

the Oak Ridge  
Reservation

# Annual Site ENVIRONMENTAL Report



2007

## ASER 2007 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 450.1A, “*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 some activities (i.e., waste characterization, remedial effectiveness) are presented in other documents
- Lessee operations at the ETTP
- Upcoming lessee operations at ORNL will not be included

# 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

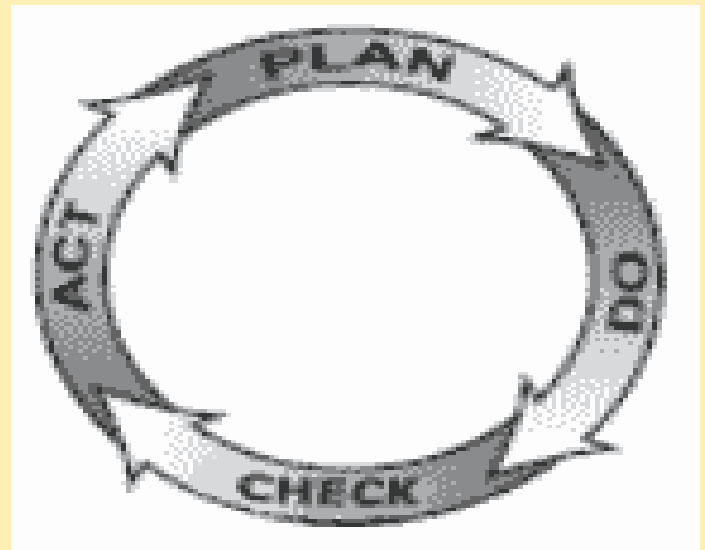
[http://www.ornl.gov/Env\\_Rpt](http://www.ornl.gov/Env_Rpt)



The screenshot shows a Windows Internet Explorer browser window displaying the homepage of the Oak Ridge Reservation Annual Site Environmental Report (ASER). The browser's address bar shows the URL [http://www.ornl.gov/Env\\_Rpt](http://www.ornl.gov/Env_Rpt). 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 the U.S. Department of Energy (DOE) operations. A second paragraph discusses government-sponsored activities on the reservation. A third paragraph states that the ASER is published annually in three volumes. A bulleted list follows, detailing the three volumes: the ASER report itself, a small ASER Summary document, and the Data Volume. The browser's taskbar at the bottom shows the start button and several open applications, including Microsoft Office and WhosCalling.

# Environmental Management Systems

- DOE Order 450.1A, “*Environmental Protection Program*”
  - Implements sound stewardship practices that are protective of air, water, land, and other natural and cultural resources impacted by DOE operations and by which DOE 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 an ISO-14001-compliant EMS (registered in 2004) for ORNL via the Standards Based Management System. In 2007 the UT-B EMS was recertified by a third party registrar with no nonconformances noted.
- Bechtel Jacobs Company has implemented an EMS for operations at ETTP, ORNL, and Y-12 consistent with requirements of DOE Order 450.1A and the elements and principles of ISO-14001.
- Y-12 has implemented a formal ISO-14001-equivalent EMS for the Y-12 National Security Complex.



# ORR 2007 Compliance

- National Pollutant Discharge Elimination System permit compliance at all three sites > 99.9%
- Effective dose to a hypothetically maximum exposed member of the public from all ORR pathways was 4 mrem
- Effective dose from ORR airborne releases to the most exposed member of the public was 0.3 mrem
- 13 environmental assessments/inspections
- No releases of extremely hazardous substances regulated by the Emergency Planning & Community Right To Know Act
- No reportable oil sheens or fish kills
- No reportable environmental releases in excess of Comprehensive Environmental Response, Compensation, and Liability Act reportable quantities



# 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 sets 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

## 2007 ORR-Wide Monitoring included

- Ambient air
- External gamma
- Surface water
- Food crops
- Milk
- Fish
- Deer
- Turkey
- Geese

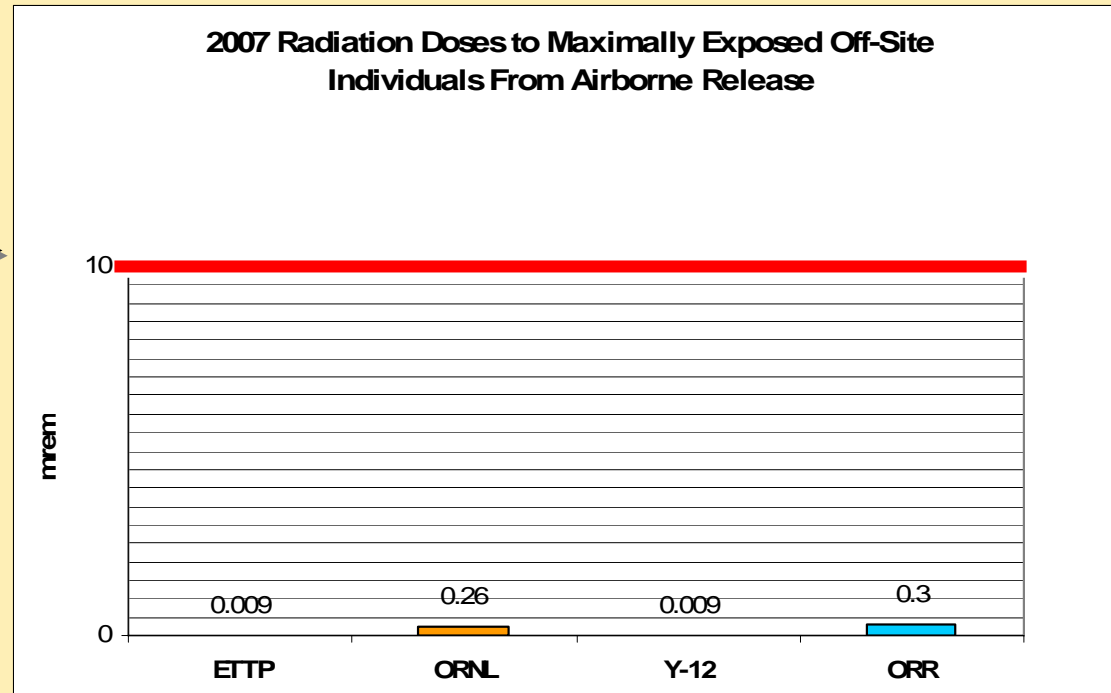


# ORR 2007 Monitoring Results

- External Gamma
  - Exposure rates on/near ORR near background based on monitoring at 6 locations
- Ambient Air
  - Radionuclide concentrations are less than DOE references (Derived Concentration Guides) 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 0.1 mrem
- Milk
  - A hypothetical consumer of milk from locations near the ORR could have received about 0.07 mrem
- Fish (upstream and downstream monitoring of 2 species)
  - Maximum rad dose from fish consumption ~ 0.9 mrem
  - PCB levels consistent with state postings
- Deer
  - 361 deer harvested with 3 retained for beta-particle activity in bone
- Turkey
  - 31 birds harvested with none retained
- Geese
  - No limit exceedances for 202 surveyed geese

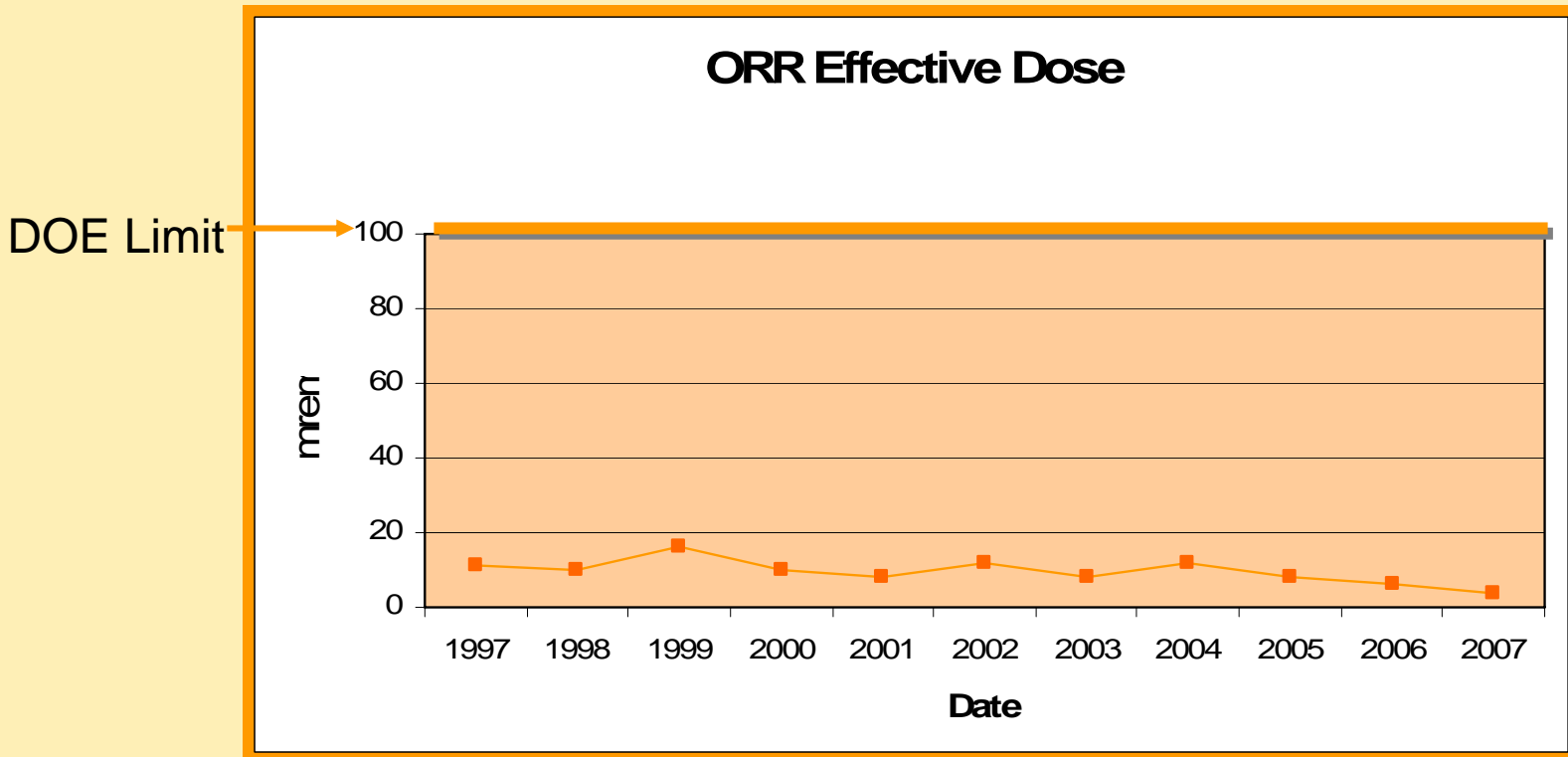
# ORR 2007 Airborne Radiological Dose Summary

**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 (some ORNL waste management responsibilities transitioned to Office of Science in FY 2008)
  - 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 environmental regulatory agencies
  - Tennessee Department of Environment and Conservation (TDEC)
  - Environmental Protection Agency (EPA)



# ETTP 2007 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 2007 Water Sampling

- NPDES Sampling
  - Wastewater facility effluent sampling
  - Storm water runoff sampling (38 representative outfalls / 2,750 data points)
  - Annual storm water characterization
  - Biological and toxicity monitoring
- Surface water sampling
  - 2,332 data points from 9 locations
- Groundwater monitoring results are reported in the *Remedial Effectiveness Report*

- Water Quality Monitoring Results
  - 5 exceedances in NPDES water quality monitoring – details provided in ASER Appendix E
- Surface water and biological monitoring results are generally consistent with historical trends
- Evidence of gradual improvement in biological monitoring for Mitchell Branch



# ETTP 2007 Air Monitoring

ETTP radiological emissions to the atmosphere in 2007 were calculated to be 0.03 mrem which is well below the 10 mrem NESHAP standard.

## Emissions at TSCA Incinerator are Compliant

Pollutant	Actual TSCA Emissions (lbs/year)	Allowable Emissions (lbs/year)	% of Allowable
Semivolatile Metals	3.4	241.8	1.4
Beryllium	0.08	0.42	18.6
Low-volatile Metals	10.5	598.1	1.8
Mercury	2.1	324.0	0.7
Hydrogen Fluoride	6	5,957	<0.1
Hydrogen Chloride	82.4	191.9	42.9
Sulfur Dioxide	23	77,088	<0.1
Volatile Organic Compounds	619	10,074	6.1
Particulate	469	11,280	4.2

- Radiological stack sampling at TSCA Incinerator
- 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, EnergX
- 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 environmental regulatory agencies
  - TDEC
  - EPA



# ORNL Permits and Approvals

- One ORNL-wide NPDES permit covered 164 discharge points (note: a new permit became effective in 2008)
  - included wastewater and storm drains
  - Spallation Neutron Source permit issued in December 2003
- UT-Battelle Title V permit issued in 2004 includes 10 sources
- BJC Title V permit includes 2 sources
- Three RCRA permits
- Three underground storage tanks (petroleum)



# ORNL 2007 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 2 permit exceedences from ~ 7,000 water quality monitoring data points. (Details on exceedences provided in Appendix E.)
- Biological communities in ORNL streams demonstrate gradual improvements
- All results from wastewater toxicity testing met NPDES limits
- Monitoring at White Oak Dam shows general decline in rad concentrations



# ORNL 2007 Air Monitoring

- Continuous stack sampling at 7 locations
- Calculation of airborne emissions for nonradiological parameters
- Ambient air monitoring at 4 ORNL perimeter locations
- Emission calculations are performed for 15 minor point/group sources

Actual emissions from steam production at ORNL are less than allowable levels

Pollutant	Emissions (tons/year)		% of Allowable
	Actual	Allowable	
Sulfur Dioxide	8	1,277	0.6
Particulate	3	71	4.2
Carbon Monoxide	32	196	16.3
Volatile Organic Compounds	2	14	14.3
Nitrogen Oxides	54	380	14.2

ORNL airborne radiological emissions were 0.3 mrem in 2007. Well below the 10 mrem NESHAP standard.

# ORNL 2007 Modernization Activities

- DOE chooses ORNL for site of BioEnergy Science Center. BESC located in recently completed Joint Institute for Biological Sciences laboratory
- ~ 12 acres at ORNL leased to Halcyon, LLC (CROET subsidiary) and site preparation initiated for the Oak Ridge Science and Technology Park
- Multiprogram Research Facility reached full operational capacity
- Old ORNL cafeteria demolished



Average age of ORNL facilities has been reduced from 42 to 31 years.

# Y-12 National Security Complex (Y-12)

- Multiple co-located DOE programs and associated DOE contractors
  - National Nuclear Security Administration – Y-12 Complex
  - 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 environmental regulatory agencies
  - TDEC
  - EPA
  - City of Oak Ridge



# Y-12 2007 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)
- Two Active Underground Storage Tanks (petroleum)



# Y-12 2007 Water Monitoring

- Approximately 3,200 water quality monitoring data points
  - Identified 1 NPDES permit limit exceedence
- Over 1,400 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 shows continued improvement but pace has slowed in recent years
- 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 2007 Air Monitoring

- Stack sampling for uranium
- Continuous opacity and NO<sub>x</sub> 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 Scarborough Community continued through FY 07

## 2007 Actual Versus Allowable Air Emissions from the Y-12 Steam Plant

Pollutant	Emissions (tons/year)		Percentage of allowable
	Actual	Allowable	
Particulate	28	945	3.0
Sulfur Dioxide	2,038	20,803	9.8
Nitrogen Oxides	437	5,905	7.4
Nitrogen Oxides (ozone season only)	133.5	232	57.5
Volatile Organic Compounds	2.3	41	5.6
Carbon Monoxide	18	543	3.3

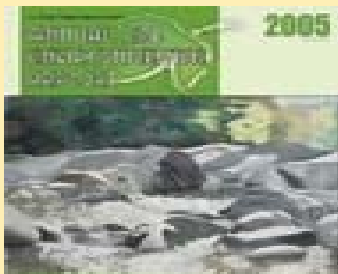
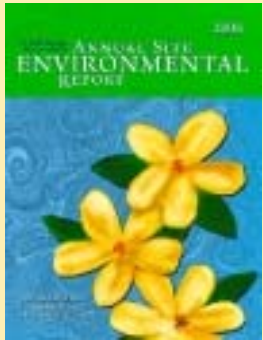
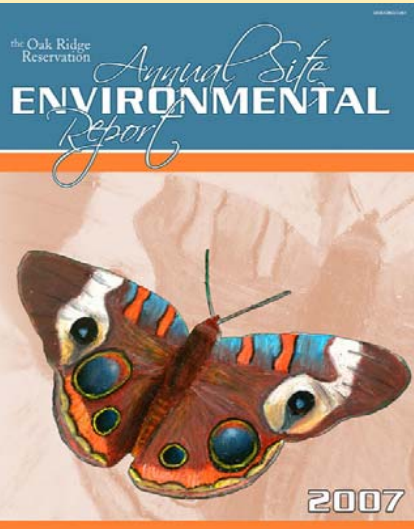
2007 Y-12 radiological emissions to the atmosphere were 0.15 mrem - well below the 10 mrem NESHAP standard.

# Y-12 Facility and Infrastructure Modernization in 2007

- New Hope and Jack Case Centers completed and occupied
- NNSA approved initiation of new steam plant design and construction
- 108,000 ft<sup>2</sup> of floor space demolished in 2007



# In Conclusion



- ASER 2007 is available on the web at [http://www.ornl.gov/Env\\_Rpt](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)
- Compilation of ASER 2008 has begun with publication scheduled for October 2009