

# Executive Summary

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## Overview

The US Department of Energy (DOE) manages the Oak Ridge Reservation (ORR), which is located in Roane and Anderson Counties in East Tennessee about 40 km (25 mi) northwest of Knoxville. DOE's signature integrated safety management system (ISMS) integrates safety in all aspects of work at its facilities. Safety, as defined in ISMS, encompasses protection of the public, the worker, and the environment and includes all safety, health, and environmental disciplines: radiation protection, fire protection, nuclear safety, environmental protection, waste management, and environmental management.

ORR is one of DOE's most unusual and complex sites. It was established in the early 1940s as part of the Manhattan Project to enrich uranium and pioneer methods for producing and separating plutonium. Today it comprises three major facilities and thousands of employees performing every mission in the DOE portfolio: energy research, environmental restoration, national security, nuclear fuel supply, reindustrialization, science education, basic and applied research in areas important to US security, and technology transfer. Scientists at the Oak Ridge National Laboratory (ORNL), DOE's largest science and energy laboratory, conduct leading edge research in advanced materials, neutron scattering, nuclear programs (including isotope production), and high-performance computing. The Y-12 National Security Complex (Y-12 or Y-12 Complex) is vital to maintaining the safety, security, and effectiveness of the US nuclear weapons stockpile and reducing the global threat posed by nuclear proliferation and terrorism. The East Tennessee Technology Park (ETTP), a former uranium enrichment complex, is being transitioned to a clean, revitalized industrial park.

ORR is managed by three DOE Program Secretarial Offices and their management, operating, and support contractors. This 2017 *Oak Ridge Reservation Annual Site Environmental Report* (ASER) contains detailed and complex information furnished to the DOE ORR integrating contractor by contractors including UT-Battelle, LLC; Consolidated Nuclear Security, LLC; URS | CH2M Oak Ridge LLC; North Wind Solutions, LLC.; Oak Ridge Associated Universities; and Isotek Systems, LLC.

Three key chapters were prepared for DOE in strict accordance with applicable federal, state, and local regulations. Chapter 3 was written by URS | CH2M Oak Ridge LLC, the lead environmental management contractor for ETTP; Chapter 4 was developed by Consolidated Nuclear Security, LLC, which manages and operates the Y-12 Complex; and Chapter 5 was written by UT-Battelle, LLC, which manages ORNL. These contractors are also responsible for independently carrying out the various DOE missions at the three major ORR facilities. They manage and implement environmental protection programs through environmental management systems that adhere to International Organization for Standardization standard 14001, *Environmental Management Systems*, and are integrated with ISMS to provide unified strategies for managing resources. Chapters 3, 4, and 5 include detailed information on the contractors' environmental management systems.

DOE operations on ORR have the potential to release a variety of constituents to the environment via atmospheric, surface water, and groundwater pathways. Some of these constituents, such as particles from diesel engines, are common at many types of facilities while others, such as radionuclides, are unique to specialized research and production activities like those conducted on ORR. Any releases are highly regulated and carefully monitored. DOE is committed to enhancing environmental stewardship and managing the impacts its operations may have on the environment. It encourages the public to participate

in matters related to ORR's environmental impact on the community by soliciting citizens' input on matters of significant public interest and through various communications. DOE also offers public access to information on all of its Oak Ridge environmental, safety, and health activities.

The ASER is prepared for DOE according to the requirements of DOE Order 231.1B, *Environment, Safety, and Health Reporting*. The ASER includes data on the environmental performance of each of the major DOE ORR contractors and describes significant accomplishments in pollution prevention and sustainability programs that reduce all types of waste and pollutant releases to the environment. An environmental report that provides consolidated data on overall ORR performance and status has been published annually since the mid-1970s. The ASER is a key component of DOE's effort to keep the public informed about environmental conditions across DOE and National Nuclear Security Administration sites. The report is prepared for readability, and frequent references to other sections, chapters, and reports are made throughout to avoid redundancy.

## 2017 Impacts

DOE ORR operations in 2017 resulted in minimal impact to the public and the environment. Permitted discharges to air and water were well below regulatory standards, and potential radiation doses to the public from activities on the reservation were significantly less than the 100 mrem standard established for DOE sites in DOE Order 458.1, *Radiation Protection of the Public and the Environment*.

The maximum radiation dose a hypothetical off-site individual could have received from DOE activities on ORR in 2017 was estimated to be 0.3 mrem from air pathways, 1 mrem from water pathways (drinking water, fish consumption, swimming, recreation, and other uses), and 2 mrem from consumption of wildlife harvested on ORR. This is about 3 percent of the DOE 100 mrem standard for all pathways and is significantly less than the 300 mrem annual average dose to people in the United States from natural or background radiation. The 2017 maximum hypothetical dose is consistent with those calculated for the previous 5 years (2012–2016).

## Environmental Monitoring

Each year extensive environmental monitoring is conducted across ORR. Site-specific environmental protection programs are carried out at ORNL, the Y-12 Complex, and ETPP. ORR-wide environmental surveillance programs, which include locations and media both on and off the reservation, are carried out to enhance and supplement data from site-specific efforts. In 2017 thousands of samples and measurements of air, water, direct radiation, vegetation, fish, and wildlife collected from across the reservation were analyzed for both radioactive and nonradioactive contaminants. Sample media, locations, frequencies, and parameters were selected based on environmental regulations and standards, public and environmental exposure pathways, public concerns, and measurement capabilities. Chapters 2 through 7 of this report summarize the environmental protection and surveillance programs on ORR. These extensive sampling and monitoring efforts demonstrate DOE's commitment to ensuring safety; protecting human health; complying with regulations, standards, DOE orders, and "as low as reasonably achievable" principles; reducing the risks associated with past, present, and future operations; and improving cost-effectiveness.

## Compliance with Environmental Regulations

Federal, state, and local government agencies including the US Environmental Protection Agency (EPA) and the Tennessee Department of Environment and Conservation (TDEC) monitor ORR for compliance with applicable environmental regulations. These agencies issue permits, review compliance reports,

participate in joint monitoring programs, and inspect facilities and operations. Continued compliance with environmental regulations and DOE orders assures on-site processes do not adversely impact the public or the environment.

Compliance with applicable regulations during 2017 for the three major ORR sites is summarized as follows:

- Y-12 experienced two notices of violation in 2017 in reference to the Resource Conservation and Recovery Act.
- ETTP had no environmental violations, issues, or findings in 2017.
- ORNL achieved 99 percent compliance with permit limits and conditions during 2017.

Chapter 2 provides a detailed summary of ORR environmental compliance during 2017. Chapters 3, 4, and 5 discuss each site's compliance status for the year.

## Pollution Prevention and Site Sustainability

Numerous pollution prevention and sustainability programs across ORR embody efforts to achieve enduring sustainability in facilities, operations, and organizational culture. These programs promote energy and water conservation, building efficiency, sustainable landscaping, green transportation, sustainable acquisition, and waste minimization, which in turn decrease the life-cycle costs of programs and projects and reduce risks to the environment. While implementing their work in 2017, ORR contractors achieved a high level of excellence in operations, pollution prevention, and sustainability programs as described in Chapters 3, 4, and 5.

## Cleanup Operations in 2017

ORR has played key roles in America's defense and energy research. However, past waste disposal practices, operational and industrial practices, changing standards, and unintentional releases have left land and facilities contaminated with radioactive elements, mercury, asbestos, polychlorinated biphenyls, and industrial wastes. The DOE Environmental Management program is responsible for cleaning up these sites, and numerous cleanup projects are under way at the reservation's three main facilities.

A notable ETTP accomplishment in 2017 was completion of the design for the K-25 History Center, which will ensure the national historical significance of this crucial site is preserved. The History Center will feature a theater experience, period artifacts, equipment replicas, and workers' oral histories to explain K-25's historical context in World War II and the Cold War. Other significant accomplishments at ETTP included completion of characterization for the disposal of demolition debris at the Central Neutralization Facility, the beginning of demolition at the Poplar Creek facilities, and continued deactivation of Building K-1037 to prepare for its demolition in 2018.

Y-12 achievements included characterization of the eight remaining buildings at the Y-12 Biology Complex and completion of preparations for demolition of the complex, which is scheduled to begin in 2018. Also, the design was completed for the Outfall 200 Mercury Treatment Facility, which will be capable of treating 3,000 gallons of water per minute and will include a 2 million gallon storage tank to handle storm water peak flow conditions. A construction contract is to be awarded in 2018.

ORNL achievements included implementation of 24 new pollution prevention projects and ongoing reuse and recycling projects that eliminate more than 6.5 million kg of waste annually.

Sustainability accomplishments in 2017 included the following:

- Y-12 achieved an 8.0 percent reduction in energy use intensity from the fiscal year 2015 baseline, in line with meeting the DOE site sustainability plan reduction goal of 25 percent by fiscal year 2025, and a 65 percent reduction in water use.
- ORNL achieved a 24 percent reduction in water use intensity through fiscal year 2017, in compliance with the Executive Order 13693 reduction goal of 36 percent by 2025; a 32 percent decrease in petroleum consumption; and an increase, to 47, in the number of electric vehicle charging stations available for both personal and government fleet vehicles.
- ETTP carbon dioxide emissions have exceeded the targeted 40 percent reduction outlined in Executive Order 13693.

The Office of Environmental Management also continued planning for capital asset projects that will further advance ORR cleanup objectives. In addition to the aforementioned mercury treatment facility at Y-12, such projects include a new disposal facility that will accept debris from future cleanup at Y-12 and ORNL, and a new sludge treatment facility at the Transuranic Waste Processing Center.