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Terms & Acronyms

BJC — Bechtel Jacobs Co.	LOC — Oak Ridge Reservation Local Oversight Committee, Inc.
BMAP — Biological Monitoring and Abatement Program	NGA — National Governors Association
BNFL — British Nuclear Fuels Ltd.	NEPA — National Environmental Policy Act
CAP — Citizens' Advisory Panel	NPDES — National Pollutant Discharge Elimination System
CERCLA — Comprehensive Environmental Response, Compensation, and Liability Act	NPL — National Priorities List
CROET — Community Reuse Organization of East Tennessee	NRC — Nuclear Regulatory Commission
The Division — TDEC DOE Oversight Division	ORHASP — Oak Ridge Health Agreement Steering Panel
D&D — Decontamination and decommissioning	ORNL — Oak Ridge National Laboratory
DNAPLs — Dense non-aqueous phase liquids	ORO — Oak Ridge Operations
DOE — U.S. Department of Energy	ORR — Oak Ridge Reservation
EIS — Environmental Impact Statement	ORSSAB — Oak Ridge Site Specific Advisory Board
EM — Environmental Management	PCBs — Polychlorinated biphenyls
EPA — U.S. Environmental Protection Agency	PRGs — Preliminary Remediation Goals
EQAB — Oak Ridge Environmental Quality Advisory Board	RCRA — Resource Conservation and Recovery Act
ERDA — Energy Research and Development Administration	ROD — Record of Decision
ERP — Emergency Response Plan	TDEC — Tennessee Department of Environment and Conservation
ETTP — East Tennessee Technology Park (formerly K-25)	TDH — Tennessee Department of Health
FFA — Federal Facilities Agreement	TEMA — Tennessee Emergency Management Agency
IRC — Information Resource Center	TOA — Tennessee Oversight Agreement
IVO — Independent Verification Organization	TSCA — Toxic Substances Control Act
IWMF — Interim Waste Management Facility	TWRA — Tennessee Wildlife Resources Agency
LLW — Low-level waste	VOCs — Volatile organic com- pounds
LMER — Lockheed Martin Energy Research Corporation	

Executive Summary

Oak Ridge, Tennessee, is home to one of the largest and most diverse U.S. Department of Energy (DOE) complexes in the nation. The Oak Ridge Reservation (ORR) was born of the Manhattan Project and nurtured by the Cold War, and its primary missions were to develop the materials and skills necessary to build the atomic bomb.

When they were first built, the three major facilities on the ORR—Y-12, K-25 and X-10—each had a distinct mission. Y-12 enriched uranium using an electro-magnetic process, which was later abandoned in favor of the more efficient gaseous diffusion used at K-25. Y-12's primary mission became precision machining of specialty materials for bomb manufacturing. X-10, later known as Oak Ridge National Laboratory (ORNL), undertook weapons research and development, especially purification of plutonium.

Now these facilities have different missions. Y-12 disassembles nuclear weapons and stores highly enriched uranium. It has also been designated the National Prototype Center, in recognition of the unique expertise of its machinists.

K-25 has been renamed East Tennessee Technology Park (ETTP) and is dedicated to environmental management. Surplus facilities at ETTP are being decontaminated and leased to private industry under a plan known as "reindustrialization." ORNL undertakes research and development in a wide variety of scientific fields; it is widely known for its contributions to neutron science and is the designated location for the planned Spallation Neutron Source.

Activities on the ORR have not been without a price. For more than 50 years, radioactive, hazardous, and mixed wastes have been buried, poured into ponds and streams, burned, and discharged out smokestacks. The resulting contamination affects approximately 10 percent of the Reservation's area and has migrated off site via air, groundwater and rivers.

Activities on the ORR have not been without a price. For more than 50 years, radioactive, hazardous, and mixed wastes have been buried, poured into ponds and streams, burned, and discharged out smokestacks.

Tennessee Oversight Agreement

The State of Tennessee, driven by concerns over the pollution of state waters and potential impacts on local residents' health, entered into a legal agreement with DOE called the Tennessee Oversight Agreement (TOA). Signed in 1991,

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the TOA requires DOE to provide technical and financial support to the State for activities in four major areas: environmental restoration, environmental monitoring and oversight, emergency response and preparation, and public outreach.

A second legal document, the Federal Facilities Agreement (FFA), was inked in 1992 and established a formal relationship between the State, DOE and the U.S. Environmental Protection Agency (EPA). The FFA specifies objectives and timetables DOE must meet to ensure that cleanup activities proceed according to mutually agreed-upon plans.

The Tennessee Department of Environment and Conservation (TDEC) created the Division of DOE Oversight to implement the State's responsibilities under these two agreements. The Division has five program sections: Environmental Monitoring and Compliance, Environmental Restoration, Radiological Monitoring and Oversight, Waste Management, and Administration.

Local Government and Citizen Involvement

The State and the Division have long been proponents of community involvement in the difficult decisions regarding environmental restoration of the ORR. Under the TOA, the State provides a grant to the Oak Ridge Reservation Local Oversight Committee, Inc., (LOC) to serve as an independent multi-jurisdictional forum for local governments to provide advice to DOE and the regulatory agencies. In place since 1991, the LOC added a Citizens' Advisory Panel in 1995 to enable interested citizens to study the issues in depth and make recommendations to the LOC Board.

The State and the Division have long been proponents of community involvement in the difficult decisions regarding environmental restoration of the ORR.

The Division also supports DOE's official advisory board, the Oak Ridge Site Specific Advisory Board (ORSSAB), and holds an *ex officio* seat on the ORSSAB. This board was created in 1995 and is chartered under the Federal Advisory Committee Act.

Local governments also have boards concerned with the environmental effects of DOE's activities within their jurisdictions. The Oak Ridge Environmental Quality Advisory Board and the Roane County

Environmental Review Board routinely examine DOE's environmental decisions.

Outside of these "official" bodies, stakeholder initiatives have taken on a life of their own. Out of the highly successful End Use Working Group, a Stewardship Working Group was formed in 1999 to produce a detailed road map

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for DOE to use in managing sites that have residual contamination after remediation is complete. The Division provided a point of contact and technical support to this group over the course of its life.

The widespread availability of electronic mail and the Internet have made near-instantaneous dissemination of complex information an everyday event. TDEC (including the Division of DOE Oversight), the Environmental Protection Agency, DOE, the stakeholder organizations, and other interested groups maintain Web sites and communicate via e-mail lists and listservers regarding environmental issues at the ORR.

Major Findings

DOE historically released immense quantities of radioactive and hazardous contaminants, raising important questions: What effects did these releases have on human health of workers and residents? Is the current population at risk from contamination remaining in the environment? These are questions that have been studied by hundreds of scientists, engineers and health professional from DOE as well as by numerous independent agencies and organizations. The Division supports these initiatives by providing data on current contamination and past and ongoing releases.

The Tennessee Department of Health manages the Oak Ridge Health Studies, a TOA-funded program designed to answer the above questions. The health studies receive advice from a group of experts and citizens known as the Oak Ridge Health Agreement Steering Panel. These studies are scheduled to be completed in late 1999.

The Y-12 Plant.

DOE photo

It is the Division's opinion, based on its own monitoring and oversight of DOE, that there are no immediate threats to public health from current activities on the ORR. However, the potential for harm does exist if there are lapses in

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maintenance and cleanups fail to progress. Dangerous materials such as uranium hexafluoride, highly enriched uranium, and metallic lithium remain in storage. DOE must ensure that current operations maintain the integrity of the controls on these materials. In addition, most of the poor waste disposal practices of the past have yet to be remedied, resulting in the continuing migration of contaminants off the Reservation. These sites, which act as sources for current soil, groundwater, and surface-water contamination, must be cleaned up or safely and permanently controlled.

DOE continues to release low levels of contaminants to the air and water, treat its hazardous and radioactive wastes, and dispose of solid wastes, all under permits granted by the State of Tennessee or the EPA. The Division monitors these activities to ensure that DOE remains in compliance. The results thus far indicate that DOE's current operations typically meet the requirements of its state and federal permits and do not pose health risks to the public.

Reindustrialization of ETTP is an avenue by which DOE has hoped to accelerate the cleanup of usable buildings and bring new jobs to Oak Ridge. The Division supports these goals but is committed to ensuring that reindustrialization does not interfere with mandated progress on site cleanup and does not pose a health hazard to private-sector workers on site.

Key Issues and Challenges

Today's cooperative relationship between DOE, EPA and the State of Tennessee evolved from a difficult situation in 1983. Massive quantities of mercury, released for years from Y-12, were discovered to have polluted East Fork

Poplar Creek, which runs through downtown Oak Ridge. Court action forced a reluctant DOE to begin complying with federal and State laws and regulations.

The current partnership between these three entities is based on open communication, mutual respect for the different interests of each party, and the shared desire to accomplish site cleanups. This relationship took another step forward this year with the initiation of periodic meetings at the highest management levels between Oak

Ridge Operations, EPA Region 4, and the Division.

Remarkable progress has been made in the past few years. East Fork Poplar Creek has been cleaned up, numerous other sites have been closed, and other

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Today's cooperative relationship between DOE, EPA and the State of Tennessee evolved from a difficult situation.

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significant milestones have been achieved. DOE has recently come to an agreement with the State on how to ensure adequate funding for long-term care of the planned on-site Environmental Management Waste Management Facility. However, many challenges remain—predictably, these are the most difficult to address. They include:

- ✓ Providing sufficient resources for long-term control and monitoring—or “stewardship”—of contamination left on the ORR;
- ✓ Coming to key decisions on how to address widespread groundwater contamination and the disposition of burial grounds that contain extremely long-lived radionuclides;
- ✓ Finding an appropriate disposal option for the huge inventory of low-level waste stored on the ORR as well as for the types of cleanup wastes that will be ineligible for disposal in the Environmental Management Waste Management Facility;
- ✓ Ensuring that the State of Tennessee will be treated equitably when the burdens of waste treatment and disposal are decided at the national level;
- ✓ Balancing the desire to reindustrialize ETTP with the need to decontaminate facilities and clean up significant problems at this still-contaminated site;
- ✓ Verifying that tools, metals, and other assets released into the public sector are appropriately decontaminated;
- ✓ Resolving health and safety questions raised by DOE and contractor workers and by area residents; and
- ✓ Providing adequate, long-term level funding for Environmental Management at ORO in the face of federal budget restrictions and commensurate with the severity of its contamination problems.

Many challenges remain—predictably, these are the most difficult to address.

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The Oak Ridge Reservation is located in East Tennessee. Map courtesy of U.S. Department of Energy (Oak Ridge Reservation Annual Site Environmental Report for 1998, DOE/ORO/2091).

Introduction

The Oak Ridge Reservation is one of the largest DOE sites in the nation. It is home to three major DOE facilities: Oak Ridge National Laboratory, the Y-12 Plant, and East Tennessee Technology Park. These three facilities have diverse missions that parallel DOE's national missions: Energy Research, Defense, and Environmental Management.

Radioactive, hazardous, and mixed wastes generated over the last 50-plus years have been released into the environment on the Reservation. Additional wastes were brought from other locations and buried near ORNL. The resulting environmental contamination prompted the U.S. Environmental Protection Agency to place the ORR on the National Priorities List (NPL) on November 21, 1989.

The NPL is generated by the EPA under the authority of Superfund, known officially as the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Enacted in 1980, this law established a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. The law also set up rules governing these sites and holding liable those responsible for the contamination liable. CERCLA required the establishment of the NPL and enabled revision of the National Contingency Plan, which is the federal government's blueprint for responding to oil spills and hazardous substance releases.

Being placed on the NPL is an important designation. Sites on the NPL pose the nation's most serious threats to public health and the environment. CERCLA requires that NPL sites be investigated to assess the nature and extent of contamination, risks faced by humans and the environment, and alternatives available to minimize these risks.

In 1991 the State of Tennessee and DOE signed the Tennessee Oversight Agreement (TOA). Under TOA, DOE provides technical and financial support to the State for environmental monitoring and oversight. TOA focuses on four major areas: environmental restoration, environmental monitoring and oversight, emergency response and preparation, and public outreach. The TOA was extended in 1996 and will be reviewed for further extension or modification in 2001.

The 1999 Status Report to the Public details the activities of the various sections of the DOE Oversight Division sections during the fiscal 1999 (July 1, 1998, to June 30, 1999). It recounts DOE activities in Oak Ridge and

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Radioactive, hazardous, and mixed wastes generated over the last 50-plus years have been released into the environment on the Reservation.

Introduction

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the extent to which they these activities affect human health and the environment. The report outlines regulations that govern hazardous and radiological materials on the ORR, and explains TDEC's duties in monitoring and overseeing DOE activities. It also provides information on other TOA activities, including the Oak Ridge Health Studies, Emergency Response Planning through the Tennessee Emergency Management Agency, and outreach through the Local Oversight Committee. Additional information is available in the Division's 1998 Environmental Monitoring Report.

Oak Ridge National Laboratory.

DOE photo

Background

In August 1939, Albert Einstein wrote a letter to President Franklin Delano Roosevelt concerning recent research that had been performed on nuclear chain reactions using uranium. The research proved that it was possible to produce large amounts of power from a chain reaction and that this energy could conceivably be used to construct “extremely powerful bombs.” This news sparked concern that the Germans, the aggressors in the European theater embroiled in World War II, might develop such a weapon. The U.S. government was determined to create an “atomic” bomb first, a decision that led to the 1942 creation of the Manhattan Project. This resulted in establishment of the Oak Ridge Reservation (ORR) and the City of Oak Ridge. Under the leadership of General Leslie R. Groves, the U.S. Army Corps of Engineers built four facilities in the sheltered valleys of East Tennessee; these facilities were code-named X-10, Y-12, K-25, and S-50.

The Oak Ridge Reservation

The Oak Ridge Reservation covers 35,545 acres, the majority of it lying within the 56,000-acre Oak Ridge City limits. The ORR is one of the largest of DOE’s 19 sites currently operating in the United States. The Reservation’s three major facilities — the Y-12 plant, East Tennessee Technology Park (ETTP), and Oak Ridge National Laboratory (ORNL) – occupy about 30 percent of the ORR. The remainder of the Reservation has been designated a National Environmental Research Park to provide protected land for environmental science research and education.

The government chose this portion of the Clinch River watershed for a number of reasons. The river provided adequate quantities of water, the Tennessee Valley Authority furnished sufficient electricity to meet the enormous demands of the uranium-enrichment process, and the region was relatively isolated, with the industrial plants hidden and sheltered between steep ridges. A residential community for workers was built in conjunction with the production of research facilities.

The City of Oak Ridge was incorporated in 1959, 17 years after the Reservation was created. The Reservation lies almost completely within Oak Ridge city limits and straddles two counties, Anderson County in the east and Roane County in the west. ORNL and ETTP are located in Roane County, and Y-12 is located in Anderson County.

Background

The Plants

Oak Ridge National Laboratory

The plant known as X-10 was originally responsible for weapons research and development. It occupies about 2,900 acres in Bethel Valley and Melton Valley. Its mission included developing methods for enriching uranium enrichment and producing plutonium production for nuclear weapons. X-10 developed methods for separating plutonium from irradiated uranium fuel, a process that required various nuclear reactors and associated chemical separation facilities. The production of plutonium was soon shifted to the more isolated Hanford Plant in Washington State, partly because large volumes of mixed waste were produced in the process.

X-10 is now known as Oak Ridge National Laboratory, and its mission has changed a great deal. ORNL hosts the world's first full-scale nuclear reactor, once known as the Clinton Pile and now called the Oak Ridge Graphite Reactor; it is listed on the National Historic Register. ORNL has become an internationally recognized center for general research and development in many scientific and technical fields.

Its initiatives now include programs in the energy, nuclear, biological, chemical, environmental and materials sciences. ORNL also produces many radioactive isotopes with important applications in research and medicine. In recognition of its outstanding neutron science capabilities, ORNL was chosen as the site for the National Spallation Neutron Source.

Y-12 Plant

The Y-12 plant was built in 1943 on 811 acres between Chestnut Ridge and Pine Ridge. Y-12's initial mission was the enrichment of uranium using a calutron, which employed an electromagnetic process to increase concentration of the fissionable uranium-235 isotope. When the gaseous diffusion process used at K-25 (ETTP) was designated the preferred enrichment process, Y-12's primary mission changed to the production and fabrication of nuclear weapons components.

When the Cold War ended in 1992, Y-12's mission was redefined as "stockpile stewardship." The plant currently disassembles nuclear weapons and is the nation's primary storage site for highly enriched uranium and for other uranium and lithium materials. Y-12 also continues to support DOE's weapons laborato-

Background

ries in New Mexico and California by upgrading some nuclear weapons. In addition, Y-12 houses the Centers for Manufacturing Technology and the National Prototype Center.

East Tennessee Technology Park

K-25, also known as the Oak Ridge Gaseous Diffusion Plant, is located four miles west of downtown Oak Ridge and occupies 1,500 acres. K-25 produced enriched uranium using a process known as gaseous diffusion, which is based on the principle that molecules of a lighter isotope will pass through a porous barrier more readily than molecules of a heavier one.

K-25 and the surrounding area have since been renamed East Tennessee Technology Park and are now dedicated to Environmental Management (EM). EM's mission involves four main activities: (1) management of urgent and high-risk nuclear materials and facilities, (2) management of large amounts and various types of waste, (3) environmental restoration, and (4) technology development. ETTP is home to the Toxic Substances Control Act (TSCA) Incinerator. TSCAI is the only incinerator in the country permitted to treat mixed wastes—wastes with both hazardous and radioactive contaminants—that also contain polychlorinated biphenyls (PCBs). Some of the usable facilities at ETTP are

The Oak Ridge Reservation lies about 20 miles west of Knoxville and straddles Roane and Anderson Counties. Map courtesy of U.S. Department of Energy (Oak Ridge Reservation Annual Site Environmental Report for 1998, DOE/ORO/2091).

Background

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being released for use by private industry.

A fourth plant, S-50, was also located on the ORR. Its mission was to enrich uranium by means of a high-speed centrifuge. This process proved very ineffective, and the S-50 plant operated only in 1944 and 1945. The plant site is located within the current ETTP boundaries, although no physical facilities remain.

Setting and Area Populations

Oak Ridge residential and business areas are to the north and east of the Oak Ridge Reservation, while the Clinch River is to the west and south. The map on page 13 also shows the locations of the three plants—Y-12, ORNL, and ETTP.

The counties nearest to the ORR are Anderson County, Roane County, Knox County, Loudon County, and Morgan County. Their population estimates for January 1, 1997, are (Rand McNally Commercial Atlas and Marketing Guide 1998):

- ✓ Anderson (includes the eastern portion of Oak Ridge and the ORR) – 71,900
- ✓ Roane (includes the western portion of Oak Ridge and the ORR) – 49,100
- ✓ Knox (including the City of Knoxville) – 366,100
- ✓ Loudon – 37,600
- ✓ Morgan – 18,100

The nearest towns, besides the city of Oak Ridge, are Oliver Springs, Kingston, Lenoir City, Harriman, Farragut, and Clinton. Knoxville, the nearest metropolitan center, is about 20 miles to the southeast.

The ORR is situated in the Valley and Ridge Province of East Tennessee. The province is bounded on the southeast by the Great Smoky Mountains and on the northwest by the Cumberland Mountains.

The Environment

The region's climate is moderately humid, with an annual mean precipitation of about 54 inches. The average winter temperature is 42 degrees Fahrenheit and the average summer temperature is 76 degrees Fahrenheit. Wind patterns in the region are controlled primarily by the ridge and valley topography, with prevailing winds moving up the valleys to the northeast during the daytime and down the valleys to the southwest at night.

Background

Streams on the ORR drain into the Clinch River to the east and to the south. The Clinch is a tributary of the Tennessee River, joining it near Kingston. Melton Hill Dam is located on the Clinch River a short distance upstream from ORNL. Portions of the Clinch River above the dam are part of Melton Hill Lake, and portions below the dam are backwaters of Watts Bar Reservoir.

The flow of groundwater on the Reservation is very complex but is generally similar to that of the surface streams. In many areas, water flows underground in channels dissolved in the bedrock.

Contamination

DOE and its predecessor agencies have contaminated 527 sites on or near the Reservation. The total area involved is about 15 percent of the ORR. The entire ORR has been designated a National Priorities List (NPL) site under the Superfund law. It requires one of the largest environmental cleanup efforts in history. Although contamination is confined largely within the Reservation boundaries, some has been carried off site. These affected areas include Lower East Fork Poplar Creek (which winds through the Oak Ridge community), the Clinch River, Watts Bar Reservoir, and the groundwater in Union Valley (an industrial area in the city). The off-site areas have received a great deal of study, and the extent of the contamination is known. In the case of Lower East Fork Poplar Creek, remediation has been completed.

The K-25 Site (East Tennessee Technology Park).

DOE photo

The contaminated areas within the ORR are being evaluated for cleanup using the "watershed" approach. The ORR has been divided into five large tracts of land roughly equivalent to the major hydrologic watersheds. They are: (1) White Oak Creek Watershed – Bethel Valley, (2) White Oak Creek Watershed – Melton Valley, (3) Bear Creek Valley Watershed, (4) Upper East Fork Poplar Creek

Background

Watershed, and (5) ETPP Watershed.

By using this approach, all sources of environmental contamination within a watershed are evaluated together. This also ensures that comprehensive resources are developed for eliminating or otherwise controlling these contaminated sources. The watershed approach has many benefits:

- ✓ It permits consistent cleanup goals and standards for the entire watershed area;
- ✓ It focuses on major problem areas and evaluates relative risk;
- ✓ It optimizes remediation efforts;
- ✓ It allocates limited cleanup resources efficiently;
- ✓ It enhances the prioritization of cleanup activities;
- ✓ It facilitates a coordinated technical approach and field implementation; and
- ✓ By combining decisions for multiple disposal areas into a reduced number of Records of Decision (RODs), it significantly reduces the documentation costs and schedules associated with the alternative selections.

White Oak Creek Watershed — Bethel Valley

Oak Ridge National Laboratory dominates the Bethel Valley Watershed, which occupies about 800 acres. The watershed is bounded to the south by the White Oak Creek Watershed – Melton Valley and to the north by the Bear Creek Valley Watershed.

The wastes located in the Bethel Valley portion of the watershed resulted from nuclear reactors, radioisotope operations, particle accelerators, hot cell operations, physical, chemical, and biological research, fuel chemical reprocessing research, and analytical laboratories. The watershed has been divided into three main areas of contamination:

- ✓ ORNL Main Plant Area: This includes active and inactive facilities, four inactive research reactors, underground waste tanks, pipelines, and surface impoundments. Problem contaminants are strontium-98, cesium-137, and uranium.
- ✓ Waste Area Grouping 3: This was used for the disposal of low-level waste and transuranic waste.
- ✓ Waste Area Grouping 17: East of ORNL, this area contains the majority of ORNL's craft and machine shops and associated support facilities, which have contaminated groundwater and soil primarily with volatile organic compounds (VOCs).

Background

White Oak Creek Watershed — Melton Valley

The White Oak Creek Watershed – Melton Valley occupies about 1,000 acres of land south of and downstream from the Bethel Valley portion of the White Oak Creek Watershed. Haw Ridge separates Melton Valley from Bethel Valley. The Clinch River borders Melton Valley on the west.

Melton Valley contains many acres of burial grounds, seepage pits, contaminated floodplains, and hydrofracture wastes, but the majority of disposal activities involved the use of shallow land burial. The wastes located in this watershed originated not only from local operations, but from other sites as well. From 1955 to 1963, ORNL's solid waste storage areas were designated by the Atomic Energy Commission as the Southern Regional Burial Grounds. About 1 million cubic feet of solid waste from various off-site installations was disposed of in this area.

White Oak Lake and some of the many waste burial grounds in Melton Valley will require long-term stewardship.

DCE photo

The Melton Valley Watershed has been divided into nine major areas of contamination: Waste Area Groupings 2, 4, 5, 6, 7, 8, 9, 10, and 13. Problematic contaminants, many of which are discharging into the Clinch River via White Oak Creek, include cesium-137, cobalt-60, strontium-90, tritium, other radionuclides, transuranic elements, and VOCs.

Bear Creek Valley Watershed

The Bear Creek Valley watershed covers about 1,000 acres of land, about 20 percent of which has been used for waste disposal. To the west lies the East Tennessee Technological Park Watershed, and to the south lies the White Oak

Background

Creek Watershed - Bethel Valley. The City of Oak Ridge is located north of the Bear Creek Valley Watershed, as is Pine Ridge. The Upper East Fork Poplar Creek Watershed borders the Bear Creek Valley Watershed on the east.

Shallow groundwater in the eastern end of Bear Creek Valley is contaminated with uranium and chlorinated solvents.

Shallow groundwater in the eastern end of Bear Creek Valley is contaminated

with uranium and chlorinated solvents, also known as dense non-aqueous phase liquids (DNAPLs). Deep groundwater is also contaminated with DNAPLs, which tend to sink through groundwater and fractured or porous rocks. A portion of these contaminants dissolves into the groundwater and escapes into the stream that runs through the valley.

Other contaminants that have migrated into surface water include nitrates and uranium from the S-3 Ponds Area, uranium and VOCs from the Oil Landfarm Area, and VOCs from the Bear Creek Burial Grounds.

The major sites in Bear Creek Valley are:

- ✓ S-3 Ponds: Used from the 1950s through the 1980s for disposal of more than 2 million gallons of nitric acid solutions each year, they are now closed under the Resource Conservation and Recovery Act (RCRA).
- ✓ Oil Landfarm Area: Used to dispose of organic wastes, contaminated waste oils, and coolants, it has been partially remediated.
- ✓ Sanitary Landfill 1: Used between 1968 and 1982 for the disposal of non-contaminated materials, it was closed in 1983 and capped according to TDEC requirements.
- ✓ Boneyard/Burnyard: A series of unlined trenches used for the disposal of contaminated debris and wastes and for the burning of magnesium chips and wood, in operation from 1943 until 1970; only the Hazardous Chemicals Disposal Area portion of the site has been capped.
- ✓ Bear Creek Burial Grounds: Used from 1955 to 1991 as the main solid waste disposal area for the Y-12 Plant and for disposal of industrial wastes from ORNL, ETTP, and areas outside the ORR. Here the "Walk-in Pits" were used for the disposal of shock-sensitive and pyrophoric materials. The Walk-in Pits and other parts of the burial grounds have been closed under RCRA. The burial Grounds are estimated to contain approximately 40 million pounds of Uranium metal and hydroxides (primarily U-238) that have been buried in unlined pits and trenches.

Background

Upper East Fork Poplar Creek Watershed

Located between Pine Ridge and Chestnut Ridge, Upper East Fork Poplar Creek Watershed includes the main Y-12 Plant and its surrounding area. This watershed lies to the east of the Bear Creek Valley watershed.

There are more than 70 known sources of contamination in the Upper East Fork Poplar Creek Watershed.

The central plant area is underlain by a groundwater plume contaminated with nitrates, uranium-238, and other radionuclides and metals. This plume originates from the S-3 Ponds (on the divide with Bear Creek Valley Watershed) and from other sources within the plant.

A carbon tetrachloride-contaminated groundwater plume exists on the east end of the Plant and extends off site and under the Union Valley Industrial Park. The source of this plume is unknown, but carbon tetrachloride was used in large amounts from 1943 until 1946 in processing source material for the electromagnetic separation process.

Mercury is also a major contaminant in the Upper East Fork Poplar Creek Watershed. Mercury from past releases is also a contaminant in the soils and around building foundations. Mercury levels in Upper East Fork Poplar Creek have been steadily decreasing over the years.

Chestnut Ridge, which is included as part of the Upper East Fork Poplar Creek Watershed, lies south of the Y-12 Plant and extends to the northern edge of Bethel Valley Road. The area consists of more than 2,000 acres and drains south into the Clinch River.

Chestnut Ridge contains a variety of disposal sites that are regulated by CERCLA, RCRA, or both, depending on the type of contamination at the site. Several industrial landfills are also located on Chestnut Ridge. The CERCLA and RCRA sites contain a wide variety of contaminants. These include nitrate-contaminated sludges fixed in cement, as well as arsenic, copper, lead, zinc, mercury, uranium, fly ash, PCBs, cadmium, chromium, nickel, carbon tetrachloride, and chloroform.

East Tennessee Technology Park Watershed

The East Tennessee Technological Park Watershed occupies 4,600 acres of land, but only about 1,000 acres have been affected by operations at the former K-25 site. The watershed is partially bordered on the west by the Clinch River, and its tributary Poplar Creek runs through the area.

Background

Principle contaminants in the groundwater are VOCs, some radionuclides, and various types of metals. The most ubiquitous contaminants are trichloroethylene and technetium-99. For the most part, contamination levels are not substantial in surface water.

Different types of contamination can be found in the shallow soils and the deeper soils.

Shallow soils contain radionuclides, metals, and organics that can be traced back to spills, overflows, building runoff, and atmospheric releases. Petroleum products, VOCs, and some radionuclides are found in the deeper soils. This contamination is the result of waste line leaks, tank leaks, and burial grounds.

The ETTP Watershed has been divided into three main areas:

- ✓ K-901/Duct Island/Powerhouse Area: This area contains burial grounds for unclassified low-level radioactive solid and mixed chemical waste, a cylinder destruction facility, and a scrapyard. Contaminants of concern include uranium, thorium, beryllium, boron, cesium, technetium-99, asbestos, PCBs, and heavy metals.
- ✓ K-27/29/31/33 and Administration Area: This area contains limited hot spots of shallow and deep soil contamination with uranium, cesium, and PCBs.
- ✓ Main Plant Area: This is a heavy industrial zone contaminated with uranium isotopes, technetium-99, and VOCs. This area also contains several unlined waste burial grounds. These burial areas contain organic compounds, hazardous metals, and various radionuclides.

Jurisdiction

Oak Ridge, Tennessee, did not exist before World War II. The Oak Ridge Reservation and the City of Oak Ridge were born from the Manhattan Project, whose mission was to create the first nuclear weapons. In the years following the war, responsibility for the U.S. nuclear program passed among several federal agencies. The Atomic Energy Commission was created in 1946 and lasted until 1975. It was replaced by two other agencies: the Energy Research and Development Administration (ERDA) and the Nuclear Regulatory Commission (NRC). Civilian nuclear programs fell under the NRC's authority, while control of nuclear weapons and programs related to the production of nuclear weapons went to ERDA. The Oak Ridge Reservation fell under the jurisdiction of ERDA.

In 1977, ERDA was raised to cabinet level and renamed the Department of Energy (DOE). At first, DOE did not answer to any other agency for its environmental problems. A court ruling in 1984 changed that policy, and it was determined that DOE was subject to regulation under the Resource Conservation and Recovery Act (RCRA). After this ruling, DOE accepted external regulation in all areas except radioactive materials. While DOE does not now submit to outside regulation in its use and management of radioactive materials, pilot programs across the DOE complex did consider the feasibility of placing DOE under NRC regulation. For non-radioactive materials, DOE is required to apply for all necessary TDEC permits as would any private industry.

Until the court ruling, DOE and its predecessors had been creating dangerous wastes for more than four decades. The agency established an Office of Environmental Management (EM) in 1989 to cope with the accumulated waste and with ongoing environmental concerns. DOE remains self-regulating in the area of radioactive materials, a situation that has led to several negotiated agreements between the agency and the State of Tennessee.

DOE has contracted the management of its EM program on the ORR to Bechtel Jacobs Company (BJC). Under this "management and integrating" contract, BJC subcontracts the majority of required environmental work to other companies. Although BJC and its subcontractors may be listed on permits, DOE retains ultimate responsibility for regulatory compliance.

At first, DOE did not answer to any other agency for its environmental problems. A court ruling in 1984 changed that policy.

Tennessee Oversight Agreement

The State and DOE signed the Tennessee Oversight Agreement (TOA) in 1991. TDEC created the Division of DOE Oversight the same year to carry out its responsibilities under the agreement. The TOA provides a framework and funding for the State to move forward in four areas:

- ✓ A regulatory program to support State participation in the Federal Facilities Agreement;
- ✓ A non-regulatory program of independent environmental monitoring and oversight to supplement activities conducted under applicable environmental laws and regulations;
- ✓ An emergency response program to help ensure that the State and local communities are prepared in case DOE creates an off-site emergency;
- ✓ An outreach program to increase public awareness and involvement by local governments and communities in DOE operations in Oak Ridge.

It is important to underscore the fact that the Division's non-regulatory program does report observed violations to other TDEC divisions, which will take action if warranted.

The TOA focuses on four major areas: environmental restoration; environmental monitoring and oversight; emergency response and preparation; and public outreach. To meet these responsibilities, the Division has established five program sections: Environmental Monitoring and Compliance; Environmental Restoration; Radiological Monitoring and Oversight; Waste Management; and Administration. Responsibilities of each program section are given below.

Environmental Monitoring and Compliance

- ✓ Oversees DOE's ambient air, water, soil, and biological sampling programs, focusing on the largely uncontaminated areas adjacent to the ORR.
- ✓ Coordinates the Division's independent sampling efforts.
- ✓ Participates in activities under the Safe Drinking Water Act and Safe Dam Act (such as oversight of bacteriological and residual chlorine sampling and dam inspections).
- ✓ Oversees DOE's groundwater monitoring and underground storage tank programs.

Environmental Restoration

- ✓ Represents the Division during the development, scheduling, and implementation of milestones under the FFA.
- ✓ Coordinates corrective actions under CERCLA and RCRA.
- ✓ Participates in the Watts Bar Working Group and in special projects related to the FFA.
- ✓ Reviews and comments on all DOE documents related to CERCLA.
- ✓ Participates in Natural Resource Damage Assessment efforts.

Radiological Monitoring and Oversight

- ✓ Oversees DOE management of radioactive materials on the ORR, including materials such as enriched uranium and plutonium that are subject to nuclear fission and are used in nuclear weapons.
- ✓ Evaluates the radiological impacts of proposed DOE actions in coordination with the Division of Radiological Health, focusing on radiation protection for the public, handling of radioactive materials, and transportation of radioactive substances.
- ✓ Performs facility surveys on the ORR and manages the Division's Environmental Radiation Ambient Monitoring System, which is a joint project between EPA Region 4 and TDEC.
- ✓ Works with other Federal and State agencies to investigate incidents that involve potential radiological contamination.

Waste Management

- ✓ Oversees all aspects of DOE's active waste management program, including air emissions; surface water discharges; and treatment, storage, and disposal of solid, hazardous, radioactive, and mixed waste on the ORR.
- ✓ Represents the Division in establishing priorities and scheduling Commissioner's Orders for mixed waste treatment.
- ✓ Evaluates the potential costs and benefits of DOE's privatization program for waste treatment and recycling.
- ✓ Supports the Division in its review of DOE strategies for a nationwide waste management system, focusing on impacts these strategies may have on Tennessee.

Administration

- ✓ Coordinates Division activities and reports on DOE performance.

Jurisdiction

- ✓ Coordinates the Division's outreach activities with local officials, community groups, individuals, and DOE.
- ✓ Schedules training and coordinates acquisition of security clearances for Division personnel.
- ✓ Performs administrative functions such as fiscal management, clerical support, and personnel services.
- ✓ Serves as the lead for TOA implementations.

To further its goals, TOA also provides funding to several organizations. For fish and mussel tissue collection and analysis, the State has contracted with the Tennessee Wildlife Resource Agency (TWRA). Emergency response is being

managed by the Tennessee Emergency Management Agency (TEMA). The Local Oversight Committee (LOC) promotes public outreach.

The Division has established an advisory panel of Tennessee officials to help coordinate State responsibilities in and around the ORR.

In addition, the Division has established an advisory panel of Tennessee officials to help coordinate State responsibilities in and around the ORR. This panel includes the directors of the following TDEC divisions: Solid Waste Management; Air Pollution Control; Radiological Health; Water Pollution Control; Drinking Water Supply; Underground Storage Tanks; Superfund;

Groundwater; and Natural Heritage and Archeology. The panel also includes a representative from the Tennessee Department of Health's Division of Epidemiology and Environmental Laboratories.

Federal Facilities Agreement

The State, DOE, and the EPA signed the Federal Facilities Agreement (FFA) in 1992. The FFA ensures that the Division will place emphasis on cleaning up contamination from the past DOE activities. Oak Ridge has an FFA because the ORR is listed on CERCLA's National Priority List.

The DOE Oversight Division coordinates State activities under the agreement. The agreement itself outlines a procedure for cleanup on the Reservation, including the identification of problems, scheduling of activities, and implementing and monitoring of appropriate responses. Actions taken under the FFA conform to CERCLA, RCRA, and other federal and State laws.

The FFA agencies have certain obligations that take precedence in their activities. They are as follows:

- ✓ Promoting cooperation and a free flow of information among the three agencies.
- ✓ Minimizing duplication in investigation and analysis and ensuring the quality of data management.
- ✓ Guaranteeing that cleanup and other remedial steps conform to relevant laws and regulations.
- ✓ Encouraging quick response.
- ✓ Integrating actions taken under CERCLA with those taken under RCRA and State laws.
- ✓ Ensuring a comprehensive cleanup at the ORR.

Under the FFA, contaminated areas are combined into logical groups known as “operable units.” For each of these units, the three agencies agree on a cleanup schedule, with clear deadlines for cleanup milestones. The EPA and the State have the authority to penalize DOE when these deadlines are missed.

Cleanup plans are developed in the public eye. Public comment is an essential tool in helping the agencies to improve cleanup plans and avoid future pitfalls. A formal comment period is required for most actions taken under CERCLA and under the National Environmental Policy Act (NEPA). DOE has chosen to fold public participation requirements of the two laws into a single, coordinated process.

Environmental Laws and Regulations

The DOE complex at Oak Ridge is subject to a variety of federal and State environmental laws and regulations. These laws exist to protect the community and environment from contaminants

Environmental Laws

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

Commonly known as the “Superfund,” CERCLA was enacted in 1980. It establishes a trust fund for cleaning up abandoned or uncontrolled hazardous waste sites. It also sets up rules governing these sites and holding those responsible for the contamination liable.

CERCLA lays out the steps through which DOE must proceed in cleanup planning under its Environmental Restoration program. The “CERCLA process” guides DOE through seven clearly defined steps:

- ✓ Planning,
- ✓ Investigation,
- ✓ Feasibility analysis,
- ✓ Development of alternatives,
- ✓ Public participation,
- ✓ Selection of alternatives, and
- ✓ Creation of a final, legal decision embodied in a document known as a Record of Decision (ROD).

The ROD is a key milestone in CERCLA decisions because it establishes the legal and technical requirements for a given cleanup. Once the State and the EPA have signed a ROD, DOE is responsible for carrying out

Continued on the next page

Jurisdiction

Environmental Laws

Continued from the previous page

the actions outlined in the document. The ROD, and cleanup actions taken under it, are designed to ensure that all unacceptable risks to human health and the environment are eliminated or controlled as much as possible.

The State is responsible under the FFA for coordinating, reviewing, commenting on, and approving each phase of the CERCLA cleanup. The phases include remedial investigations, feasibility studies, RODs, remedial designs, remedial actions, and follow-up evaluations. These phases are present to ensure success of the cleanup. The FFA involves the State directly in program management, dispute resolution, project prioritization, and milestone scheduling.

Resource Conservation and Recovery Act (RCRA)

This law gives the EPA authority to control hazardous waste from "cradle to grave." It covers the generation, transportation, treatment, storage, and disposal of hazardous

Continued on the next page

released in harmful amounts. Each of these laws gives the State and EPA authority to regulate DOE Oak Ridge Operations in specific areas of environmental management. In addition, the Department of Energy maintains its own internal policies, called "orders," that govern how the agency conducts business.

NEPA

The Division maintains a section devoted to NEPA that reviews documents concerning DOE's proposed activities on the ORR. The Division comments on these documents to help ensure that DOE decisions provide the widest range of beneficial uses with the least degradation to the environment or risk to health and safety. Comments reflect the State's policy of promoting decisions that bring with them the least degradation or risk for the most benefit.

NEPA documents reviewed and commented on in fiscal 1999 include the following:

- ✓ Notice of Intent, Draft and Final Environmental Impact Statement for the Production of Tritium Using One or More Commercial Light Water Reactors located in the United States (DOE/EIS-0288).
- ✓ Draft and Final Programmatic Environmental Impact Statement for Alternative Strategies for the Long-Term Management and Use of Depleted Uranium Hexafluoride (DOE/EIS-0269, December, 1997)
- ✓ Final Environmental Analysis for the Proposed Lease of Land and Facilities within the K-25 Site, Oak Ridge, Tennessee (DOE/EA-1175)
- ✓ Draft Environmental Impact Statement for Surplus Plutonium Disposition (DOE/EIS-0283-D)
- ✓ Notice of Intent to prepare an Environmental Impact Statement for the Proposed Transfer of the Heat Source/Radioisotope Thermoelectric Generator at the Mound Site Near Miamisburg Ohio to an Alternative DOE site.

Environmental Laws

Continued from the previous page

waste. It also provides a framework for managing non-hazardous wastes. RCRA focuses only on active and future facilities.

DOE's Waste Management Program must answer to the State's delegated authority under RCRA. The Division does not enforce RCRA regulations, but it can and does document violations, which are then dealt with by TDEC's Division of Solid Waste Management.

National Environmental Policy Act (NEPA)

NEPA is the basic national charter for protection of the environment. It establishes policy, sets goals, and provides means for carrying out the policy. NEPA requires DOE and other federal agencies to provide public officials and citizens with environmental information for proposed federal actions that could affect the quality of the environment. With regard to major decisions regarding CERCLA activities, DOE has incorporated "NEPA values," including public participation and broad assessment of possible impacts, into the CERCLA process.

Natural Resources Damage Assessment

The Division also participates in Natural Resources Damage Assessment activities. Federal law authorizes this program, which gives natural resource trustees at the state and federal level a means of recovering environmental damages caused by releases from CERCLA sites. Specifically, the program is intended to address damages that cannot be effectively corrected through cleanup.

Other Laws

Other laws applicable to Environmental Management at the ORR include the following: Clean Air Act (1970); Clean Water Act (1977); Emergency Planning and Community Right-to-Know Act (1986); Federal Hazardous Substance Act (1966); Federal Facility Compliance Act (1992); Safe Dam Act (1973); Safe Drinking Water Act (1974); Solid Waste Disposal Act (1965); and Toxic Substances Control Act (1976).

Jurisdiction

- ✓ Notice of Intent to Prepare an Environmental Impact Statement for the Proposed Production of Plutonium-238 (Pu-238) Using One or More DOE Research Reactors and Facilities.

The DOE Oak Ridge Operations (ORO) has not always made good use of the required NEPA process. Instead of being used as a planning and decision tool, NEPA documents often appear to be tailored to decisions that have already been made. DOE has not always been responsive to public or State comments or shown a willingness to engage in public discussions. The State has serious concerns about DOE's failure to follow NEPA regulations during recent development of the ED-1 (Horizon Center) industrial park. There is some indication, however, that DOE is putting greater effort into the NEPA process, particularly public involvement, for current projects.

Other Planning and Policy Issues

The Division also reviewed and commented on a variety of planning and policy documents, including the following:

- ✓ Moving from Cleanup to Stewardship, Draft, September 17, 1997
- ✓ Accelerating Cleanup: Focus on 2006 Discussion Draft, Stakeholder Issues Matrix and Action Plans, November 3, 1997
- ✓ Accelerating Cleanup: Paths to Closure, DOE/EM-0342 and Accelerating Cleanup: Paths to Closure, Oak Ridge Operations Office, February 1998.
- ✓ Draft DOE Order O 435.1 and Radioactive Waste Management Manual M 435.1
- ✓ Accelerating Cleanup: Paths to Closure, Oak Ridge Operations Office, June 1998
- ✓ Plans to Widen State Route 95 from State Route 58 near Westover Drive in Oak Ridge: Roane County, Tennessee
- ✓ DOE Oak Ridge Reservation Annual Site Environmental Report, 1997
- ✓ DOE Environmental Monitoring Plan for the Oak Ridge Reservation, 1997

Environmental Monitoring & Compliance

The Division has a variety of programs to monitor the environment near the ORR for hazardous materials. Monitoring efforts look at groundwater, surface water, residential wells, underground storage tanks, sediment, milk, vegetation, fish, and wildlife. The programs evaluate a wide variety of radioactive and hazardous substances, including heavy metals, boron, cyanide, nitrogen, ammonia, phosphate, pesticides, and PCBs.

Groundwater

The Division's groundwater programs range from independent sampling and dye-trace testing to a review of DOE efforts. The Division oversees the plugging and abandonment of wells on the ORR, samples off-site drinking water, and helps collect and evaluate data for DOE's Oak Ridge Environmental Information System.

Residential Wells

The Division in 1999 continued to identify residential wells that may be contaminated with pollutants from the ORR. In 1996, Division staff had gone house to house in an area bounded on one side by Black Oak Ridge near ETTP and on the other by the intersection of Interstate 40 and Highway 95. In particular, they were looking for families who use well water for drinking, cooking, and bathing.

The Division has identified 69 residential wells in this area. In fiscal 1999, it tested 13 of these, which were chosen according to geology, depth from which water is drawn, and proximity to the ORR.

Division staff tested for volatile organic compounds (VOCs), nutrients, radioactive contaminants, general inorganics, and metals. These tests allowed the Division to evaluate the general groundwater quality and to identify chemicals and radionuclides that had been used at the ORR. Results were compared to maximum contaminant levels established by the Safe Drinking Water Act.

The quality of water from these wells appears to be good. Most homeowners interviewed continue to indicate no problem with groundwater quality, and test results indicate that the water in these wells is adequate for drinking and household uses.

Test results indicate that the water in these wells is adequate for drinking and household uses.

Springs and Seeps

The Division sampled 63 springs and seeps in fiscal 1999. The springs sam-

Environmental Monitoring & Compliance

pled in Bear Creek Valley appeared to have been contaminated by DOE, showing nitrates, gross alpha activity, and gross beta activity. Most of these springs and seeps are considered places where contaminated groundwater comes to the surface and ultimately flows into local waterways. With some exceptions, however, contamination is low in other springs around the Reservation, and the general quality of groundwater on the ORR is good.

Monitoring Wells

Twenty-nine monitoring wells were sampled during fiscal year 1999. This begins a new project devoted entirely to the cooperative sampling of monitoring wells and sumps at facilities on the ORR. The sampling of Exit Pathway wells has shown that some of the wells are not contaminated, while other wells in the facilities are very contaminated. These locations should be marked and, as the sites are remediated, this data should be used to determine the effectiveness of that remediation.

Plugging and Abandonment of Wells

In this project, Division staff reviewed information from each facility on wells that will be—or have been—plugged and abandoned.

Without a regulatory driver, plugging of outdated monitoring wells will continue to be pushed down in priority.

There are more than 1,000 monitoring wells and borings on the ORR. It is likely that contaminated water is in contact with the surface or with uncontaminated water below the surface where many older wells have not been plugged. The State has no regulations requiring DOE to plug the wells unless it can be demonstrated that the wells are contributing to pollution. Without this regulatory driver, plugging of outdated monitoring wells will continue to be pushed down in priority, especially in light of decreasing funding for DOE's Environmental Management program.

Underground Storage Tanks

The Division is also responsible for overseeing the Underground Storage Tank program on the ORR. Staff did not observe any violation in fiscal year 1999 of requirements adopted by TDEC's Division of Underground Storage Tanks.

Surface Water

The Division routinely samples the Clinch River and its tributaries that drain

Environmental Monitoring & Compliance

from the Reservation. All told, 22 sites were sampled in In fiscal year 1999, the Division continued to sample including 15 tributary sites added to the program in 1997. Twenty of the 22 sites were chosen to allow the Division to detect contamination from DOE. The two remaining sites are located upstream from the ORR and serve to provide background data. The original seven sites are located on the Clinch River and have been sampled since 1993.

Many factors cause contaminant levels in streams to fluctuate greatly. Contaminants can be diluted, they can be concentrated, they can be absorbed by sediments or vegetation, and they can interact chemically with geological substrates. In addition, contaminant sources of contamination may be only intermittent. Because the Clinch River is large and dilutes contaminants from the ORR, the Division does not expect to find significant pollution levels in surface water grab samples. The sampling data do, however, set up a baseline for observing changes over time and for evaluating the impact of unplanned releases or accidents.

Because the Clinch River is large and dilutes contaminants from the ORR, the Division does not expect to find significant pollution levels.

The tributary sites and the original river sites were sampled twice in 1998. Samples were analyzed and compared with Tennessee Water Quality Criteria. The Division has not observed substantial concentrations of pollutants coming from the Reservation.

Sediment

Sediment analysis is a key tool in evaluating the environmental quality of rivers, streams, lakes, and impoundments. Samples can be subjected to a variety of chemical, physical, toxicological and biological tests.

The Division conducts an ambient sediment program that includes 21 sampling sites. Six are located on the Clinch River and have been sampled since 1994. The other 15 are located on ORR tributaries of the Clinch River. This sediment sampling program monitors shallow sediment only.

Samples were analyzed for organic, inorganic and radiological contaminants, and the results were compared with standards developed for DOE's Oak Ridge Operations. These Preliminary Remediation Goals (PRGs) are based on accepted EPA guidance and protocol. Since there are no State or federal regulatory guidelines for sediment quality, these standards are used to assess sediment quality on

Environmental Monitoring & Compliance

the ORR. The sediment samples met PRGs for recreational uses; these standards assume people will be exposed to sediments while engaging in outdoor activities such as playing, fishing, hunting and hiking. This sampling currently excludes sediment from Bear Creek, East Fork Poplar Creek, and White Oak Creek.

Potential Food Sources

Milk Sampling

The Division conducted regular oversight visits to cow's milk sampling stations operated by Lockheed Martin Energy Research (LMER) around the ORR. LMER takes raw milk samples from four locations in the vicinity of the Reservation and analyzes them for radiological contamination. The data show that milk from the sampling area is not contaminated from Reservation activities.

Vegetation Sampling

The Division conducted oversight visits to LMER vegetable sampling locations around the Reservation. LMER purchases lettuce, tomatoes and turnips from area gardeners for radiological analysis. The sample locations are the City of Oak Ridge, including locations within the Scarboro community, Lenoir City, Kingston, and the Claxton community. The vegetables showed no radiological contamination.

Fish and Aquatic Life

The State, the Tennessee Valley Authority, the Tennessee Wildlife Resources Agency, and DOE work together each year to develop the TDEC Tennessee Fishing Advisory. The advisories include warnings against the consumption of fish or contact with the water from East Fork Poplar Creek (due to Mercury and

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***East Fork Poplar Creek,
Melton Hill Reservoir and
Watts Bar Reservoir are
included in the TDEC
fishing advisories.***

PCB contamination) and the consumption of certain species of fish from the Melton Hill and Watts Bar Reservoirs (due to PCB accumulation in their flesh).

The Division worked closely in the last year with ORNL's Biological Monitoring and Abatement Program (BMAP), which is coordinated by the ORNL Environmental Sciences Division. By documenting the ecological standing of a system, biological monitoring helps identify the causes of ecological damage and

assess the effectiveness of remediation.

The BMAP now employed by DOE addresses both radiological and

Environmental Monitoring & Compliance

non-radiological contaminants, looking at land on site as well as waterways downstream. Sophisticated studies are conducted on the interactions of these contaminants with plants, animals, and the environment.

The Division confirms the results of studies conducted by BMAP personnel by undertaking independent monitoring programs on the ORR. These include sampling communities of creatures living on the stream bottoms—known as benthic macroinvertebrates—and collecting largemouth bass from a quarry located on the ORR for mercury analysis.

The Division has also begun two new projects—the Rapid Bioassessment project and the Periphyton Monitoring Program—that together will give an independent confirmation of DOE monitoring and evaluate new areas of possible concern. These projects will assist the Division in evaluating surface water conditions on and around the Oak Ridge Reservation.

White-Tailed Deer

The Division oversaw and monitored the 1998 Reservation deer hunts, which were open to the public. Of the 231 deer killed on the Reservation, three were confiscated because measurements of beta radiation (attributed to strontium-90) taken from bone samples were found to be above background levels.

Before 1996, ORNL personnel were required to survey each deer with hand-held instruments for excessive external radiation, but external contamination has not been found since the hunts began. Division staff assumed this responsibility in 1995 to confirm the DOE position that external scans for radiation could safely be discontinued. Division staff found no evidence of external contamination, and in 1996 the external scans were discontinued.

Canada Geese

A study of Canada Geese began in 1987, as part of BMAP, and researchers began an annual leg banding study in 1988. The following year, they expanded the study by placing throat collars with visible identification numbers on geese

Oak Ridge Reservation Wildlife Monitoring

- ✓ Of 231 deer killed on the Oak Ridge Reservation by hunters in 1998, three were confiscated due to internal radioactive contamination above background levels.
- ✓ One hundred twelve Canada Geese were rounded up for research purposes in 1998. Thirty-six of these were sacrificed due to elevated levels of internal radioactive contamination.
- ✓ Hunters killed 21 turkeys in the spring of 1999. None were confiscated due to internal radioactive contamination above background levels.

Environmental Monitoring & Compliance

during molting season. This project has been done in cooperation with the Tennessee Wildlife Resources Agency, DOE, BMAP teams and Division staff since 1991.

Canada Geese are captured and scanned to assess their uptake of radionuclides and contaminants from White Oak Lake and accessible waste disposal areas at ORNL. The background level of cesium-137 in Canada Geese is about 0.3 picocuries per gram. Because the resident Canada Goose population has become well established on the ORR, the study was extended to include sites near ETTP and Y-12, as well as other local areas.

The June 1998, goose roundup surveyed 112 geese. Thirty-six geese, collected near Building 1505 at ORNL, were sacrificed due to relatively high levels of radioactivity. Future sampling will be conducted to determine the extent of

Current Fish Tissue Advisories (September 1998)

<u>STREAM</u>	<u>COUNTY</u>	<u>PORTION</u>	<u>POLLUTANT</u>	<u>COMMENTS</u>
Loosahatchie River	Shelby	Mile 0.0 - 20.9	Chlordane, Other Organics	<i>Fish should not be consumed.</i>
Wolf River	Shelby	Mile 0.0 - 18.9	Chlordane, Other Organics	<i>Fish should not be consumed.</i>
Mississippi River	Shelby	MS line to mile 745	Chlordane, Other Organics	<i>Fish should not be consumed. Commercial fishing prohibited by TWRA.</i>
McKellar Lake & Nonconnah Creek	Shelby	Mile 0.0 to 1.8	Chlordane, Other Organics	<i>Fish should not be consumed. Advisory ends at Horn Lake Road bridge.</i>
North Fork Holston River	Sullivan, Hawkins	Mile 0.0 - 6.2	Mercury	<i>Fish should not be consumed. Advisory goes to TN/VA line.</i>
East Fork of Poplar Creek including Poplar Creek embayment	Anderson, Roane	Mile 0.0 - 15.0	Mercury, PCBs	<i>Fish should not be consumed. Avoid contact with water also.</i>
Chattanooga Creek	Hamilton	Mouth to GA line	PCBs, chlordane	<i>Fish should not be consumed. Avoid contact with water also.</i>
Woods Reservoir	Franklin	Entirety	PCBs	<i>Catfish should not be consumed.</i>
Fort Loudoun Reservoir	Loudon, Knox, Blount	Entirety (46 miles)	PCBs	<i>Commercial fishing for catfish prohibited by TWRA. Catfish, large mouth bass over two pounds, or any large mouth bass from the Little River embayment should not be consumed.</i>

Environmental Monitoring & Compliance

contamination in local Canada geese populations.

Wild Turkey

The ORR's second annual wild turkey hunt was held in the spring of 1999. None of the 21 birds killed were confiscated. As the hunts continue, a better picture will emerge of whether contamination affects the Reservation turkey population.

Public Drinking Water Supplies

Many public water systems near the ORR rely on the Clinch River for their raw water. Monitoring of the river indicates that the level of various radiological pollutants is within regulatory limits.

Current Fish Tissue Advisories (Continued)

<u>STREAM</u>	<u>COUNTY</u>	<u>PORTION</u>	<u>POLLUTANT</u>	<u>COMMENTS</u>
Tellico Lake	Loudon	Entirety	PCBs	<i>Catfish should not be consumed.</i>
Melton Hill Reservoir	Knox, Anderson	Entirety	PCBs	<i>Catfish should not be consumed.</i>
Watts Bar Reservoir	Roane, Meigs, Rhea, Loudon	Tennessee River portion	PCBs	<i>Catfish, striped bass, & hybrid striped bass-white bass should not be consumed. Precautionary advisory* for whitebass, sauger, carp, smallmouth buffalo and largemouth bass.</i>
Watts Bar Reservoir	Roane, Anderson	Clinch River arm	PCBs	<i>Striped bass should not be consumed. Precautionary advisory for catfish and sauger. *</i>
Boone Reservoir	Sullivan, Washington	Entirety	PCBs, chlordane	<i>Precautionary advisory for carp and catfish. *</i>
Nickajack Reservoir	Hamilton, Marion	Entirety	PCBs	<i>Precautionary advisory for catfish. *</i>
Pigeon River	Cocke	NC line to Douglas Reservoir	Dioxin	<i>Precautionary advisory for carp, catfish, and redbreast sunfish. *</i>

*Precautionary Advisory - Children, pregnant women, and nursing mothers should not consume the fish species named. All other persons should limit consumption of the named species to one meal per month.

Environmental Monitoring & Compliance

In 1998, the Division also began a closer oversight of maintenance and compliance activities relating to water treatment and distribution systems at the Oak Ridge facilities. This work continued into fiscal 1999 with efforts to provide independent monitoring of residual chlorine levels; to increase oversight of cross-connection controls, water line repairs and general system distribution status; and to monitor transition of the water system operations from federal to private contractors. Some problems relating to administrative controls and procedural technicalities were discovered, but no serious threats to worker or public safety were detected.

Goose Roundup 1999, conducted by the Division.

DOE photo

Environmental Restoration

Fiscal year 1999 has seen substantial progress toward the completion of some complex ongoing CERCLA projects at the Oak Ridge Reservation. The major projects under active remediation follow.

Gunite Tanks

Contaminated sludge is now being moved from the Gunite Tanks at the Oak Ridge National Laboratory to the Melton Valley Storage Tanks. When this transfer is completed, a significant CERCLA risk at Oak Ridge will have been diminished greatly.

The Molten Salt Reactor Experiment

Reactive Gas Removal

By year's end, a total of 23.5 kilograms of uranium-233 had been removed from the MSRE vent system since the project began. In addition, blank flanges had been installed to isolate the purge and trap system from the reactor vessel. The purge and trap system will remain in place and operational, but it will not be used as extensively in the future, since its main objective has now been accomplished.

Uranium Deposit Removal

The cleanup project encountered problems in 1999 with uranium deposit removal. DOE had planned to vacuum the material, but this was deemed impossible when it was discovered that the top several inches of charcoal has hardened. This meant that a new removal plan was needed.

Fuel and Flush Salt Removal

Work on fuel and flush salt removal proceeded on schedule, and the fuel drain tanks and cells were inspected successfully. Problems with deposit removal, mentioned above, will not affect the fuel and flush salt removal task.

Group I Facilities

Decontamination and decommissioning (D&D) of the Group I facilities at ETTP have now been completed. Contaminated waste material generated from this D&D activity is packaged and awaits off-site shipment to a permanent disposal facility.

Environmental Restoration

K-25 D&D

Progress continues toward decontamination and decommissioning of the large K-29, K-31 and K-33 buildings at ETTP. Because of its magnitude, this CERCLA removal action will continue for the next three to four years.

Other Active Projects

In addition to ongoing cleanup, CERCLA decision documents have been completed on the following projects. The Division anticipates that active cleanup will begin on these projects in fiscal year 2000.

✓ ETTP G-Pit Excavation – This action involves the removal of a waste burial pit that is actively contributing to ground-water contamination.

✓ ORNL Surface Impoundment's Excavation – This action involves the complete removal of contaminated sludge from four unlined waste impoundments at ORNL.

✓ ORNL Core Hole 8 Source Removal of Contaminated Soil – This action involves the removal of soils and a leaking tank contaminated with radionuclides at ORNL. This will eliminate a major source of ground water and surface water contamination.

✓ Y-12 East End Plume Capture and Treatment – This action will remove contaminated ground water by pump- and- treat methodology at Y-12. It is anticipated that this action will eliminate or greatly reduce the contribution to the off-site Union Valley contaminated plume.

The TOA provides an independent mechanism to protect the health, safety and environment of Tennessee citizens.

The Division and other parties to the Federal Facilities Agreement (FFA) worked in fiscal 1999 to resolve several difficult issues that have an overriding effect on future cleanup at Oak Ridge. There was much discussion and planning involving the parties as well as the stakeholder public. The following will provide an overview of these issues, their status, and potential programmatic impacts.

Funding and CERCLA Obligations

It became evident early in the year that DOE ORO was experiencing funding shortfalls within the Environmental Management budget. Because of these short-

Environmental Restoration

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falls, DOE reported to the State and EPA that several activities it had committed to in the FFA would not be completed as scheduled. After seriously discussing the issues and turning to the FFA dispute resolution process, the agencies agreed on a path forward. DOE ORO would request that funds be reprogrammed from the agency's Washington Headquarters to allow it to meet its fiscal year 1999 cleanup obligations at Oak Ridge. To date, the request has been made and all parties are awaiting notice of approval. Lack of approval will have a significant impact on DOE's ability to carry out its obligations under CERCLA and the FFA.

Funding shortfalls in fiscal 1998 led in part to a missed Federal Facility Agreement milestone for the Bethel Valley Main Plant Tanks removal action. As a result of this missed milestone, the State of Tennessee and EPA have assessed penalties against DOE in fiscal 1999 as provided for in the Oak Ridge Federal Facility Agreement.

Long Term Stewardship Obligations

After several years of intense work by the FFA parties and a thorough review by the Oak Ridge End Use Working Group, it has become clear that, even with the best efforts of DOE and regulators, some hazardous substances will remain on the ORR for many years to come. These substances carry a long-term risk to both human health and the environment unless proper institutional and active care is assured. In order to provide adequately for this assurance, the State of Tennessee has requested that DOE establish a "Stewardship Trust Fund." The Division expects this fund to remain in trust, assuring that future funding will always be available. If DOE does not clean the site to a level that allows for unrestricted use, funding for long-term care will be absolutely necessary. It is Tennessee's opinion that this assurance should not rely entirely on annual appropriations by Congress. This issue remains to be resolved between the State and DOE, and it will have a significant impact on future cleanup decisions.

Oak Ridge Environmental Management Waste Management Facility

Cleanup on the Oak Ridge Reservation produces large volumes of contaminated waste; the management of this waste is a formidable disposal problem. Historically, there have been two options: package and ship the waste to out-of-state locations, or leave it where it is. In some cases, neither of these options is

Environmental Restoration

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acceptable; as a result, the ORR needs an on-site disposal facility that is properly engineered and constructed. The FFA parties and the public have been working together to complete the planning and decision-making that will pave the way

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Such a facility will need to be maintained in perpetuity, with the accompanying requirement for a long-term, reliable funding source.

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for construction and use of such a facility. This process, conducted under CERCLA, was completed late in 1999, after resolution of significant administrative issues.

Because of the nature of contaminants to be disposed, such a facility will need to be maintained in perpetuity, with the accompanying requirement for a long-term, reliable funding source. The State approved the Record of Decision only after receiving assurance from DOE that the agency will meet the long-term funding need for

this facility without relying entirely on annual appropriations. DOE can now proceed with construction of the facility for disposal of CERCLA-generated waste. This action will allow the completion of other RODs that depend on development of the disposal facility.

East Tennessee Technology Park (formerly K-25) Cleanup Plan

ETTP is evolving from a highly restricted federal uranium enrichment facility to a commercial industrial facility, even though cleanup obligations under CERCLA have not been completed. This situation has led to conflicts in priority among the various interests involved. It is the State's belief that DOE brought on much of this confusion by failing to have a comprehensive plan in place that addresses all the potential conflicts. The State and EPA have now asked DOE to develop such a plan. The State anticipates that this plan will identify DOE's short- and long-term objectives at ETTP. In addition, the strategy outlined in this plan should identify a sequence of decisions and activities that allow DOE to comply with CERCLA as well as meeting its other objectives.

Experience has shown that it is very difficult to accurately anticipate future accomplishments at a federal facility cleanup. Nevertheless, if the administrative issues noted above can be resolved and if adequate funding is received, fiscal year 2000 can be a banner year toward cleanup progress on the Oak Ridge Reservation.

Radiological Monitoring & Oversight

The Atomic Energy Act of 1954, as amended, largely exempts DOE from outside regulation in the management of radioactive materials.

However, this law also obligates DOE to regulate these materials in a manner that protects workers, the public, and the environment. The Tennessee Oversight Agreement provides an avenue for the State to oversee and evaluate DOE's management of these materials on the Oak Ridge Reservation. This agreement specifies the State will:

- ✓ Review DOE radiological monitoring systems and recommend improvements where appropriate;
- ✓ Participate with DOE in sampling and analysis to detect and characterize off-site contamination and to evaluate on-site control measures; and
- ✓ Develop programs to complement and verify DOE monitoring.

TDEC, DOE, and EPA have cooperated in addressing these responsibilities.

Liquid Effluents

TDEC's Division of Water Pollution Control issues National Pollutant Discharge Elimination System (NPDES) permits under authority of the State's Water Quality Control Act. These permits require ORR facilities to monitor radioactive wastes discharged to area streams. New permits also require that radiological monitoring plans be expanded to include the following:

- ✓ assessment of wastes that emit alpha, beta and gamma radiation;
- ✓ sufficient data collection to determine which radionuclides should be monitored; and
- ✓ radiological monitoring of storm water.

***NPDES permits require
ORR facilities to monitor
radioactive wastes
discharged to area streams.***

Radiological monitoring, as reported in the NPDES program, has continued to confirm that discharges are in compliance with DOE Order requirements.

Surface Waters

TDEC's Division of Radiological Health monitors surface water at various locations on and surrounding the ORR. Results for 1998 show that radiological samples were all below regulatory limits. Notably, results over the last four years indicate that radionuclide concentrations are decreasing at the White Oak Dam monitoring station. Historically this station has shown the highest radionuclide

Radiological Monitoring & Oversight

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concentrations of any location in the sampling program. DOE contractors had predicted that CERCLA cleanup activities completed at ORNL in 1995 would reduce the total amount of strontium-90 passing across the dam by 30 percent. While measurements at the dam have not verified this projection, data generated by the Division of Radiological Health do corroborate a decrease in strontium-90 activity.

Public Drinking Water Supplies

Several public water systems near the ORR use the Clinch River as their source of raw water. While monitoring of the river indicates radioactive contaminant levels are below regulatory standards, there has

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There has been a concern that pollutants released from the ORR could affect area drinking water supplies.

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been a concern that pollutants released from the ORR could affect area drinking water supplies. In association with EPA's Environmental Radiation Ambient Monitoring System, the Division began sampling drinking water at local water treatment systems in 1996.

Radiochemical analysis of the samples is performed at EPA's National Air and Radiation Environmental

Laboratory in Montgomery, Alabama. The results reported

by EPA to date have all indicated contaminant levels well below regulatory limits.

Groundwater

Much of the radiological contamination found in streams on the ORR comes from groundwater that has itself been contaminated by deteriorating waste storage, transport, and disposal facilities. These contaminants make their way into the streams through seeps, springs and outfalls and are eventually carried to the Clinch River. In an effort to better define the extent of this contamination, the Division samples groundwater on and near the ORR and continuously reviews monitoring data produced by DOE and its contractors. Although samples taken on the Reservation have shown varying degrees of radioactive contamination, samples taken by the Division in 1998 at off-site locations have not exhibited significantly elevated levels of radioactive constituents.

Air Monitoring

For some time, there have been concerns that air emissions from the ORR may pose a health threat to off-site residents, although these emissions have

Radiological Monitoring & Oversight

decreased substantially in recent years. DOE activities that cause air discharges include the incineration of hazardous and mixed wastes, production of radioactive isotopes, and cleanup of contaminated sites.

The Division has joined with DOE and EPA in developing air-monitoring programs to evaluate radioactive emissions from the Reservation. The Division's Perimeter and Fugitive Air Monitoring Programs focus on determining the impact of DOE activities on the local environment, identifying unplanned air releases, and verifying DOE monitoring data. Data derived from the Division's participation in EPA's Environmental Radiation Ambient Monitoring System supplements information produced by the other air programs and provides verification of State and DOE monitoring. Results from these programs have so far shown no significant impact on local air quality from current DOE activities on the ORR.

Monitoring of Ambient Gamma Radiation

Gamma radiation is emitted by various radionuclides associated with DOE's ongoing and past activities on the ORR. Of the three types of ionizing radiation—alpha, beta, and gamma—gamma radiation is the most penetrating and presents the greatest hazard from external exposures. Radioactive contaminants that emit gamma radiation are evident in ORR facilities and in surrounding soils, sediments, and waters. In order to assess the risks posed by these contaminants, the Division began monitoring ambient gamma radiation levels on the ORR in 1995. This program provides the information necessary to determine if past remedial actions were effective and if future remedial actions are needed.

TDEC photo
Staff from the Division's Radiological Monitoring and Oversight section locate a sampling point using a Global Positioning System.

The Division monitors various locations on and near the Reservation, using thermoluminescent dosimeters and continuous gamma rate monitors. Results are compared with background levels and DOE's "primary dose limit" for members

Radiological Monitoring & Oversight

of the public. DOE's primary dose limit is 100 millirem per year—approximately one-third of the average dose received by individuals in the United States from natural sources of radiation.

Gamma levels were measured above the primary dose limit at various locations in restricted areas of the ORR.

Gamma levels were measured above the primary dose limit at various locations in restricted areas of the ORR. These sites are subject to remediation under CERCLA and the FFA. Six locations considered potentially accessible to the public also exhibited elevated results. Under current conditions, however, members of the public are unlikely to spend the time necessary to accumulate more than a relatively small portion of the primary dose limit at any of these locations. It should be understood that the annual exposure estimates generated by this program require an individual to be at the monitoring location 24 hours a day for a year to receive the dose reported.

Soils

Division staff members have performed walkover radiation surveys of large parcels on the ORR over the past three years. The program is being conducted in cooperation with DOE as an outgrowth of DOE's Footprint Reduction Program. The goal is to identify areas on the Reservation that have remained uncontaminated and can, therefore, be released conditionally from CERCLA requirements. The effort has provided valuable information on soils throughout the ORR and has identified several areas that will require further investigation.

Gamma radiation monitoring was performed along seven public roads and points of interest on the Oak Ridge Reservation. The purpose of the project was to survey high traffic areas accessible to the public. The survey did not indicate areas of radiological contamination. However, several areas of gamma shine—exposure from known sources in nearby restricted areas—were noted.

Facilities

Buildings and other facilities on the ORR historically released vast quantities of chemical and radiological contamination to the environment. In 1994, the Division developed an independent Facility Survey for the Reservation. The survey has three goals:

- ✓ To document past releases,
- ✓ To identify hazardous and radioactive inventories, and

Radiological Monitoring & Oversight

✓ To estimate the current potential for releases under a variety of circumstances, ranging from normal operations to a full-blown catastrophe.

Since the program began in 1994, the Division's survey team has characterized more than 115 facilities at ORNL, Y12 and ETTP (K25) and found that nearly 30 percent pose a relatively high potential for contaminant releases. The survey team evaluated eight of these facilities in calendar year 1998 and found that two of these posed similar risk. One of these facilities was at ORNL, the other at ETTP.

TDEC photo
Division staff with a gamma spectrometer taking readings at the K-1066 Cylinder Yard.

Radiological Monitoring & Oversight

TDEC photo

Knoxville Field Office staff with TDEC's Division of Radiological Health check radiation levels of a spent nuclear fuel shipment at the High Flux Isotope Reactor at ORNL.

Waste Management

The Division's responsibilities include oversight of solid, hazardous, mixed and radioactive waste. "Hazardous" waste is defined by RCRA as having any toxic, corrosive, reactive or ignitable material that could harm human health or the environment, whether that material is a solid, liquid or sludge. "Mixed" waste contains both hazardous and radioactive substances.

The Division works to ensure that DOE adheres to applicable State and federal laws and regulations. While the Division's Waste Management Program does not enforce environmental regulations, it does point out violations to DOE and to the appropriate regulatory agency.

Solid Waste

The Division works to ensure that the DOE adheres to provisions of RCRA and the State of Tennessee Solid Waste Disposal Regulations. No violations were reported during the 1999 fiscal year.

In general, DOE runs an effective solid waste management program.

The Division also assisted TDEC's Solid Waste Division in environmental audits of solid waste landfills and hazardous waste storage sites. The DOE successfully completed RCRA closure of the K-1417B Drum Storage Yard in fiscal 1999.

Water Pollution Control

The Division conducts comprehensive yearly water pollution audits at ORNL, Y-12, and ETTP. The most recent reviews showed no immediate threat to human health or significant harm to the environment. In general, the sites were putting forth commendable efforts in complying with NPDES permit requirements.

The TDEC Division of Water Pollution Control has issued new NPDES permits, with more stringent requirements, for Y-12 and ORNL. DOE is in the process of appealing these permits. DOE did report several instances of noncompliance during the calendar year 1998 for such things as exceeding the permitted limits for discharge flow rate, pH levels and oil sheen.

The TDEC Division of Water Pollution Control has issued new NPDES permits, with more stringent requirements, for Y-12 and ORNL.

DOE has contracted operation of the Central Neutralization Facility to Radian Corp. In addition, operation of the ETTP Sewage Treatment Plant and the ETTP Water Treatment Plant has been turned over to Operations Management

Waste Management

International through a lease arrangement with the Community Reuse Organization of East Tennessee (CROET).

Air Pollution Control

The Division performs an annual audit of permitted air sources at ORNL and assists the Knoxville Environmental Assistance Center in conducting inspections at Y-12 and ETTP. All three sites are meeting State air pollution control regulations, and no violations were noted. The Division also oversees asbestos management and removal on the ORR to ensure compliance with air pollution control regulations.

The Division's air pollution control program has also established an independent ambient air monitoring effort to identify overall levels of hazardous air pollutants in the air on and around ETTP. The program has not detected elevated levels of hazardous air pollutants at ETTP since monitoring at the site began in 1997. The Division established comparable air monitoring programs at ORNL and Y-12 for calendar year 1999.

Radioactive Waste Management

The Division oversees DOE's management of radioactive waste on the ORR. Short-lived waste is disposed of at the Interim Waste Management Facility

(IWMF) at ORNL; the facility was scheduled to cease operation at the end of DOE's fiscal year 1998.

This was in line with the ORR's Waste Management organization decision to abandon "expensive" on-site disposal at IWMF in favor of shipment off site. This resulted in a drive to fill IWMF, maximizing the use of allowable radionuclide loading. Some of the waste collected from storage locations throughout the plant and placed in the IWMF during this drive was "hotter" than anticipated, and had to be later removed from the disposal pads. The IWMF facility is near its maximum capacity for holding

Workers check solid waste for radioactive material prior to disposal. *DOE photo*

Waste Management

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radionuclides. However, the facility remains open pending completion review by DOE Headquarters and issuance of the Disposal Authorization Statement.

Long-lived waste and low-level waste with high activity continue to be sent to storage facilities on the ORR.

As in the past, it is critically important for DOE to develop – and adequately fund – off-site facilities that will accept radioactive waste unsuitable for disposal on the ORR. Since our last report, the inventory of low-level radioactive waste increased to 40,000 cubic meters, with an expected generation rate of 10,000 cubic meters a year.

Recycling, Decontamination and Decommissioning

At ETTP, DOE began demolition in October 1997 of five deteriorating process support buildings. The project is known as Auxiliary Facilities Demolition (Group I) Buildings. The buildings were contaminated with uranium, asbestos, and small amounts of hazardous and PCB-contaminated materials. The demolition was essentially complete at the end of June 1999. So far, 122 B-25 boxes of LLW from the project have been sent to Envirocare of Utah, and another 62 boxes are scheduled to be sent there. Efforts to decontaminate and recycle structural steel from K-1131 were unsuccessful because of the labor involved. Attempts to decontaminate the slabs of three buildings were also unsuccessful, and the slabs were paved with asphalt to fix the contamination. The project is expected to be completed for the projected cost of \$5 million.

The D&D of Building K-1420 began this fiscal year. Initially, this effort was projected to cost about \$10 million, with a completion date of November 2000. Because a number of previously unidentified work items have been added to the contractor's scope of work, it is now projected to cost \$11.4 million, with a completion date of early 2001. Various materials and equipment are being decontaminated and removed from K-1420. The LLW and mixed waste are being packaged in B-25 boxes and 55-gallon drums for pickup by BJC and storage on site. Asbestos abatement and electrical modifications are also ongoing in K-1420. Completed activities include:

- ✓ Removal of the K-1421 Incinerator House
- ✓ Removal of the K-700-A-42 Switchyard

On Aug. 25, 1997, British Nuclear Fuels Ltd. (BNFL) and DOE signed a contract for the ETTP Three Building (K-29, K-31 and K-33) D&D and Recycle Project. The total value of this fixed-price contract is \$293 million, but BNFL is

Waste Management

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projected to generate \$55 million from the recovery and recycle of metals, bringing the price of the signed contract down to \$238 million. The project will take six years.

The work began in July 1998 at the K-33 building. DOE will remove radioactive contaminants and stored waste and will recycle metals, including nickel. The nickel is to be made suitable for commercial reuse, possible in the fabrication of waste storage containers. About 18 percent of the cleanup in building K-33 has been completed. More than 4 million pounds of metal has been removed for recycling, and more than 10 million pounds of waste has been removed and sent for disposal to Envirocare.

Toxic Substances Control Act (TSCA) Incinerator

This incinerator, located at ETTP, was designed to treat mixed waste and PCBs. It is the only incinerator in the United States that can treat both PCBs and RCRA-defined hazardous waste. The Division oversees the incinerator in a variety of ways: it conducts audits, observes tests, and reviews plans and data. It also conducts independent monitoring that involves Division staff from the Air Pollution, Water Pollution, Solid Waste and Radiological Monitoring Programs.

Neither the Division of DOE Oversight nor the regulatory divisions identified technical operational deficiencies at the incinerator.

During the 1999 fiscal year, the Solid Waste Division conducted semi-annual inspections of the TSCA Incinerator, and no permit violations were documented. DOE has submitted an application for renewal of the TSCA Incinerator Part B RCRA permit. The reapplication is still under review by the Solid Waste Division.

Site Treatment Plan

As mandated by the Federal Facility Compliance Act, and implemented through a Tennessee State Commissioner's Order, the Department of Energy and the State establish compliance milestones for the treatment of specific quantities of mixed waste on an annual basis. In fiscal year 1998, DOE failed to complete treatment of the specified quantity of incinerable mixed waste. This resulted in a \$500,000 fine in fiscal year 1999 that has been, through negotiation, replaced by a Supplemental Environmental Project. This will result in the proper disposal of a legacy mixed waste at an estimated cost of \$1,200,000 to the Department of Energy, but will be of benefit to Oak Ridge Operations and Tennesseans.

Health Studies & Emergency Response

Oak Ridge Health Studies

The Oak Ridge Health Studies examine health problems that may have been caused by federal activities in Oak Ridge. The studies are aimed specifically at nearby residents who may have been affected by air or water emissions from the ORR.

The Oak Ridge Health Studies Agreement is an outgrowth of TOA. It requires that DOE provide funding for a comprehensive health study in the region. DOE and former Gov. Ned McWherter signed the agreement in 1991. The study evaluates environmental releases from the Oak Ridge facilities and estimates risks to people off site. The Oak Ridge Health Agreement also provided funding to evaluate the quality of the state's cancer registry and to create a birth defects registry.

The Tennessee Department of Health (TDH) is the primary State agency involved in the studies. TDEC and its DOE Oversight Division provide support as needed. The study was conducted by an independent contractor, ChemRisk, a division of McLaren/Hart Environmental Services, Inc. The Oak Ridge Health Agreement Steering Panel (ORHASP) guides these studies; this group consists of experts and concerned stakeholders. This year was the final year for the studies, and finalizing them has been the primary goal of ORHASP during 1999.

The TOA requires that DOE provide funding for a comprehensive health study in the region.

The Oak Ridge Health Studies' primary health focus has been "dose reconstructions" in the four areas described below.

- ✓ Radioactive Iodine Releases from ORNL - Between 1944 and 1956, ORNL processed irradiated nuclear fuel to extract radioactive lanthanum, a material useful in nuclear weapons testing. The process released radioactive iodine-131 and other isotopes into the air. Because iodine concentrates in the thyroid gland, concern is focused on the fact that these releases may have caused thyroid problems, including thyroid cancer.
- ✓ Mercury Releases from Y-12 - In the 1950s and the 1960s, Y-12 isolated the lithium-6 isotope for use in nuclear weapons by using a process that used millions of pounds of mercury. More than 350,000 pounds of mercury is estimated to have escaped to the air and into East Fork Poplar Creek. Mercury may cause a variety of health problems, depending on its form. Mercury vapor is primar-

Health Studies & Emergency Response

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ily elemental and can cause brain damage. Inorganic mercury, found in soil, water, and food, can damage the kidneys. Organic mercury, in a form called “methylmercury,” is found in fish and shellfish and can cause birth defects and brain damage.

- ✓ PCB Releases from Oak Ridge Facilities - PCBs were used as a fire-retardant in transformer oils throughout the ORR until the mid-1970s. In the mid-1970s the United States banned the use of PCBs because of evidence that they are harmful to human health, potentially causing cancer and hormone-like effects.
- ✓ Radionuclide Releases from White Oak Creek - White Oak Creek flows through ORNL and into White Oak Lake, ultimately discharging into the Clinch River. Radioactive contamination has entered the creek from numerous sources, including shallow land burial sites in Melton Valley and waste ponds in Bethel Valley. This study concentrated on the potential health impact from eight radionuclides: cesium-137, strontium-90, cobalt-60, ruthenium-106, niobium-95, zirconium-95, iodine-131, and cerium-144.

Project investigators have also screened a wide variety of other materials, including uranium releases from Y-12 and K-25. The uranium study, although

not a full dose reconstruction, does include a thorough analysis of data quality and an evaluation of potential health effects. Emissions from Y-12 are of particular concern because the Scarboro and Woodland communities in Oak Ridge are relatively close to the plant boundaries.

ORHASP has also comprehensively reviewed all Oak Ridge DOE documents with information on past processes, releases and potential health effects.

ORHASP has also comprehensively reviewed all Oak Ridge DOE documents with information on past processes, releases and potential health effects.

Classified material was examined by contractors and state officials with clearances, and much of this information relevant to the studies has been declassified. The resulting report will be a valuable asset for future investigations.

For further information about the Health Studies, contact Patrick Lipford at the Tennessee Department of Health. He can be reached at (800) 435-9617 (Tennessee callers) or (615) 741-5683.

Health Studies & Emergency Response

Emergency Response

The Tennessee Emergency Management Agency (TEMA) is the State's emergency management arm. Located within the Military Department of Tennessee, TEMA provides technical assistance, supplies, equipment, and training to local governments. The agency also administers funding from the State and federal governments.

TEMA operates a 24-hour emergency operations center. This center manages emergency information and coordinates State and federal assistance from one location.

Under the TOA, DOE is required to provide technical and financial assistance for emergency response. TEMA is the primary State agency responsible for implementing the following provisions:

- ✓ Developing and maintaining the State's Multi-Jurisdictional Emergency Response Plan (ERP) for ORR facilities in accordance with federal laws and regulations.
- ✓ Organizing and participating in annual emergency response exercises and drills with affected State agencies and local governments.
- ✓ Training state and local government employees and officials and volunteers who may be called upon in the event of an emergency at the ORR.
- ✓ Acquiring and maintaining equipment for TEMA and affected counties to support the ERP, with funds provided by DOE.

The Division actively participates in Emergency Response exercises on the ORR.

TEMA is responsible for Emergency Response planning and training, and the Division actively participates in the Emergency Response exercises on the ORR. The Division, in coordination with TEMA, has developed a system to track significant occurrences that are required to be reported. Daily occurrence reports are sent to the Division. The Division is also in constant contact with TEMA through the use of a dedicated duty person and the use of a 24-hour paging system.

TDEC's DOE Oversight Division developed the Emergency Response Guide and Procedures Manual in case of a possible accident on the Reservation. The guide and manual give the steps to coordinate emergency response and monitoring if hazardous or radiological materials are released to the environment.

For further information about TEMA's role and responsibilities in Oak Ridge under the TOA, contact Elgan Usrey in Nashville, Tennessee, at (615) 741-2879;

Health Studies & Emergency Response

or Charles Sitzlar in Alcoa, Tennessee, at (800) 533-7343 (Tennessee callers) or (865) 981-2387 (callers outside Tennessee).

DOE photo

Historic photo of worker handling highly radioactive fuel assemblies at ORNL.

TDEC's DOE Oversight Division conducts public outreach at the local, state, and national levels. By attending public meetings to make presentations and act as an information resource, the Division helps the public learn about the Oak Ridge Reservation's environment. The Division's local and state activities are included under the Tennessee Oversight Agreement (TOA). Its national activities include membership in a variety of programs and initiatives. The Division also maintains a World Wide Web site with detailed information about ORR environmental issues at <http://www.state.tn.us/environment/doeo>.

Other community organizations that monitor DOE activities on the Oak Ridge Reservation also seek to include the public in their work. In addition, the Department of Energy has an extensive outreach program to solicit public input on environmental concerns, and the agency has established two information centers to give stakeholders direct access to relevant documents.

Outreach programs enable the public to understand current issues, problems, and progress in environmental management on the ORR. They also provide an opportunity for citizens to play a meaningful role in environmental decision making. Following are the major public outreach efforts undertaken by a variety of organizations concerned with DOE's Environmental Management program at Oak Ridge. Contacts for local and state initiatives—including addresses, phone and fax numbers, and Web sites—are listed in the appendix.

Other community organizations that monitor DOE activities on the Oak Ridge Reservation also seek to include the public in their work.

Tennessee Oversight Agreement Initiatives

Oak Ridge Reservation Local Oversight Committee (LOC). The LOC consists of a Board of Directors and a Citizens' Advisory Panel (CAP). The Board is composed of local elected and appointed officials from the City of Oak Ridge and the counties of Anderson, Roane, Knox, Loudon, Meigs, Rhea, and Morgan. The LOC's mission is to ensure that the best interests of those communities are protected and that public funds are used wisely during cleanup, continued operations and reindustrialization at the ORR. Board members are concerned with human health and the environment as well as their communities' economic and social well being. Representatives of the Division participate in meetings of the LOC.

Outreach

The LOC created a 20-member CAP in early 1995 to provide advice to the Board, based on in-depth reviews of DOE documents and studies of community concerns. CAP meetings often begin with presentations by experts on issues of current interest to the greater Oak Ridge community. The CAP regularly transmits public concerns to DOE, EPA and TDEC. In the past year, issues addressed by the CAP have included the following:

- ✓ The Environmental Management budget process and its implications for cleanup activities on the ORR;
- ✓ The need for off-site disposal options for ORO's low-level radioactive and mixed waste;
- ✓ National policy regarding radioactive waste and materials transportation;
- ✓ A detailed assessment of long-term stewardship needs for the Oak Ridge Reservation;
- ✓ The economic impacts of DOE and contractor employment on LOC-member counties; and
- ✓ Study of technical issues and input to the decision-making process for remediation at the watershed level.

The CAP reviews draft documents, attends public hearings, and makes recommendations to the appropriate agency. CAP members attend meetings of other organizations concerned with environmental, economic, and health issues in order to better evaluate the range of stakeholder opinions.

The LOC's outreach efforts include a bimonthly newsletter, Insights, presentations to community groups and governmental entities, publication of informational white papers, and an Internet presence.

The LOC's outreach efforts include a bimonthly newsletter, Insights, presentations to community groups and governmental entities, publication of informational white papers, and an Internet presence at <http://www.local-oversight/org/>. The staff of the LOC comprises an executive director and an administrative assistant. For further information about the LOC or to be added to the newsletter mailing list, contact Susan Gawarecki in Oak Ridge by phone at (865) 483-1333 or

by e-mail at loc@icx.net.

Oak Ridge Health Agreement Steering Panel (ORHASP). Oak Ridge Health Agreement Steering Panel. The Oak Ridge Health Agreement, funded by DOE and administered through the Tennessee Department of Health, has wrapped up its mission to evaluate historical contaminant releases from the ORR

and their potential impact on the health of nearby residents. ORHASP has finalized the reports on dose reconstruction studies after extensive consultation with experts and stakeholders in a series of monthly meetings. The Oak Ridge Health Agreement, funded by DOE and administered through the Tennessee Department of Health, has wrapped up its mission to evaluate historical contaminant releases from the ORR and their potential impact on the health of nearby residents. The Steering Panel has finalized the reports on dose reconstruction studies after extensive consultation with experts and stakeholders in a series of monthly meetings.

TDEC DOE Oversight Division National Activities

At the national level, Division management staff participates in a wide range of initiatives that may affect the ORR, the Oak Ridge community or the State of Tennessee. These initiatives include:

- ✓ The National Governors' Association (NGA) Federal Facilities Compliance Act Mixed Waste Task Force;
- ✓ The DOE State and Tribal Government Working Group;
- ✓ The NGA/State Dialogue on DOE Material Disposition and Waste Disposal;
- ✓ The Environmental Research Institute of States;
- ✓ Interstate Technology Regulatory Cooperation Radionuclide Work Group;
- ✓ The DOE/EPA Rapid Commercialization Initiative for Technology Demonstration;
- ✓ The Association of State and Territorial Solid Waste Management Officials Radiation Task Force;
- ✓ The Tri-State (Tennessee, Kentucky and Ohio)/DOE Depleted Uranium Hexafluoride Working Group;
- ✓ The National DOE Site Specific Advisory Board's Workshop on Stewardship;
- ✓ The Governor's Round Table leading to a "Statement of

Division staff, center, at the 1999 Environmental Fair.

TDEC photo

Outreach

Principles” signed by Governor Sundquist and DOE Secretary, Richardson; and

- ✓ Developing a Governor’s Primer on “Cleaning Up The Nuclear Weapons Complex” for the Governor’s Round Table.

Other Local Initiatives

Oak Ridge Environmental Quality Advisory Board (EQAB). An official board of the City of Oak Ridge, EQAB’s members are appointed by the City Council, and the board, in turn, advises the City Council on environmental issues. Because the ORR is within the city limits of Oak Ridge, one of EQAB’s primary functions is to review and comment on DOE cleanup activities that potentially will affect the city. EQAB’s Web site is found at <http://orserv01.ci.oak-ridge.tn.us/eqab>.

Roane County Environmental Review Board. Members of this official Roane County governmental board are appointed by the county executive and confirmed by the County Commission. The board advises both the executive and the commission on environmental matters, including those resulting from the presence of two major ORR facilities in the County—ORNL and ETTP. Roane County continues to attract commercial waste management firms interested in doing business with DOE and outside clients. In addition, three incinerators on or near the ORR lie within county boundaries. The east end of Roane County will have a variety of DOE-related cleanup, waste management, and transportation issues to monitor for years to come.

League of Women Voters of Oak Ridge. The League of Women Voters promotes political responsibility through informed and active participation of citizens in their government. The Oak Ridge chapter, formed in 1946, participates in meetings regarding DOE’s EM activities and budget process. The organization also provides outreach on Reservation and other local environmental issues via its semi-monthly “Lunch with the League” program and monthly newsletter “Voter.” The League of Women Voters of Oak Ridge may be found on the Internet at <http://user.icx.net/~brooks/lwvor.html>.

DOE Outreach

Oak Ridge Site Specific Advisory Board (ORSSAB). ORSSAB is an advisory committee to DOE’s Environmental Management organization and is chartered under the Federal Advisory Committees Act.

Outreach

The Board provides advice to DOE's Oak Ridge EM program both on policy issues and on specific decision documents. The Board consists of up to 20 members from the greater Oak Ridge region who are concerned about environmental restoration and waste management. Representatives from TDEC, DOE and EPA Region 4 attend meetings as non-voting members to act as a resource for information and to hear the concerns of the Board.

ORSSAB's project teams are: Budget and Prioritization, Waste Management, Watershed Cleanup, and Public Outreach, with special teams addressing Stewardship, On-site CERCLA Waste Disposal Facility, Health and Safety, and Board Process.

ORSSAB produces a quarterly newsletter called The Advocate.

ORSSAB produces a quarterly newsletter called The Advocate, and its home page may be found at <http://www.oakridge.doe.gov/em/ssab>.

Community Relations. DOE's Community Relations office produces two publications distributed to interested individuals. Environmental Update is a quarterly newsletter that explains Environmental Management activities and decisions either in progress or being contemplated in Oak Ridge. The monthly Public Involvement News summarizes upcoming public meetings, announcements, availability of documents, pending NEPA actions, and opportunities for public involvement. Members of the public can be added to the Community Relations mailing list by contacting Walter Perry, Manager of Community Relations for DOE's Oak Ridge Environmental Management program, at (865) 576-0885, or can pick up a copy of either publication at the DOE Information Resource Center, 105 Broadway in Oak Ridge.

EM activities are also detailed on the Internet at <http://www.oakridge.doe.gov/em>. Links to documents and other information sources are also provided from this Web site.

National Environmental Policy Act (NEPA). NEPA requires federal agencies to provide public officials and citizens with environmental information for proposed federal actions that could affect environmental quality. This is accomplished by preparation of either an environmental impact statements (EIS) if the proposed action will have a significant impact on environmental quality, or an Environmental Assessment if the impact is not significant. The EIS requires public involvement and access to information regarding DOE proposals. Formal public meetings are held in conjunction with the scoping and release of EISs, giving regulators and citizens an opportunity to comment openly on DOE's

Outreach

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planned activities.

In 1994, DOE adopted a policy that combines the public involvement procedures of NEPA and CERCLA for major cleanup decisions. This policy states, "CERCLA documents will incorporate NEPA values, such as analysis of cumulative, off-site, ecological, and socioeconomic impacts, to the extent practicable." DOE's policy and announcements on pending NEPA actions are available on its World Wide Web site at <http://tis-nt.eh.doe.gov/nepa>.

Information Centers

Information Resource Center (IRC). The IRC, located at 105 Broadway Avenue in Oak Ridge, is the official repository for all information and documents that support or compose the Administrative Record for the Federal Facilities Agreement. This includes such information as newspaper articles related to the ORR, official correspondence, and decision documents on site remediations. These files are accessible to the public, and the staff will copy documents on request. The IRC's phone number is (865) 241-4582.

DOE Public Reading Room. This facility is located at Suite 300 in Building 1916-T-2, 230 Warehouse Road, Oak Ridge. It is a storage area for documents requested under the Freedom of Information Act, newly released or declassified files and information dealing with health issues, and documents covering all aspects of the ORR's environment not otherwise part of the Administrative Record. Documents may be read on the premises, or the staff will make copies for interested individuals. The Reading Room's phone number is (865) 241-4780.

Key Challenges

A summary of key challenges facing DOE, the community and the State is given below.

Long Term Stewardship

DOE's plans for CERCLA cleanup on the Oak Ridge Reservation include leaving hazardous substances in place for extremely long periods of time. Because of this strategy, it becomes necessary to establish an enduring and legally binding set of requirements that will provide assurance that these substances will be adequately controlled and monitored to prevent harm to human health or the environment. This need has been commonly referred to as long-term stewardship. Identifying, documenting and funding these long-term stewardship obligations on the Oak Ridge Reservation remains a major challenge to DOE in its completion of CERCLA obligations. The process of identifying these obligations and determining methods to document them is being addressed on many fronts by many different groups. However, serious discussions do not appear to be taking place within the federal government to determine an appropriate way to assure adequate funding to carry out these obligations in the long term. The State of Tennessee, as documented within the guidance policy on "perpetual institution controls," remains committed to the federal government meeting this obligation.

The process of identifying DOE's stewardship obligations is being addressed by many different groups.

Environmental Management Waste Management Facility

As presented in DOE's long range plans, almost all future cleanup activities on the Oak Ridge Reservation depend, to some degree, upon the availability of a local disposal option. This option has now been identified and the decision to proceed is moving through the CERCLA process.

Before agreeing with the decision to construct such a facility, the state has required DOE to commit to the establishment of a multi-million dollar trust fund that will provide assurance for long-term care in the event annual congressional appropriations prove to be inadequate. The establishment of this funding assurance is a key challenge that effectively has been met, allowing cleanup to proceed more expeditiously in Oak Ridge.

Key Challenges

The Federal Commitment

Several key CERCLA Records of Decision (RODs) are nearing finalization at the Oak Ridge federal Superfund site, and the actions from these decisions are pending. These RODs, commonly referred to as watershed RODs, are designed to address sources of contamination and, in some cases, to control the spread of

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It is necessary, on such a large and complex Superfund site, to make interim decisions based on results of prior actions. As a result, in only a few cases do these RODs constitute final remedial action decisions for the Oak Ridge Reservation.

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contamination. It is necessary, on such a large and complex Superfund site, to make interim decisions based on results of prior actions. As a result, in only a few cases do these RODs constitute final remedial action decisions for the Oak Ridge Reservation. This means that key decisions and challenges will remain. For example, major decisions on widespread groundwater contamination must be made. There must be final decisions on the disposition of burial grounds that contain extremely long-lived radionuclides and, in the event that these decisions do not result in acceptable risk reduction, there must be means and methods to protect human health and the environment for as long as unacceptable risk remain. With these key challenges ahead, DOE and the federal government in general must clearly show recognition of

these responsibilities to the people of Tennessee. They must do this by maintaining commitment, and they must not be sidetracked into overly simplifying the task or by thinking the task is prematurely finished.

Lack of Disposal Options for the Oak Ridge Reservation

The inventory of low level waste (LLW) stored on the ORR continues to grow, reaching 40,000-plus cubic meters in early fiscal year 1999. As in the past, the fact that a DOE disposal site for OR LLW has not been established continues to be a major concern and must be addressed by DOE. Additionally, unlike other sites across the DOE complex, ORO appears reluctant to commit to or to seek funding for disposing of a significant portion of the low level legacy waste at a commercial facility. While it is cheaper to store and monitor storage than it is to dispose of the DOE self-regulated waste, there are limits to safe storage capacity.

ETTP Comprehensive Plan: Cleanup and Reindustrialization

DOE is faced with a key challenge at ETTP—coordinating necessary CERCLA

Key Challenges

cleanup with efforts to reindustrialize the site with private industry. DOE must develop a comprehensive and coordinated plan that will ensure that reindustrialization and other activities do not interfere with or delay CERCLA cleanup needs. It is important for the plan to recognize the fact that, in several respects, the ETTP site does not now meet standards suitable for unrestricted industrial use.

Free Release of Materials

Many of DOE's contractors have undertaken projects that result in the release of tools, metals, and other assets from the complex; in some cases, these projects are part of a barter arrangement in lieu of a fee. The potential for release of radioactively contaminated materials is a major concern. The Independent Verification Organization (IVO) was developed by DOE to assure that the myriad of corporations serving as contractors to the agency follow acceptable guidelines in releasing such materials from DOE facilities. Currently, the IVO is overseeing the \$200 million British Nuclear Fuels Ltd. (BNFL) contract at ETTP, along with assorted other contracts on the Oak Ridge Reservation.

Decontaminating and decommissioning an enormous gaseous diffusion plant and all associated process materials is a significant undertaking. Completing this effort without accidentally releasing radioactive materials to the general public is the challenge to be met. The DOE Oversight Division oversees the IVO by observing self audits, by participating in monthly walk-through inspections with DOE, and by reviewing and providing comments on radioactive material release procedures used by BNFL, Bechtel Jacobs Company, and the IVO.

Decontaminating and decommissioning K-25 without accidentally releasing radioactive materials to the general public is the challenge to be met.

Environmental Monitoring

The Division's monitoring efforts, both on the Reservation and in the greater area surrounding the ORR, attempt to identify the potential exposure pathways to nearby, distant or downstream residents. The Division monitors known pathways and to date has found none that pose a significant hazard to the public. Despite these results, the community continues to express concerns about both on- and off-site releases. A major challenge in years to come will be for DOE, with assistance from other federal agencies and the State, to resolve health and safety issues for its workers and area residents.

Key Challenges

The Division has used various techniques to evaluate the known pathways. These include groundwater monitoring, surface water and sediment monitoring, and testing flora and fauna. Future challenges include identification of new path-

Approximately 5,000 canisters of uranium hexafluoride stored at ETP must be shipped to Portsmouth, Ohio, for conversion to a more stable chemical form.

ways, more pertinent monitoring, and a better understanding of contaminant transport systems and the subsequent impacts.

Increasing the Division's monitoring and sampling activities will help it to meet these challenges through a better understanding of what is present on the ORR now. Compiling results of past environmental sampling performed by DOE and by TDEC allows more comprehensive knowledge of how conditions may have changed. This

field presence can help the Division progress in the development of monitoring and sampling approaches able to uncover previously unknown environmental problems or exposure pathways.

Funding

The anticipated funding level for the DOE Oak Ridge Operations (ORO) Environmental Management Program in fiscal year 2000 is approximately \$540 million, with funding not expected to increase in the near future. A breakdown of ORO EM expenditures planned for fiscal year 2000 shows less than \$300 million is slated for environmental restoration on the ORR. The remainder is planned for active waste management on the ORR and environmental restoration at DOE's Paducah, Portsmouth and Weldon Spring facilities, which are all funded through ORO. The ORR—although considered a major facility by DOE—fares poorly relative to other sites in the complex. By comparison, expected fiscal year 2000 expenditures for environmental restoration at other major DOE facilities are as follows: Hanford, \$1,065 million; Savannah River, \$1,222 million; and Rocky Flats, \$671 million. These numbers indicate a severe inequity of funding planned for cleanup on the ORR. This inequity must be remedied through congressional action and DOE Headquarters' allocations to ORO.

Local Government & Stakeholder Organizations

The Oak Ridge Reservation Local Oversight Committee, Inc. (LOC)

136 South Illinois Avenue, Suite 208
Oak Ridge, TN 37830
Phone: (865) 483-1333
Fax: (865) 482-6572
E-mail: loc@icx.net
Web site: <http://www.local-oversight.org/>

City of Oak Ridge Environmental Quality Advisory Board (EQAB)

City of Oak Ridge, P.O. Box 1
Oak Ridge, TN 37831-0001
Phone: (865) 482-8320
Fax: (865) 425-3426
E-mail: EQAB@ci.oak-ridge.tn.us
Web Site: <http://orserv01.ci.oak-ridge.tn.us/eqab/>

Roane County Environmental Review Board

Roane County Courthouse
P.O. Box 643
Kingston, TN 37763
Phone: (865) 376-5578
Fax: (865) 376-4318
E-mail: edstrain@icx.net

Oak Ridge Site Specific Advisory Board (ORSSAB)

P.O. Box 2001, EM-90
Oak Ridge, TN 37831
Phone: (865) 241-3665
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E-mail: blacksl@oro.doe.gov
Web Site: <http://www.oakridge.doe.gov/em/ssab>

League of Women Voters of Oak Ridge

P.O. Box 4073
Oak Ridge, TN 37831-4073
Phone: (865) 482-2243
E-mail: henrymnnn@aol.com
Web Site: <http://user.icx.net/~brooks/lwvor.html>

Community Reuse Organization of East Tennessee (CROET)

107 Lea Way
P.O. Box 2110
Oak Ridge TN 37831-2110
Phone (865) 482-9890
Fax: (865) 482-9891
E-mail: younglt@croet.com
Web Site: <http://www.croet.com>

East Tennessee Environmental Business Association

P.O. Box 5483
Oak Ridge, TN 37831-5483
Phone: (865) 483-9979
Fax: (865) 481-8928
E-mail: grace@eteba.org
Web Site: <http://www.eteba.org>

Plumbers and Steamfitters Local 102

1216 Broadway
Knoxville, TN 37917
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Paper, Allied-Industrial, Chemical, and Energy Workers International Union

P.O. Box 4936
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Appendix

Coalition for a Healthy Environment

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Save Our Cumberland Mountains

P.O. Box 479
Lake City, TN 37769
Phone: (865) 426-9455
Fax: (865) 426-9289
E-mail: socm@tdsnet.com
Web Site: <http://korrnet.org/socm/>

Scarboro Community Environmental Justice Council

233 Tusculum Drive
Oak Ridge, TN 37830
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Fax: (865) 481-0027
E-mail: hillboy@icx.net

Oak Ridge Environmental Justice Committee

100 Wiltshire Drive
Oak Ridge, TN 37830-4505
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State Contacts

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Bill Childres, Waste Management

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Doug McCoy, Environmental Restoration

Dale Rector, Radiological Monitoring and Oversight

Tennessee Emergency Management Agency

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Appendix

Oak Ridge Health Studies

Patrick Lipford, Project Director
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Communicable and Environmental Disease Services
425 Fifth Avenue North
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Phone: (615) 532-2208
Fax: (615) 741-3857
Web site: <http://www.state.tn.us/health/oakridge/>

Division staff at the K1066 Cylinder Storage Yard. This yard contains the oldest uranium hexafluoride cylinders on the K-25 Site.

TDEC photo

Tennessee Department of Environment and Conservation

DOE Oversight Division

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