

2006

the Oak Ridge
Reservation

ANNUAL SITE ENVIRONMENTAL REPORT



ASER Overview

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Annual Site Environmental Report Requirements

DOE Order 231.1A, "*Environment, Safety and Health Reporting*" requires annual reporting on environmental management performance including environmental releases, environmental monitoring, and estimated radiological dose to the public.

- Periodic guidance issued by DOE Office of Health, Safety and Security to promote consistency
- Due each October 1st for previous year's data

DOE Order 450.1, "*Environmental Protection Program*" requires environmental monitoring to detect and characterize releases; assess impacts; estimate dispersal patterns; characterize exposure pathways to members of the public; and to evaluate potential impacts to the biota.

The ORR Annual Site Environmental Report (ASER) Includes:

- ORR site and operations overview
- Environmental compliance status summary
- Environmental Management Program summary
- ETTP, ORNL, Y-12 site-specific and ORR-wide monitoring program results
- Radiological dose assessment for the ORR

The ORR ASER does not include:

- results of all sampling on the ORR –data collected for other site and regulatory purposes are presented in other documents
- Lessee operations at the ETTP

ORR ASER Statistics

- A consolidated ASER is compiled for the entire ORR
- About 70 contributing authors from all ORR sites
- Includes ORR-wide and facility-specific discussions
- Consists of 3 volumes
 - ASER
 - Data Volume,
 - Summary Document
 - compiled by the Karns High School English Department as an educational outreach program

Available at

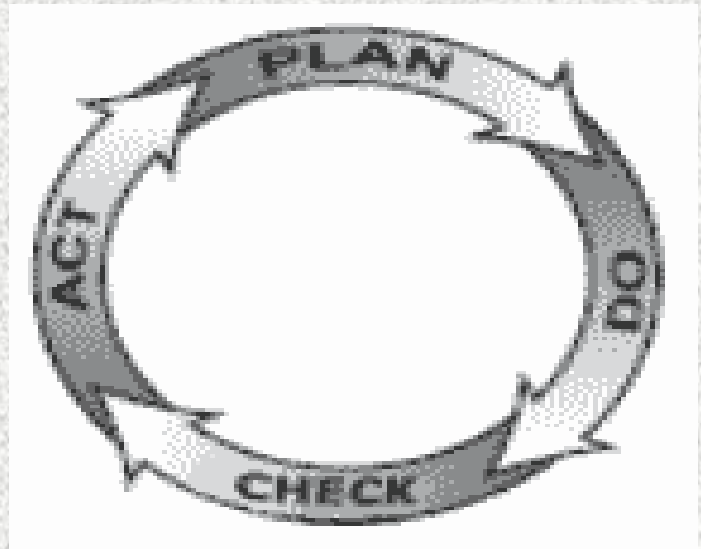
http://www.ornl.gov/Env_Rpt



The screenshot shows a web browser window displaying the homepage for the Home of the Oak Ridge Reservation Annual Site Environmental Report (ASER). The page features a header with the text "ASER - Homepage" and a sub-header "Home of the Oak Ridge Reservation Annual Site Environmental Report (ASER)". Below the header, there is a paragraph of text describing the Oak Ridge Reservation and its operations. The text states: "The Oak Ridge Reservation is situated in East Tennessee, in and adjacent to the city of Oak Ridge. The U.S. Department of Energy (DOE) operates three sites on the reservation: the East Tennessee Technology Park, formerly the K-25 Site; Oak Ridge National Laboratory; and the Y-12 National Security Complex. The three sites are government-owned, contractor-operated facilities, under DOE guidance, private companies manage the day-to-day operations of the sites according to federal laws, DOE orders, and state laws and regulations." Below this paragraph, there is another paragraph: "Government-sponsored activities on the reservation date back to the Manhattan Project and continue to the current day. Both past and current activities involve hazardous chemicals and radioactive materials. The DOE requires that an annual report be published to describe the effect that these activities have on the reservation and its surroundings. Data for the report are gathered by effluent monitoring (collection and analysis of samples of various media prior to contaminant release) and environmental surveillance (sampling of various media to obtain direct measurements subsequent to contaminant release)." At the bottom of the page, there is a section titled "The Oak Ridge Reservation Annual Site Environmental Report (ASER) is published annually in three volumes." followed by a bulleted list: "• The ASER with its appendices is about 300 pages and presents many maps, figures, data summary tables, charts, and graphs and is an inclusive treatise on that year's environmental monitoring activities, including interpretation of results and how well we complied with federal, state, and local requirements." "• The small ASER Summary document (under 25 pages) is written with the help of high school students specifically for the general public. It presents discussions and summaries of the important activities for the year." "• The Data Volume is a large document that contains the 'raw data' from which the ASER is generated. This document is useful only to those who analyze data and wish to do their own calculations. The Data Volume is

Environmental Management Systems

- DOE Order 450.1, “*Environmental Protection Program*”
 - Implements sound stewardship practices protective of air, water, land, and other natural and cultural resources impacted by DOE operations and by which DOE cost meets or exceeds compliance with applicable laws and regulations.
 - This is accomplished through implementation of Environmental Management Systems.
- An Environmental Management System is a continuing cycle of planning, implementing, evaluating, and improving processes and actions undertaken to achieve environmental goals



Environmental Management Systems on the ORR Reduce Environmental Impacts and Improve Operating Efficiency

- UT-Battelle has implemented a formal ISO-14001-compliant EMS (registered in 2004) for Oak Ridge National Laboratory via the Standards Based Management System.
- Bechtel Jacobs Company has formally implemented an EMS for operations at ETTP, ORNL, and Y-12 consistent with requirements of DOE Order 450.1 based on the elements and principles of ISO-14001.
- B&W Y-12 has implemented a formal ISO-14001-equivalent EMS for the Y-12 National Security Complex.



ORR 2006 Compliance

- National Pollutant Discharge Elimination System permit compliance sites > 99.9%
- Effective dose equivalent to a hypothetically maximum exposed individual from all ORR pathways was 6 mrem
- Effective dose equivalent from ORR airborne releases to the most exposed member of the public was 0.8 mrem
- 19 environmental assessments/inspections
- No releases of extremely hazardous substances regulated by the Emergency Planning & Community Right To Know Act
- No reportable environmental releases in excess of Comprehensive Environmental Response, Compensation, and Liability Act reportable quantities
- One reportable oil sheen and one fish kill



ORR-Wide Environmental Monitoring

Monitoring Programs are carried out for the ORR as a whole and at each site

ORR monitoring and dose assessment

-Assess impact of DOE operations on the reservation and surrounding areas

- DOE Order 5400.5 establishes public dose limit of 100 mrem for DOE activities
- Average dose for U.S citizen ~ 360 mrem/year from natural and man-made sources

Two major types of monitoring activities

- Effluent Monitoring
 - Sample collection or measurements at point of release to environment
- Environmental Surveillance
 - Sample collection or measurements from the environs

2006 ORR-Wide Monitoring included

- ambient air
- external gamma
- surface water
- food crops
- milk
- fish
- deer
- turkey
- geese

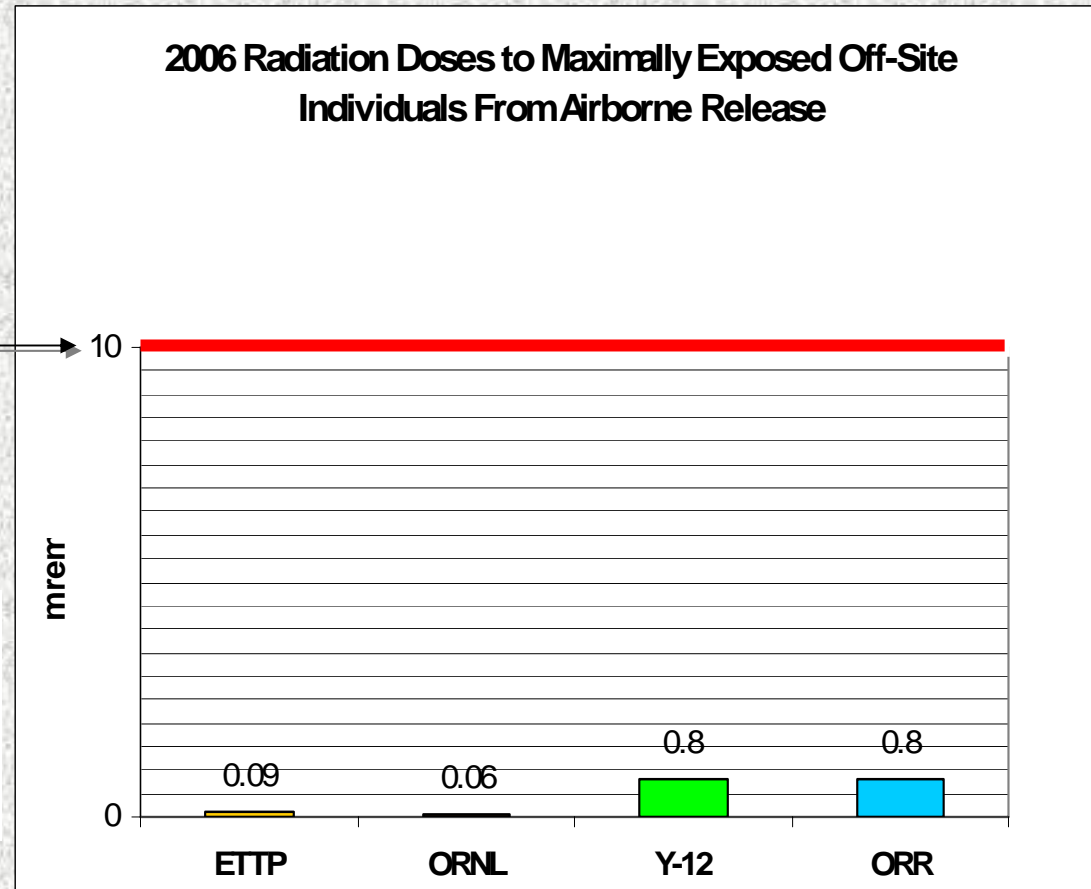
ORR 2006 Monitoring Results

- External Gamma
 - Exposure rates on/near ORR are near background based on continuous monitoring at 6 locations
- Ambient Air
 - radionuclide concentrations are less than DOE references (DCGs) based on continuous monitoring at 9 locations
- Surface Water
 - no significant differences in upstream and downstream locations
- Food Crops (lettuce, tomatoes, and turnips from local gardens)
 - a hypothetical gardener could have received a dose of 0.2 mrem
- Milk
 - A hypothetical consumer of milk from locations near the ORR could have received about 0.08 mrem
- Fish (upstream and downstream monitoring of 2 species)
 - Maximum rad dose from fish consumption ~ 0.7 mrem
 - PCB levels consistent with state postings
- Deer
 - 286 deer harvested with 2 retained for beta-particle activity in bone
- Turkey
 - 39 birds harvested with none retained
- Geese
 - no limit exceedances for 203 surveyed geese

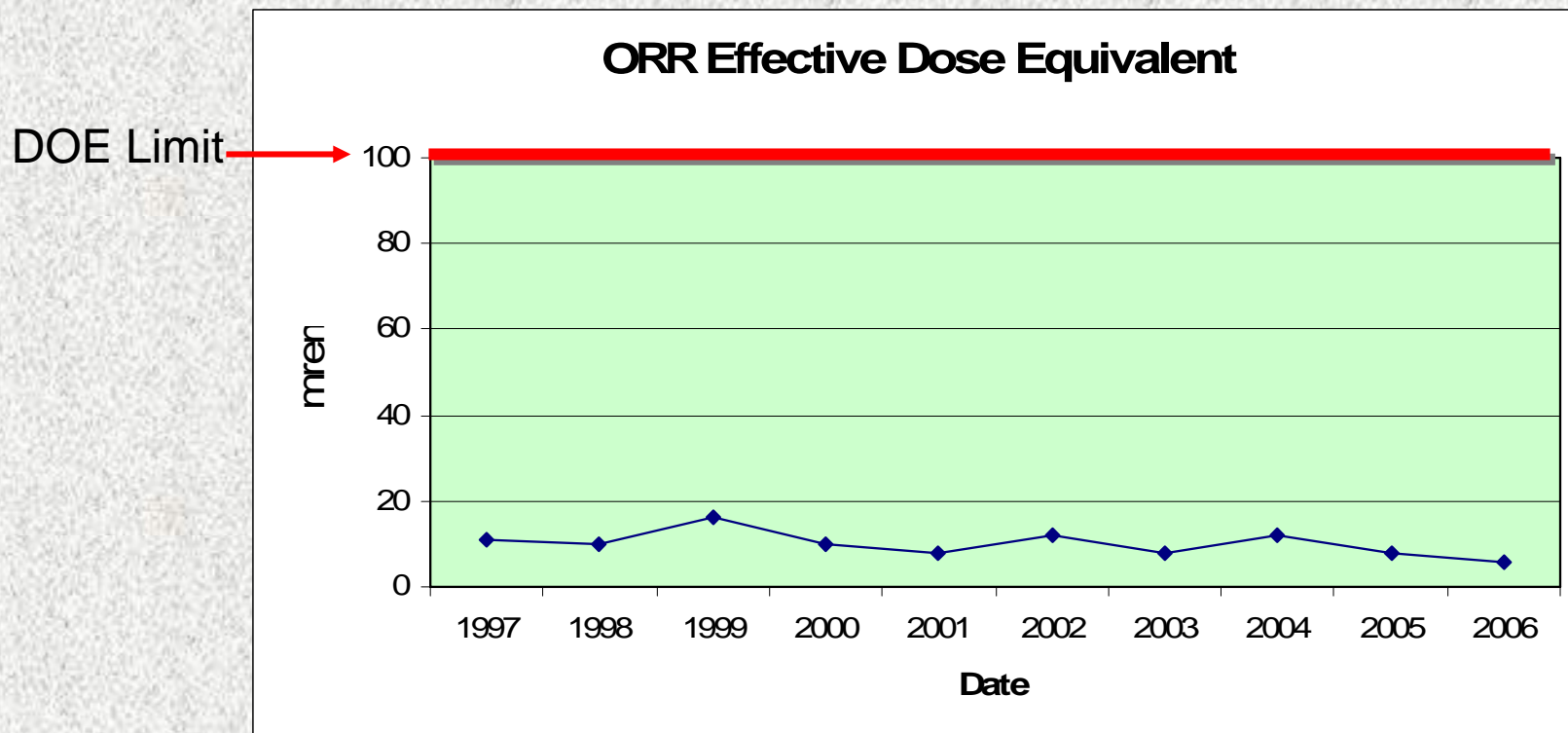
ORR 2006 Airborne Radiological Dose Summary

NESHAP Limit

Radiation doses to maximally exposed off-site individuals from airborne releases was well below the regulatory limit.



ORR Radiation Dose Trends All Pathways



DOE Office of Environmental Management (EM) ORR Projects

- **EM projects are summarized and include:**
 - Decontamination and Decommissioning projects
 - Remediations
 - Operations and maintenance of waste treatment, storage, and recycling facilities
 - Public involvement forums and opportunities
- **Detailed information is provided in the Annual “*Remediation Effectiveness Report*” and the “*Clean Up Progress Report*”**

East Tennessee Technology Park (ETTP)

- DOE operations managed by Bechtel Jacobs Company LLC and Operations Management International
 - Private companies on site through the Community Reuse Organization of East Tennessee (CROET)
- Surface water bodies within or adjacent to site boundaries:
 - Poplar Creek
 - Mitchell Branch
 - Clinch River
 - Large onsite ponds
- Primary Regulatory agencies
 - Tennessee Department of Environment and Conservation (TDEC)
 - Environmental Protection Agency (EPA)



ETTP 2006 Permits and Approvals

TDEC Issued and Approved Permits

- 2 NPDES Permits
 - Central Neutralization Facility
 - Storm water discharges
- 3 Pump and Haul Sewage Permits
- Clean Air Act Permits
 - Title V Application covering 5 major air emission sources
 - 2 Construction Permits
- 3 Resource Conservation and Recovery Act (RCRA) Permits
 - 1 Site Level Storage Permit
 - 2 Permits at the TSCA Incinerator (1 Combustion, 1 Storage)
- 2 Underground Storage Tanks (petroleum)

EPA Issued and Approved Permits

- 1 PCB Disposal Approval for TSCA Incinerator



ETTP 2006 Water Sampling

- NPDES Sampling
 - Wastewater facility effluent sampling
 - Storm water runoff sampling (121 outfalls / 937 data points)
 - Annual storm water characterization
 - Biological and toxicity monitoring
- Surface water sampling
 - 2,558 data points from 8 locations
- Water Quality Monitoring Results
 - One exceedances in NPDES water quality monitoring
- Trends are generally consistent with historical results for storm drain and stream aquatic toxicity testing
- Evidence of gradual improvement in biological monitoring for Mitchell Branch

ETTP 2006 Air Monitoring

ETTP radiological emissions to the atmosphere in 2006 were calculated to be 0.09 mrem which is well below the 10 mrem NESHAP standard.

Emissions at TSCA Incinerator are Compliant

Pollutant	Actual TSCA Emissions (tons/year)	Allowable Emissions (tons/year)	% of Allowable
Semivolatile Metals	0.0018	0.116	1.5
Beryllium	0.00002	0.00021	9.6
Low-volatile metals	0.0064	0.286	2.2
Mercury	0.00037	0.155	0.2
Hydrogen Fluoride	0.011	2.98	0.4
Hydrogen Chloride	0.014	0.092	15.1
Sulfur Dioxide	0.009	38.5	<0.1
Volatile Organic Compounds	0.356	5.0	7.1
Particulate	0.265	5.64	4.7

- Radiological stack sampling at TSCA Incinerator
- Radiological stack sampling at Stack K-1423
- Emissions for minor radiological sources estimated by EPA-approved methods
- Radiological and metals sampling and analysis at six ambient air sampling stations

Oak Ridge National Laboratory (ORNL)

- Multiple DOE Programs
 - DOE Office of Science - UT Battelle LLC
 - DOE Office of Nuclear Energy – Isotek and UT-Battelle, LLC
 - DOE Environmental Management – Bechtel Jacobs LLC
- ORNL site includes facilities in Bethel and Melton valleys and on Chestnut Ridge
- Surface water bodies include
 - White Oak Creek
 - Melton Branch
 - Numerous small creeks and tributaries
- Primary regulatory agencies
 - TDEC
 - EPA



ORNL Permits and Approvals

- One ORNL-wide NPDES permit covers 164 discharge points
 - includes wastewater and storm drains
 - Spallation Neutron Source permit issued in December 2003
- UT-Battelle Title V permit issued in 2004 includes 11 sources
- BJC Title V permit includes 2 sources
- Three RCRA permits
 - 1 storage tank permit
 - 2 container storage facility permits
- Three underground storage tanks (petroleum)



ORNL 2006 Water Sampling

- Wastewater effluent compliance sampling
- Storm water runoff sampling
- Surface water sampling
- Biological monitoring and toxicity testing
- Groundwater quality surveillance sampling

Water Quality Monitoring Results

- NPDES compliance > 99.9% with 5 permit exceedences from ~ 7,000 water quality monitoring data points
- Biological communities in ORNL streams demonstrate gradual improvements
- Results from wastewater toxicity testing met NPDES limits with one exception
- Monitoring at White Oak Dam shows general decline in rad concentrations



ORNL 2006 Air Monitoring

- Continuous stack sampling at six locations
- Calculation of airborne emissions for nonradiological parameters
- Ambient air monitoring at 4 ORNL perimeter locations
- Emission calculations are performed for 19 minor point/group sources

ORNL Steam Plant Actual Emissions are less than allowable levels

Pollutant	Emissions (tons/year)		% of Allowable
	Actual	Allowable	
Sulfur dioxide	6	1,277	0.5
Particulate	4	71	5.6
Carbon Monoxide	33	196	16.8
Volatile Organic Compounds	2	14	14.3
Nitrogen Oxides	66	380	17.4

ORNL airborne radiological emissions were 0.06 mrem in 2006. This is well below the 10 mrem NESHAP standard.

ORNL 2006 Modernization Activities

- SNS construction completed
- Center for Nanophase Material Sciences was completed
- Chestnut Ridge Expansion Project
 - extended electric, water, sewer, and natural gas lines
- Significant progress on Joint Institute for Biological Sciences
- Central campus leasing to CROET for Science and Technology Park
- MRF completed and initial occupancy in 2006



Average age of ORNL facilities has been reduced from 42 to 32 years.

Y-12 National Security Complex (Y-12)

- Multiple co-located DOE programs and associated DOE contractors
 - National Nuclear Security Administration – B&W Y-12
 - DOE Office of Environmental Management (BJC)
 - DOE Office of Nuclear Energy (UT-Battelle)
 - DOE Office of Science (UT-Battelle)
- 811 acres, spanning 2.5 miles
 - ~500 buildings housing about 7 million square feet of laboratory, machining, dismantlement, and research and development areas.
- Surface water bodies within site boundaries
 - East Fork Poplar Creek
 - Bear Creek
 - Tributaries to the Clinch River
- Primary Regulatory Agencies
 - TDEC
 - EPA
 - City of Oak Ridge



Y-12 2006 Permits and Approvals

- One NPDES wastewater discharge permit
 - Covers ~60 active point-source discharges
- One Industrial User's Permit (issued by City of Oak Ridge)
 - Regulates sanitary sewage discharges for subsequent treatment
- One Title V Air Permit covering 37 emission sources and > 100 emission points
- 12 Solid Waste Permits (issued by TDEC)
 - Three hazardous waste operating permits regulate 10 storage/treatment units
 - Three hazardous waste post-closure permits regulate 8 closed hazardous waste sites
 - Six Solid Waste permits regulate 6 on-site solid waste landfills (3 operating)
- Four Active Underground Storage Tanks (petroleum)



Y-12 2006 Water Monitoring

- Approximately 9,400 water quality monitoring data points
 - Identified 1 NPDES permit limit exceedence
- Over 1,500 sanitary sewer sampling data points
 - No Oak Ridge Sanitary Sewer Permit noncompliances
- Aquatic toxicity testing of discharges to East Fork Poplar Creek
 - Demonstrated compliance with toxicity standards established by permit
- Biological monitoring in East Fork Poplar Creek showed continued improvement
- Mercury monitoring in East Fork Poplar Creek demonstrated continued downward trend
- Groundwater quality monitoring (includes springs and tributaries)
 - Overall decreasing levels of groundwater contaminants and no identified public exposure pathways
- Ambient surface water monitoring – mercury is the only contaminant consistently above water quality standards

Y-12 2006 Air Monitoring

- Stack sampling for uranium
- Continuous opacity monitoring at coal-fired steam plant
- Calculation of airborne emissions for nonradiological parameters
- Ambient air monitoring within Y-12 perimeter as a best management practice
 - Uranium monitoring by TDEC at 3 locations
 - Mercury monitoring at 2 locations
- Ambient fluoride monitoring in Scarboro Community

2006 Actual Versus Allowable Air Emissions from the Y-12 Steam Plant

Pollutant	Emissions (tons/year)		Percentage of allowable
	Actual	Allowable	
Particulate	32	945	3.4
Sulfur dioxide	2,286	20,803	11.0
Nitrogen oxides	654	5,905	11.1
Nitrogen oxides (ozone season only)	153.4	232	66.1
Volatile organic compounds	2.3	41	5.6
Carbon monoxide	20	543	3.7

2006 Y-12 radiological emissions to the atmosphere were 0.8 mrem - well below the 10 mrem NESHAP standard.

Y-12 Facility and Infrastructure Modernization in 2006

- East End Records Storage Facility completed
- Characterization for Potable Water System Upgrade completed
- New garage service bays completed
- Old garage demolished
- 109,959 ft² of floor space demolished in 2006 with 20 more buildings scheduled for demolition over the next 3 years
- Construction planning began on Highly Enriched Uranium Materials Facility



In Conclusion

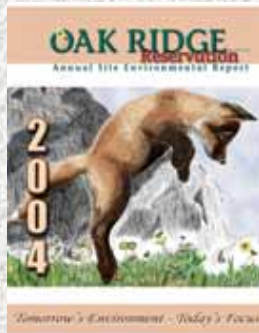


- ASER 2006 is available on the web at

http://www.ornl.gov/Env_Rpt



- For further information or additional copies please contact Joan Hughes (hughesjf@ornl.gov) or David Page (pagedg@oro.doe.gov)



- ASER 2007 is well underway and will be available in October 2008