support the Bear Creek Valley RI/FS.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

Field sampling activities will continue.

A Sampling and Analysis Plan for the Bear Creek Valley OU will be submitted to the regulators for review.

#### **3.1.7 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. Biomonitoring of aquatic organisms in McCoy Branch and Roger's Quarry has shown a biological impact potentially from the ash pond operations.

##### *Accomplishments*

The RI and FS/Environmental Assessment (EA) reports were submitted to the regulators for review on August 22. At the August regulatory meeting, the DOE program manager explained that Alternative 5 of the FS (environmental enhancement, surface water controls, and dam stabilization) was the preferred alternative and, given the schedule in the FFA, the Proposed Plan is being prepared under that assumption.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

Work on the Proposed Plan will continue; the plan will be submitted to the regulators in FY 1995.

**3.1.8 Lower EFPC OU**

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 near Oak Ridge, Tennessee, EFPC became contaminated with mercury and trace levels of other metals, organics, and radionuclides. Since 1953, a little over 2,000,000 lb of mercury are thought to have been either not accounted for or released to the environment. Approximately 733,000 lb are known to have been released. Of the remaining mercury not accounted for, it has been speculated that 645,000 lb were either not received or were held up in building structures, etc. Considerable amounts of the released mercury may still be in the floodplain soils.

The Sewer Line Beltway was constructed by the city of Oak Ridge during 1982 and 1983 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.

*Accomplishments*

Waste Management committed to making arrangements for the disposal of Lower EFPC soils.

The FS was revised and transmitted to the regulators.

The Proposed Plan was submitted to the regulators.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

None.

### 3.1.9 Reduction of Mercury in Plant Effluents (RMPE)

#### *Description*

The RMPE subproject has undergone a major rescoping activity to define projects required to support the Clean Water Act, National Pollutant Discharge Elimination System (NPDES), requirement. The formal baseline change proposal is currently being submitted. Completed projects have been removed from the project description, and the new project scope consists of the Mercury Use Building Source Elimination and the Mercury Treatment Facility.

**Mercury Use Building Source Elimination.** Mercury-contaminated storm drains and sumps in the Mercury Use Building—which consists of buildings 9201-2, 9201-4, 9201-5, and 9204-4—will be bypassed by the installation of new piping that will provide for a clean transport of water from the building. This activity will be conducted in a phased manner.

**Mercury Treatment Facility.** A new on-line effluent treatment process will be installed to remove mercury from the Y-12 Plant storm water. The design is for a small-scale filtration process with associated pumps and piping to collect the contaminated sump water from Outfall 49 and Outfall 55 for treatment. The mercury-contaminated waters from the Mercury Use Building sumps (9201-2, 9201-4, 9201-5, and 9204-4) will be collected, and long-term treatment will be performed at the Mercury Treatment Facility. The facility will be housed at the existing Central Pollution Control Facility. The facility will replace the interim treatment unit(s) once the facility is on-line.

#### *Accomplishments*

The 9201-2 Interim Mercury Treatment Unit began 24-hour operation.

Source elimination construction at 9201-2 was completed. Construction on 9201-5 began and is 50% complete. The design of the 9201-4 source elimination was completed.

#### *Concerns*

*Concern:* An NPDES permit is currently being negotiated for the Y-12 Plant that may contain mercury limits that are not attainable during high rainfall periods. *Impact:* The Y-12 Plant and ER Program could be issued a permit that would result in numerous noncompliances. *Action:* The project team has requested modification of draft permit requirements to allow the achievement of requirements.

#### *Scheduled Activities for Next Quarter*

Title I and II design activities for the Mercury Treatment Facility (CPCF) subproject will begin.

Title I and II design activities for the Upgrade to the 9201-2 Interim Mercury Treatment Unit should begin.

The construction phase of the Mercury Source Elimination will continue. Source elimination construction on 9201-5 should be completed, and construction will begin on 9201-4 and 9204-4.

Investigation and characterization of additional outfalls showing elevated mercury levels will begin.

### 3.1.10 RCRA Closures

#### *Description*

This subproject consists of three areas: (1) the Building 9409-5 Tank Storage Facility, (2) the Garage USTs, and (3) the Interim Drum Yard.

**YS-017 Building 9409-5 Diked Tank Storage Facility.** The Building 9409-5 Diked Tank Storage Facility 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. All tanks have been removed from the facility, and the closure plan has been submitted. Approval is pending for all three sites.

**YS-019 Garage Underground Tanks.** The Garage USTs 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 is a RCRA outdoor tented storage facility for containerized hazardous waste. Drums are stored on wooden pallets placed on gravel lined with a plastic tarp covering native soil.

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

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

The facility is due to be closed under CERCLA, at which time all wastes stored in the yard will be removed. A small area of the south side was previously closed. Soil contamination at the northern part of the drum yard will be addressed at closure.

### *Accomplishments*

The RCRA closure package for the Garage USTs—which includes closure certification by the independent Registered Professional Engineer, the closure summary report, and the supporting documentation—was transmitted to the state regulators.

Field sampling was completed for the Interim Drum Yard (IDY) and the Diked Tank Storage Facility (DTSF), and site characterization summaries were prepared for both.

Based on verification sampling, the Closure Plan for IDY was revised and is now in the review process.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

The DTSF Closure Plan will be reviewed and amended.

#### **3.1.11 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*

Written authorization was received from TDEC to terminate work on this project. Unneeded design funds will be used elsewhere, and a BCP has been submitted to revise the project schedule to stop design activities and eliminate all remaining work.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

None.

**3.1.12 Study Areas***Description*

The Study Areas consist of ~180 individual sites within the Y-12 Plant that have been identified as having the potential of containing or having contained one or more hazardous substances or materials. The preponderance 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 Preliminary Assessments and Site Investigations (PA/SIs) of all sites to determine if further action is necessary under one of the existing OUs. For those sites requiring further action, the balance of the CERCLA process of 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 the CERCLA process.

As the PA/SIs progress and more information is accumulated and assimilated relative to the current and historical 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*

None.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

The 25 study areas with the highest potential risk or reason for environmental concern will be identified on the basis of the prioritization methodology and historical evidence. Additional work at these study areas will be initiated if funds become available. Based on the most recent ER Program funding prioritization, however, work on all study areas is being pushed beyond the 7-year planning window with the possible exception of the 25 to be identified.

## 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 Gunite and Associated Tanks OU 1

#### *Description*

OU 1 consists of the underground steel and gunite tanks associated with the tank farms located in the center of the ORNL main plant area. The Gunite and Associated Tanks (GAAT) OU includes the tanks located in the North and South Tank Farms as well as Tanks TH-4 and W-11. The solid waste management units within this OU are primarily the large gunite tanks installed to store liquid wastes in 1943 and subsequently used as the main holding tanks for the low-level liquid radioactive waste system at ORNL. A number of steel tanks associated with the North Tank Farm are also included in this OU. The strategy of this grouping is to allow those tanks that are geographically similar to be remediated as a group.

The Gunite and Associated Tanks OU is commonly referenced as three separate tank groups as described on the following page:

- South Tank Farm Waste Tanks W-5, W-6, W-7, W-8, W-9, and W-10;
- North Tank Farm Waste Tanks W-1, W-2, W-3, W-4, W-13, W-14, W-15, and W-1A; and
- Building 3550 Laboratory Waste Tanks TH-4 and W-11.

#### *Accomplishments*

Additional liquid and sludge sampling of the Gunite Tanks was initiated to support the treatability study.

The Treatability Study Work Plan was submitted to EPA and TDEC. This transmittal met the FFA milestone for submitting the document by September 30, 1994.

Efforts were initiated on the design and testing of a confined sluicing end effector tool for sludge removal from the ORNL Gunite and Associated Tanks (GAAT).

A visual field inspection of the North and South Tank Farms was completed. The primary purpose of the inspection was to assess the condition of equipment located inside inactive valve boxes and pump pits—equipment that includes key elements of the pipeline integrity testing that will assess the potential for using existing piping to support the GAAT Treatability Studies.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

Sampling of liquids and sludges in GAAT will be completed.

Preparation of the Phase 2 Treatability Study Work Plan will be initiated.

**3.2.2 ORNL WAG 1 Surface Impoundment OU 2***Description*

The following is a brief description of each of the four surface impoundments included in OU 2:

**Basin 3513.** This unlined impoundment was constructed in 1944 to serve as a settling basin for untreated waste waters prior to their discharge into adjacent WOC. The impoundment basically was constructed by excavating into the clay soil overlying the limestone bedrock at the site, and no lining was added.

**Basin 3524.** Basin 3524 is one of four holding basins located in the south central portion of the Bethel Valley ORNL facilities complex. Basin 3524, frequently referred to as the equalization basin, was an intermediate storage, collection, and mixing basin for the process waste treatment system located in Building 3544. Now it is only used for surge capacity for storm events.

**Basin 3539 and 3540.** ORNL Basins 3539 and 3540, constructed in 1964 and frequently referred to as the 190 ponds, were formerly used as surge ponds to receive process waste streams primarily from the Building 4500 complex. The waste streams are split into identical, parallel basins and monitored primarily for radionuclides before discharge to the process waste treatment system via Basin 3524 or to WOC. Currently, the ponds are only used as surge capacities for the collection of storm water during peak storm events.

*Accomplishments*

Agreement was reached on the alternatives identified in the FS that should be retained for detailed analysis.

The analysis of data obtained through surface impoundment sediment, creek, and fish samples was completed.

The Microgravity Survey of the surface impoundments was completed.

The EE/CA for the WAG 1 Core Hole 8 Plume Removal Action at ORNL was submitted to the regulators on September 14.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

Work will continue on the RI/FS Report.

The identification of potentially applicable ARARs will be completed.

The WAG 1 Core Hole 8 Plume Action Memorandum will be submitted to the regulators.

**3.2.3 ORNL WAG 1 Groundwater OU 4***Description*

The Groundwater OU includes the shallow groundwater beneath the WAG that discharges to surface streams within WAG 1. The potential exists for contaminant migration from various sources within WAG 1 through both shallow and deeper groundwater movement to off-WAG receptors. Deeper groundwater movement through bedrock underneath WAG 1 is discussed in the Bethel Valley Groundwater OU.

*Accomplishments*

None.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

Activities identified in the Groundwater Characterization Plan (the regulator-renamed Phase 2 RI Work Plan) will be initiated.

**3.2.4 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*

Presentations were made to Defense Nuclear Facilities Safety Board (DNFSB) staff on the origins of waste stored in tanks, characterization bases, associated hazards, the history of tank leakages, seismic/structural issues, tanks construction materials and corrosion control, the Waste Tank Preventive Maintenance and Waste Monitoring Program, training and qualification, and remediation plans/treatment options. A tour was conducted of SWSA 5 and the Melton Valley storage tanks for DNFSB staff.

Fieldwork was initiated by MK-Ferguson to replace malfunctioning valves in the single wall piping sections of the liquid low-level waste system; this replacement will allow required leak testing.

Routine leak tests were performed on nine small tanks; seven had passing results. Gas pressure decay tests were conducted on the discharge line from Tank WC-2 to Valve Box No. 2 and on the discharge line from Tank WC-20 to the Evaporator Complex; both lines had passing results. An enhanced volume balancing test was performed on the inlet line to Tank WC-2 from Building 3038; the test of this line also indicated passing results.

The document *Annual Status Report on Federal Facility Agreement Compliance for the Liquid Low-Level Waste Tank Systems at Oak Ridge National Laboratory* (DOE/OR/01-1291&D1) was submitted.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

The design assessment that is to be part of the Melton Valley Liquid Low-Level Collection and Transfer System Upgrade Project at ORNL will be conducted.

## 3.2.5 ORNL WAG 2 (White Oak Creek Embayment/Tributaries/Soil OU 1)

### *Description*

ORNL WAG 2 includes two sites. The first site consists of the area encompassed by the stream channels of WOC and Melton Branch; the second site includes WOL, White Oak Dam, and the 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  $^{90}\text{Sr}$ ;  $^{137}\text{Cs}$ ;  $^{60}\text{Co}$ ; thorium; uranium; transuranics; metals (mercury, zinc, and chromium); and some organic compounds (including PCBs) located primarily in bottom sediments.

### *Accomplishments*

The Environmental Restoration Monitoring and Assessment (ERMA) Report was transmitted to the regulators on September 28, 1994.

The FY 1995 WAG 2 RI Work Plan was transmitted to the regulators on September 28, 1994.

Soil and sediment cores were collected from several areas in the WOC floodplain for analysis for radionuclides and nonradioactive contaminants. The data from the analyses will be used in completing the WAG 2 contaminant inventory, in assessing the potential human health and ecological risks attributable to sediment-associated contaminants, and in assessing the potential need for early actions.

Final bimonthly seep and tributary transect samples were collected for radionuclide analysis. The data from the analyses will complete data collection activities in these tasks and will provide the basis for assessing the relative annual contributions of contaminant sources to indicators of potential human health risk.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

A bathymetric survey of the bottom of WOL will be conducted to provide a basis for evaluation of the rate of filling of the lake. Accelerated filling would change the potential for resuspension of contaminated sediment and transport off the ORNL site and alter the associated potential human health risk.

Sediment coring of the WOC floodplain will be completed to provide estimates of the vertical and lateral distribution of radionuclides in the WAG 2 floodplain.

### **3.2.6 ORNL WAG 4**

WAG 4 is located in Melton Valley immediately south of the main plant area through a gap in Haw Ridge. This WAG is comprised of three OUs: (1) a shallow land burial ground containing radioactive and hazardous wastes; (2) two pilot-scale LLLW waste seepage trenches; and (3) an underground pipeline used to transfer liquid radioactive wastes from the main plant area to waste pits and trenches (WAG 7).

### *Accomplishments*

The acquisition of site investigation data (groundwater and soil analytical results) for WAG 4 was completed. The data are being input in the site conceptual model, and calculations are being performed to aid in determining the off-site risk percentage and source of each seep. The groundwater and soil samples were analyzed for gross alpha, beta, and gamma and <sup>90</sup>Sr.

On September 16 a scoping meeting was held with representatives from DOE, TDEC, and Energy Systems in attendance. The objectives of the meeting were to reach agreement on the site conceptual model and to reach agreement on a draft set of remedial alternatives for the seeps. These objectives were accomplished.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

A DQO meeting with the regulators will be held for the purpose of making a decision on the preferred remedial alternative and the appropriate CERCLA regulatory pathway to follow (i.e., removal action or remedial action).

The EE/CA will be initiated.

### 3.2.7 ORNL WAG 5

#### *Description*

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, and a shallow land burial ground containing radioactive and hazardous wastes (SWSA 5). The major contaminants detected in shallow groundwater are  $^{90}\text{Sr}$  and  $^3\text{H}$ .

#### *Accomplishments*

The WAG 5 Seep Area C Collection and Treatment Unit was constructed. The system will become operational after the readiness assessment has been completed.

The excavation of the Seep D collection box was initiated.

The readiness assessment of Seep Area C was initiated. This project will be assessed in two components: Operations/Maintenance and Monitoring.

Several deep point wells were installed at the site to enhance the spatial and temporal monitoring of the diffusive mass transfer of tritium within secondary source regimes at WAG 5 tracers. A total of 20 of these drive point wells are planned to be installed.

The testing of the elaborated tracer injection system (using Br, He, and Ne in the laboratory) was completed; the system appears to work as expected.

The compilation of the field investigation summary that will be presented as a technical appendix in the RI Report was completed.

The calibration of the WAG 5 surface water model using the HSPF code was completed. The model will simulate hydrologic processes as needed to characterize contaminant release mechanisms and migration pathways and to quantify contaminant flux from the site.

Work began on developing a methodology for identifying and prioritizing the WAG 5 OUs.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

The WAG 5 Seep Area C and D Collection and Treatment Units will begin operations.

The WAG 5 Seeps postconstruction will be completed on December 14.

Work will continue on the RI Report technical appendixes; specifically, documentation on the physical characteristics of WAG 5, the nature and extent of contamination, and contaminant fate and transport will be completed.

Support will continue for the ORNL risk assessment teams for WAG 5 (human health and ecological).

The technical bulletins documenting storm event sampling of surface water and soil sampling, field sampling, and CSL support for the ecological risk assessment will be completed.

Work will continue on the data quality appendix that documents the results of data validation and verification activities, including documentation to the effect that DQOs for the RI were attained.

## **3.2.8 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 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*

Well P&A activities were completed. A total of 636 wells were plugged and abandoned.

Construction on the monitoring stations began.

The sampling of all WAG 6 seeps and springs was completed.

The plan for WAG 6 technical demonstration studies was presented to the regulators.

Baseline sampling of groundwater monitoring wells was conducted.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

Monitoring Station 1 and 3 construction will be completed.

Tumulus I and II construction will be completed.

Baseline sampling of groundwater monitoring wells will continue.

**3.2.9 ORNL WAG 7 Pipeline and Leak Site OU 2***Description*

The pipelines and associated leak sites run throughout the WAG and carry the liquid waste to each of the seven seepage pits; several known leak sites are associated with the subsurface pipelines. These units are located to the west and southwest of SWSA 4 in Melton Valley about 0.5 miles southwest of the main ORNL complex and are bounded on the south side by WOC. Several radioactive contaminants have been identified with major activities of  $^{90}\text{Sr}$ ,  $^{137}\text{Cs}$ ,  $^{60}\text{Co}$ , and transuranic isotopes.

*Accomplishments*

A review was conducted of the final setup plans for equipment to be used for in situ vitrification of Pit 1.

The radiological analyses of all Pit 1 soil core samples were completed.

A bench-scale ISV test was completed during which an estimated 150 lb of ORNL soil were melted. The uncontaminated soil was shipped to PNL from the Pit 1 area. The test was conducted to evaluate and confirm the ability of the ORNL Pit 1 soils to be processed. Preliminary results indicated that there are no major items of concern with melt temperatures of about 1700C, which reflects the low alkali metal and alkaline earth composition of the soil.

Additional samples of perched water from Pit 1 at WAG 7 were collected and analyzed for radionuclides, elements, and hazardous chemical species. Numerous spikes, blanks, and

replicates were used to verify the absence of hazardous species. All three samples contained Cesium-137 between 50 and 100 dpm/mh.

The WAG 7 readiness assessment, including all required documentation for the start of fieldwork, was completed. Fieldwork was delayed until September 24, 1994, because of rain. The site was prepared, and wells MW001 and MW006 were drilled, sampled, and installed on September 24 and 25 (with the exception of grout).

### *Concerns*

*Concern:* Final bids for the design and fabrication of a very basic ISV off-gas collection hood for use in the ORNL treatability study were still about \$500K over the project budget.

*Impact:* There could be a 3–5 month delay in the start of the demonstration of ISV of Pit 1.

*Action:* A preferred alternative—one that would keep the project within budget and ensure no more than a 4-month delay in schedule—would be to refurbish the existing but damaged large-scale ISV off-gas hood in Richland, Washington.

### *Scheduled Activities for Next Quarter*

Contract negotiations on the design and fabrication of the ISV off-gas hood will continue.

Construction of the ISV off-gas hood will be completed during the next quarter.

## **3.2.10 ORNL WAG 10 Hydrofracture Wells Plugging and Abandonment OU 3**

### *Description*

The objective of this OU is to plug and abandon WAG 10 injection wells, deep observation and monitoring wells, and deep bore holes that are not suitable for use as piezometers or water quality sampling wells.

### *Accomplishments*

The civil survey of wells (with the exception of wells in the Seep C exclusion zone) was completed.

Bore hole geophysical logging was completed.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

The analysis of groundwater samples will continue.

The technical bulletin on the draft well evaluation will be completed.

The technical bulletin on the draft bore hole geophysics will be completed.

Work will begin on the Site Characterization Summary Report for 23 WAG 10 wells located near the Old Hydrofracture Facility.

Planning associated with the tapping and sampling of two wells near the New Hydrofracture Facility will begin. These two wells are situated along the construction access route that will be used during the Melton Valley Storage Tank Capacity Increase Project (CIP). The wells will be characterized through tapping and sampling to allow a decision to be made regarding how to protect the well risers during CIP construction activities.

### 3.2.11 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 ~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  $^{137}\text{Cs}$ ,  $^{234}\text{Th}$ ,  $^{235}\text{U}$ , and PCBs.

#### *Accomplishments*

The PCB Treatability Study Work Plan was submitted to the regulators.

The WAG 11 Postconstruction Report was revised and submitted to the regulators.

Regulatory approval of the revised WAG 11 Postconstruction Report was received.

The geophysical survey at WAG 11 was completed.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

The PCB pilot-scale treatability study will be conducted.

### 3.2.12 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 ~330 ft north of the Clinch River at Clinch River Mile 20.5. The 50-acre area was set aside for studying the ecological effects of simulated fallout of  $^{137}\text{Cs}$ , which would occur in the event of a nuclear war. The contaminant consisted of  $^{137}\text{Cs}$  fused at high temperature to silica particles. After ~20 years (since contamination), about 5.2 curies of  $^{137}\text{Cs}$  remain.

The Erosion/Runoff Study Area is located due north of the confluence of WOC and the Clinch River. The purpose of this study area was to use the field contamination to study runoff, erosion, and infiltration of <sup>137</sup>Cs on a silt-loam soil.

*Accomplishments*

The revised WAG 13 Postconstruction Report was submitted to the regulators.

Regulatory approval of the revised WAG 13 Postconstruction Report was received.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

None.

**3.2.13 ORNL Groundwater OU/Well Plugging and Abandonment**

*Description*

Groundwater flowpaths and restoration activities are not constrained by WAG boundaries. Therefore, groundwater activities associated with individual WAG source OUs have been integrated over a larger geographic area. The groundwater OU consisting of Melton Valley and Bethel Valley has been established and will be the focus of a multi-year, long-term investigation.

The ORNL Well Plugging and Abandonment Project was established for the purposes of developing, implementing, and managing the plugging and abandonment of unneeded wells and core holes at ORNL with the exclusion of WAG 6 wells and certain unique hydrofracture wells (WAG 10).

*Accomplishments*

The Characterization Plan for the ORNL Area-Wide Groundwater Program was completed. EPA concurrence on the plan was received.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

Planning documentation associated with the hydrologic head monitoring stations pressure measurement and groundwater sampling program will be completed.

### 3.3 OAK RIDGE K-25 SITE

#### 3.3.1 K-901 OU

##### *Description*

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-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 ~35,575 ft<sup>3</sup> of uranium-contaminated material and 2430 ft<sup>3</sup> of thorium-contaminated material. Other material includes UF<sub>6</sub> cylinders, beryllium chips, boron, radioactive NaF, oil, rags, etc. The K-1070-A landfarm received ~5000 ft<sup>3</sup> 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.

The 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*

The technical scope of the refocused investigations of the K-1070-A Old Contaminated Burial Ground and the K-901-A Holding Pond for the K-901 OU was finalized.

Field activities began for the groundwater focused RI/FS on the K-1070-A Burial Ground and the risk screening evaluation of the K-901-A Holding Pond with the initiation of the seep and spring survey.

##### *Concerns*

None.

##### *Scheduled Activities for Next Quarter*

Field investigation work will continue.

#### 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 comprised 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, which is located immediately west of the site and has been likely contaminated by the burial ground.

#### *Accomplishments*

Demobilization of the RI subcontractor (SAIC) was completed.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

The RI Report will be developed.

### **3.3.3 K-1070 SW-31 Spring Project**

#### *Description*

This 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 previously flowed into a storm drain that 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 PCBs. Required unit processes will be added to the Central Neutralization Facility as an upgrade for the Phase 2 design.

#### *Accomplishments*

The Phase 2 Remedial Action Work Plan was submitted to EPA and TDEC for approval on August 3.

#### *Concerns*

The initiation of flow collection, transport, and treatment activities for the SW-31 Spring entails risk(s) that could result in environmental noncompliances.

#### *Scheduled Activities for the Next Quarter*

None.

### 3.3.4 K-1220 Underground Storage Tank

#### *Description*

Under the rules of the TDEC Division of USTs, an operator of a petroleum UST system must conduct an EA in accordance with the TDEC Division of USTs. The purpose of the EA is to delineate the nature and full extent of any existing petroleum contamination. Upon completion of the EA, the Environmental Assessment Report will be prepared following the guidelines specified by TDEC. After completion of the report, if soil and/or groundwater contamination is detected above the applicable Closure Action Level, a Corrective Action Plan will be prepared following the guidelines specified by TDEC.

#### *Accomplishments*

Plugging and Abandonment reports were sent to the TDEC region and division offices on August 2. A No Further Action determination from TDEC is expected for the K-1220 UST project.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

None.

### 3.3.5 K-1407 OU

#### *Description*

The K-1407 OU contains seven solid waste management units: the K-1407-A Neutralization Pit, the K-1407-B Holding Pond, the K-1407-C Retention Basin, K-1407-C and K-1417 Soil, the K-1070-B Old Classified Burial Ground, the K-1700 Stream (Mitchell Branch), and the 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.

The 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.

The 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. Since sludge removal during 1987 and 1988, radionuclides are the only remaining contaminants. Both ponds are RCRA Interim Status Units and are being closed.

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

Buried at the K-1070-B Old 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.

The 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 capacity 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 was produced to address both units.

### *Accomplishments*

TDEC concurrence was received on RCRA closure certifications that signify clean closure.

CERCLA remedial construction activities were initiated on July 13 for the K-1407 B&C Ponds.

### *Concerns*

*Concern:* Waste material has been discovered west of the K-1407-C Retention Basin. *Impact:* The risk associated with the material could not be evaluated. *Action:* The basin will be the subject of a Preliminary Assessment/Site Inspection Report. The waste will be covered with soil by October 31.

### *Scheduled Activities for Next Quarter*

The K-1407 B&C Ponds construction will be completed on December 27.

## 3.3.6 K-1420 OU

### *Description*

The K-1420 OU is in the area of the Building K-1420 and of the K-1420 Mercury Recovery Room, K-1420 Oil Storage Pad, K-1420 Process Lines, and K-1421 Incinerator. Removal of the K-1420 Mercury Recovery Room and the K-1421 Incinerator is included in the D&D Program. The OU elements included in the ER remedial action baseline are as follows:

**K-1420 Recovery Room.** The 15 ft × 15 ft room is the northwest section of Building K-1420 and contained equipment used to clean and recover used mercury. The unit is no longer used.

Mercury solutions were present on ventilation hoods, distillation equipment, and other equipment. Mercury was found in the room's center floor drain, which flowed into the K-1407-B Holding Pond. Air and soil are the media of concern, with mercury-contaminated soil the primary concern.

**K-1420 Oil Storage Pad.** The pad, presently unused, is on the north side of Building K-1420. Uranium and PCB-contaminated waste oil were stored on this pad. The pad was once used to store waste uranium cascade motor lubricant oil containing 2 to 3 percent uranium, along with uranium solutions in safe-geometry dollies. There is evidence that oil leaked from the drums.

Soil and groundwater are the media of concern. Sampling in the summer of 1991 was part of a RCRA Facility Investigation. Data are currently undergoing validation.

**K-1420 Process Lines.** The presently unused lines are in the northeast quadrant of the plant, north of Building K-1420 and east of Building K-25. This unit includes underground pipes ~300 ft long, which were used to transfer wastewater, including low-level waste, uranium, metals, semivolatile organics, corrosives, detergents, and rinse waters. Transuranics were reportedly disposed of in both line systems. Abandoned process lines have been found to contain uranium, mercury, and PCBs. Tests conducted in 1987 showed that the process line systems on both the north and south sides of the building were leaking. Soil and groundwater are the media of concern. A RCRA Facility Investigation has been conducted, and validation is in progress.

**K-1421 Incinerator.** The incinerator, ~108 ft<sup>3</sup>, is east of Building K-1421. This unit was shut down in 1982 because emissions exceeded EPA standards for uranium. Materials incinerated were contaminated with low-level uranium wastes. Windblown particles and gases were the primary methods of release/contamination. Radioactivity contaminated surface soil downwind of the incinerator is the primary concern. A RCRA Facility Investigation has been conducted, and data validation is in progress.

### *Accomplishments*

ASI completed electronic data verification activities related to analytical data.

A data evaluation was prepared and a presentation on the results made to EPA and TDEC.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

None.

### 3.3.7 Groundwater OU

#### *Description*

The K-25 Groundwater OU provides for the assessment and remediation of groundwater at the K-25 Site. The Groundwater Program encompasses 12 tasks including (1) geological mapping; (2) acquisition of September 1942 aerial photographs and construction of a digital elevation model; and (3) continuous monitoring of water levels, temperature, and conductivity in existing monitoring wells.

The area of the K-25 Groundwater OU is ~1500 acres. There are three major contaminants observed in K-25 groundwater: radionuclides, including  $^{238}\text{U}$ ; organic compounds; and heavy metals, including lead and mercury.

#### *Accomplishments*

The site-wide groundwater sampling of low base flow conditions was 40% complete at the end of the quarter. The slug testing activity was 100% complete.

Geophysical logging of 74 existing monitoring wells was completed. A preliminary interpretation of the logs indicates good definition of well integrity; however, the utility of the logs for stratigraphic correlation is in question.

Pumps were placed in existing monitoring wells in preparation for the site-wide groundwater sampling effort.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

Low base flow sampling will continue, and sampling for high base flow conditions will begin. Continuous water level measurements will be initiated. The submerged seep and spring survey will be initiated. The quantitative measurements of previously identified seeps and springs will begin. Stage gauging of Poplar Creek will begin.

### 3.3.8 Inactive Waste Sites Surveillance and Maintenance

#### *Description*

This activity includes those tasks necessary to manage the Inactive Waste Sites Surveillance and Maintenance Program to ensure adequate containment and site control at inactive waste sites and other contaminated areas prior to final remediation. The major tasks are program/project management, routine S&M, and special activities.

The inactive sites include areas such as classified and/or contaminated burial grounds, scrap yards, switchyards, cooling tower basins, landfills, soil piles, and the grounds around inactive facilities. The level of effort involved is expected to remain relatively constant for the near term, with a decrease in activities as the site characterizations and remediations are

implemented. There is the potential for a subsequent increase in effort in the long term if surveillance and maintenance is required as part of the final site remediation.

### *Accomplishments*

The radiological survey was completed on the following areas: K-1004-L Underground Tank, K-892 Cooling Towers, K-792 Switchyard, K-822-B Recirculating Water Lines, K-1031 Waste Accumulation Area, K-1410 Plating Facility, K-762 and K-709 Switchyards, K-1070-C and K-710 Sludge Beds.

A self-assessment of the K-25 Site ER S&M sites to identify any compliance issues was completed. Sites were categorized as areas of high, medium, and low concern. There were two areas of high concern noted: the K-901 South Waste Disposal Area (because of asbestos) and the K-1303 area (because of PCBs). The asbestos has been removed from the K-901 South Waste Disposal Area, and samples from the K-1303 area have been sent to the lab for PCB analysis. No areas of medium or low concern were noted.

Fieldwork for the radiological survey was completed on September 30.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

None.

## **3.4 CLINCH RIVER AND OAK RIDGE ASSOCIATED UNIVERSITIES**

### **3.4.1 Clinch River OU**

#### *Description*

The Clinch River RI focuses on the portions of the Poplar Creek and 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 eastern and southern boundaries of the ORR. Poplar Creek drains the K-25 Site and receives inflow from EFPC. The Clinch River enters the Tennessee River system of multipurpose impoundments near Kingston, Tennessee, 34 km downstream from the Oak Ridge complex. This WAG/OU/study area includes Poplar Creek, Melton Hill Reservoir, and the Clinch River from Melton Hill Dam to Kingston.

The contaminants released from the ORR originate from research, industrial, and waste disposal activities conducted at ORNL, the Y-12 Plant, and the K-25 Site. 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. TDEC has a fish consumption advisory in effect for Melton Hill Reservoir and the Clinch River arm of Watts Bar Reservoir. Arsenic, chromium, mercury, selenium, zinc,  $^{137}\text{Cs}$ , and  $^{60}\text{Co}$  constitute a risk only if deep-channel sediments are dredged and dredge spoil is used for agriculture.

### *Accomplishments*

Water samples from sites at McCoy Branch Embayment, Walker Branch Embayment, Melton Hill Reservoir, Poplar Creek, and the Clinch River were collected during July as part of Phase 2 of the Clinch River/Poplar Creek RI. Samples were collected on 20 different dates for a total of 81 site visits.

Sediment and pore water were collected from Poplar Creek and the Clinch River for toxicity testing as part of Phase 2 of the Clinch River/Poplar Creek RI.

Toxicity tests using *Ceriodaphnia* and fathead minnows were conducted August 11–18 as part of the Clinch River RI. Water samples were collected from the McCoy Branch Embayment area and the Walker Branch Embayment area.

The sediment characterization task for Phase 2 of the Clinch River RI was completed. Sediment and pore water were collected from five locations in Poplar Creek. Sediment was collected in conjunction with TVA, at eight locations in Poplar Creek and the Clinch River. These samples collected in conjunction with TVA were used for mussel toxicity tests performed at ESD and the TVA toxicity laboratory.

Bathymetric data were obtained from the Army Corps of Engineers hydrographic survey. This information, along with other elevation data, was used to create a bathymetric surface of the Clinch River and Poplar Creek.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

None.

## **3.4.2 Lower Watts Bar Reservoir OU**

### *Description*

Watts Bar Reservoir is the first Tennessee River impoundment located downstream of the ORR. TVA's Watts Bar Dam, completed in 1942, is situated at Tennessee River kilometer 853.6 (river mile 530.5). The reservoir receives inflow from both the Tennessee and the Clinch rivers. This WAG/OU/study area consists of that portion of the reservoir that extends from TRK 913.1 (river mile 567.5, mouth of the Clinch River at Kingston) to Watts Bar Dam.

The source of ORR contaminants in this OU is the Clinch River. Because the dam was completed prior to the start of operations at ORR and also because the reservoir acts as an efficient trap for sediments and any associated particle-reactive contaminants, much of these contaminants have accumulated in the bottom of Watts Bar Reservoir over the years. The contaminants of concern and exposure pathways are the same as for the Clinch River OU, with PCBs in fish posing the greatest risk. TDEC has issued a fish consumption advisory for Watts Bar Reservoir. A fish consumption advisory is also in effect for the Fort Loudoun and Tellico reservoirs, located upstream of Watts Bar Reservoir and the ORR. Sediment contaminant concentrations, because of dilution by the Tennessee River and the greater spatial extent of the reservoir as compared to the Clinch River, are generally lower in Watts Bar Reservoir than in the Clinch River. Screening-level human health risk analyses indicate that contaminants in sediment pose a risk only if deep channel sediments are dredged and the dredge spoil is used for agriculture.

#### *Accomplishments*

A meeting was held of the Watts Bar Reservoir Interagency Working Group (DOE, TVA, Corps of Engineers, EPA, and State of Tennessee) to discuss the status and findings of the Lower Watts Bar Reservoir RI and FS.

The RI/FS and Proposed Plan were submitted to the regulators.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

The revised versions of the RI/FS and Proposed Plan will be submitted to TDEC and EPA for approval.

### **3.4.3 South Campus Facility OU**

#### *Description*

The South Campus Facility (SCF) 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 that 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 as well as 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 and the results of an inspection at this site indicate the presence of target compound list organics in the groundwater.

An RI at SCF was initiated in FY 1993. SCF areas included in the RI are the wastewater treatment plant, ponds, various laboratories, and animal containment facilities. Contaminants of concern include radionuclides, volatile organics, and pentachlorophenols.

### *Accomplishments*

The RI/FS was submitted on schedule and met the FFA milestone of September 16, 1994.

The Sampling and Analysis Plan was submitted to the regulators on July 29, 1994.

### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

Fall sampling of the wetlands treatability study cells will be conducted next quarter.

Work will continue on the Proposed Plan that is scheduled to be submitted to the regulators on February 24, 1995.

## **3.4.4 Freels Bend Study Area**

### *Description*

The 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 <sup>60</sup>Co 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. The entrance to the access road is blocked with a locked bar gate.

Freels Bend Area regions to be investigated include those associated with the irradiation facilities, animal burial locations, and three small impoundments used in the care of control

herds maintained at the Freels Bend Area. Contaminants of concern include radionuclides, organics, and metals.

A briefing was presented to the regulators in November 1993 to present the findings of the site investigation at the Freels Bend Area. The regulators determined at that time that a petition for No Further Investigation could be submitted by DOE for the Freels Bend Area and that the source containment wells present at the Low Dose Rate Irradiation Facility could be remediated as a maintenance action (i.e., an unregulated activity).

#### *Accomplishments*

A No Further Investigation petition was prepared.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

The No Further Investigation petition will be submitted to the regulators.

### **3.5 TECHNICAL OVERSIGHT AND TECHNICAL PROGRAMS**

#### **3.5.1 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 the 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 focused on completing the user evaluation of OREIS and making appropriate system changes in preparation for fully supported operations after June 1994. The charter for OREIS was approved by DOE Headquarters, and OREIS is now a production system. The production version of the software has been installed on the central OREIS servers and the workstations at the sites, DOE, and TDEC. The system development documentation for OREIS was also approved by the Information Resources Management staff at DOE Headquarters.

Data from portions of eight ER reports were loaded into the data base. Records documenting the QA review of the data were established. The data loaded in the data base

are fully accessible by all OREIS users. The OREIS data base now contains information from approximately 310,000 environmental measurements. Data from several other ER reports are under final review for loading in the data base.

Data were submitted to TDEC and EPA for the Clinch River, Gunite and Associated Tanks, and Y-12 Bear Creek Valley OU 2 ER reports.

A specification for transferring environmental compliance (NPDES) data into OREIS was prepared. This specification will be tested during the next quarter. Plans for transferring ambient air data are being formulated. This transfer is a cooperative effort with personnel associated with the environmental compliance programs in Oak Ridge.

Introductory OREIS training was conducted for approximately 40 users. These users included staff from the Environmental Restoration and Environmental Compliance programs and TDEC. Training sessions included an overview of OREIS and introductory training on SAS and ArcView GIS software. The total number of registered users has increased to over 100.

### *Concerns*

*Concern:* The ER Program is emphasizing a significantly shorter (and more frequent) timetable for transferring data from ER projects to OREIS. *Impact:* A different timetable for data transfer will require the revision of the process developed for loading data into OREIS. Additional effort will be required to evaluate and revise the process. This revision of the data transfer schedule has the potential for significantly improving the clarity of the OREIS data, if the schedule is developed properly. *Action:* OREIS data management staff are participating in planning activities associated with a pilot of a revised data transfer schedule for one project. Staff from a site project and project subcontractors are also participating in this effort.

### *Scheduled Activities for Next Quarter*

Additional user training sessions for the production version of OREIS will be provided.

The results of the user evaluation process will be published.

An updated summary of OREIS data base contents will be published.

A configuration control board to support the OREIS charter will be established. The board will include representatives from the site programs, DOE, EPA, and TDEC.

The loading of the backlog of data from ER reports will be completed.

Additional geographic data from existing map data, new base map activities, and aerial survey programs will be collected and made accessible to interested parties.

Data management and system development activities across the ER Program will be coordinated.

### 3.5.2 Remote Sensing and Special Surveys Program

#### *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 Remote Sensing and Special Surveys Program (Aerial Remote Sensing Surveys) 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 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*

The Quality Assurance Plan was completed.

The report that summarizes the extensive study and experimentation on Graphical User Interface (GUI) tools for the dissemination of textual, graphic, and other information in a user-friendly manner was completed. Security issues associated with setting up information servers are also addressed in this document. These tools are under investigation as a possible means by which data from the Remote Sensing Program could be reviewed and acquired by ER and other researchers.

A 12-photo mosaic orthophotographic image of K-25 from 6000-ft altitude photography of the ORR was prepared.

*Scirpus fluviatilis* (River Bulrush), a Tennessee state-listed species, was located and identified at WAG 2 on the edge of WOL. This location is believed to be the second recorded site for the species in Tennessee and in the entire Southeastern United States.

A new population of *Delphinium exaltum*, the Tall Larkspur that is a C2 federal candidate and a Tennessee state threatened species, was discovered. This new population is vigorous, with over a hundred individuals. The population occurs in a rocky area on Chestnut Ridge in the area just north of Bethel Valley Road and just west of Walker Branch. This area will be proposed for identification as an ORR Natural Area.

Eight plant species (nothing rare) that are potentially new to the reservation flora list were identified through the efforts of staff who are part of the threatened and endangered plant species survey project. These findings will be confirmed over the winter.

#### *Concerns*

None.

### *Scheduled Activities for Next Quarter*

Survey activities associated with the threatened and endangered plant and animal species on the ORR will continue.

### **3.5.3 Risk Assessment Program**

#### *Description*

A risk assessment, as defined in the DOE Oak Ridge Operations (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 Bear Creek Valley DQO Workshop was attended August 1-3, 1994. The working team discussed, in detail, the strategies for handling each area of the RI Report and for the FS Report.

The Baseline Human Health Risk Assessment for the K-1070 OU was completed.

The Human Health Risk Assessment strategy document entitled *Defining the Role of Risk Assessment in the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Remedial Investigation Process at the DOE-OR* was revised.

The regulators' comment resolution meeting for the WAG 1 GAAT OU was attended on September 20. Specific issues relating to the risk assessment sections of the WAG 1 GAAT OU RI/FS Report were discussed.

#### *Concerns*

None.

#### *Scheduled Activities for Next Quarter*

None.

### **3.5.4 Federal Facility Agreement and Tennessee Oversight Agreement**

#### *Description*

Section 120 of CERCLA requires federal facilities listed on the National Priorities List to enter into an FFA with the 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 for investigating and remediating 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*

A kickoff meeting was held to discuss the D&D strategy and the integration of the D&D Program into the FFA.

A meeting was held to discuss the objectives and strategy for modifying the FFA language and preparing the HSWA permit modification that is due out in 1996 to ensure a working CERCLA/RCRA integration under the FFA and compliance with the HSWA permit.

The April 18, 1994, list of FY 1995 deliverables was compared with the list of approved deliverables in the 1995 Fiscal Year Work Agreement and updated to reflect current information. This updated list was submitted to the regulators.

FFA modification language was prepared to incorporate the new Appendix I (operating instructions) sections into the current language.

FFA project managers approved the first No Further Investigation.

Appendix C of the FFA was completed for transmittal to the regulators.

*Concerns*

None.

*Scheduled Activities for Next Quarter*

Appendix C of the FFA will be updated.

## 4. REMEDIAL 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—Energy Systems, ENSERCH, Jacobs Engineering, and MK-Ferguson—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 RI Work Plan for Chestnut Ridge OU 1.  
Development of an RI Report for Chestnut Ridge OU 2.

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

**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. 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.**—Provision of 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.

**Jacobs ER Team**—Preparation of integrated RCRA/CERCLA/National Environmental Policy Act (NEPA) decision documents, including FSs, Proposed Plans, RODs, EAs, EISs, documents for interim actions, and cost estimates associated with these documents. Provision of technical support for RIs, assessments and investigations for off-site locations, remedial action verification, DOE and Energy Systems community relations activities, requirements associated with the Administrative Record, and risk assessments.

**SAIC**—Field sampling at Bear Creek Valley OUs 2 and 4, development of an RI Report for Bear Creek Valley OU 2, 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 the 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 analysis, support for management, and analysis and interpretation of biological data from laboratory and field studies.

**Battelle Pacific Northwest Laboratory**—Design and fabrication services for an in situ vitrification 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. Assessments will also be conducted of the inactive tanks as required by the 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 the suitability of soil for caps.

**ECOTECH**—Assistance in the analysis of surface water.

**ENSERCH Environmental Corporation**—Remedial design activities.

**Environmental Consulting Engineers**—Preparation of remediation and postremediation monitoring plans for WAG 6 and monitoring in WAG 2 and WAG 5 removal action investigation.

**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 documents.

**Highland Drilling Company**—Construction and 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.

**Jacobs ER Team**—Preparation of integrated RCRA/CERCLA/NEPA decision documents, including FSs, Proposed Plans, RODs, EAs, Environmental Impact Statements, documents for interim actions, and cost estimates associated with these documents. Provision of technical support for RIs, assessments and investigations for off-site

locations, remedial action verification, DOE and Energy Systems community relations activities, requirements associated with the Administrative Record, and risk assessments.

**JAYCOR**—Sampling and analysis support for benthic macroinvertebrate samples from WOC and its 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 EAs and CERCLA decision documents. *[Closed]*

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

**Southwest Research**—Outside laboratory services.

**Temp Systems**—Assistance with administrative functions and surface water monitoring.

**Tennessee Valley Authority Interagency Agreement**—Technical supervision of FY 1992 drilling activities, including drilling three core holes 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 surveying (Pond Waste Management Project).

**Advanced Sciences, Inc.**—Data validation.

- Analysas Corporation**—Records management (Pond Waste Management Project).
- Battelle, Columbus Laboratories**—Preparation of a simplified EA (Pond Waste Management Project).
- Brooks Rand Laboratory**—Mercury speciation analyses.
- CDM Federal Programs**—PA/SI and RCRA Facility Investigation work plan preparation.
- Chemrad Tennessee Corporation**—Ultrasonic Ranging and Data System support.
- CompuChem Laboratories**—Chemical/radiological analyses.
- COR, Inc.**—Inventory Management Information System prototype development support (Pond Waste Management Project).
- Dennis Weiter Assoc.**—Study of available filter press operations (Pond Waste Management Project).
- Enterprise Advisory Services, Inc.**—Management systems support.
- ESE Biosciences Group**—Bioremediation of a former UST site. *[Closed]*
- ETE Consulting Engineers**—Surveying.
- Geraghty and Miller**—Technical support [K-25 Site Groundwater Protection Program (GWPP)]. *[Closed]*
- GH Cofer**—Professional services.
- Gilbert Commonwealth**—Estimating support.
- Highland Drilling**—Characterization well drilling; drilling services for K-25 Site GWPP. *[Closed]*
- HSW Environmental Consultants, Inc.**—Technical support (K-25 Site GWPP).
- Jacobs ER Team**—Preparation of integrated RCRA/CERCLA/NEPA decision documents, including FSs, Proposed Plans, RODs, EAs, Environmental Impact Statements, documents for interim actions, and cost estimates associated with these documents. Provision of technical support for RIs, assessments and investigations for off-site locations, remedial action verification, DOE and Energy Systems community relations activities, requirements associated with the Administrative Record, and risk assessments.
- Labat-Anderson**—Assistance for Radian Corporation with EA for K-1407 B&C Ponds. *[Closed]*
- Lockwood Greene**—On-site project engineering support and Title II design (Pond Waste Management Project).
- A. L. Lotts**—Operational Readiness Review Board; independent member (Pond Waste Management Project).
- PAI**—Technical consulting; generation of a project management plan and operational oversight management plan (Pond Waste Management Project).
- SAIC**—RI subcontract services for the K-770 and K-1070 OUs.
- Tenera**—Technical consulting; conduct of operations (Pond Waste Management Project).

**University of Tennessee, Industrial Engineering Department**—Assistance in planning for storage layout and warehousing (Pond Waste Management Project).

#### 4.4 ORAU AND EFPC

**Alceon Corporation**—Quantitative uncertainty analysis.

**Brooks Rand Laboratories**—Analytical support.

**CompuChem Laboratories**—Analytical laboratory services.

**ENSERCH**—Baseline support for ORAU.

**ETE Consulting Engineers**—Surveying.

**GEOTEK**—Field investigation support.

**Jacobs ER Team**—Preparation of integrated RCRA/CERCLA/NEPA decision documents, including FSs, Proposed Plans, RODs, EAs, Environmental Impact Statements, documents for interim actions, and cost estimates associated with these documents. Provision of technical support for RIs, assessments and investigations for off-site locations, remedial action verification, DOE and Energy Systems community relations activities, requirements associated with the Administrative Record, and risk assessments.

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

**MK-Ferguson**—Baseline planning support for ORAU.

**SAIC**—EFPC RI/FS, data management, quality assurance, community relations, and 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.

**Atlan-tech, Inc.**—Procedure writing support for the low-level radiological laboratory being used to analyze Phase 2 samples. *[Closed]*

**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, and 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 of the first Lifecycle Baseline document. *[Closed]*

**Jacobs ER Team**—Preparation of integrated RCRA/CERCLA/NEPA decision documents, including FSs, Proposed Plans, RODs, EAs, Environmental Impact Statements, documents for interim actions, and cost estimates associated with these documents. Provision of technical support for RIs, assessments and investigations for off-site locations, remedial action verification, DOE and Energy Systems community relations activities, requirements associated with the Administrative Record, and risk assessments.

**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 the 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]*

**Oak Ridge Institute of Science and Energy**—Support for risk assessments and contaminant transport modeling.

**ORACLE**—Support in the design and implementation of ORACLE-based data bases and applications.

**ORAU**—Radioanalytical support for Phase 1 of the RI. *[Closed]*

**PEER Consultants**—Computer programming and bar coding support.

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

**SENES, Oak Ridge**—Support for human health risk assessments.

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

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

**Tennessee Valley Authority**—Support for the sedimentation range cross-sections *[Closed]*; aerial photography and topographic mapping of WOCE *[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 analyses 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 Energy Systems document management centers in Oak Ridge; study of pollutant material transport, distribution, and characterization; and program management.

#### 4.6 ENERGY SYSTEMS ER CENTRAL DIVISION

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

**Authorization Systems, Inc.**—Subcontract support to 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.

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

**Ecotect Laboratory Services, Inc.**—Laboratory sample analysis.

**Ekotek Laboratory Services, Inc.**—Radiological/analytical data analysis.

**ERC, Inc.**—Support for a feasibility study.

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

**Lietzke Soil Services**—Soil consulting services.

**Lockheed Analytical Services**—Chemical/analytical data analysis.

**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, hydrogeology, and data base management support.

**University of Waterloo (Canada)**—Groundwater modeling.

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

**4.7 JACOBS ENGINEERING**

**Geraghty & Miller**—Environmental sciences and groundwater support for the production of integrated decision documents.

**Lockwood Greene**—Environmental engineering support for the production of integrated decision documents.

**PAI Corporation**—Support for the production of integrated decision documents.

**STEP**—Support for the production of integrated decision documents.

**The University of Tennessee**—Training and other support for the production of integrated decision documents.

**United Science Industries**—Support for the production of integrated decision documents.