

the Oak Ridge Reservation

ANNUAL SITE ENVIRONMENTAL REPORT

2005

ORR/RC/2218



"When you put your hand in a flowing stream, you touch the last that has gone before and the first of what is still to come."

- Leonardo da Vinci

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ABOUT THE COVER:

Each year the Department of Energy's Oak Ridge Office sponsors the Annual Site Environmental Report Cover Design Contest, and invites students from nearby Karns High School to submit original artwork emphasizing East Tennessee's beauty and abundance of natural resources. This year's contest was judged by Robert A. Tino, one of the most gifted and celebrated artists in the Southeast.

The winning painting featured on this year's cover was submitted by Michelle Wayne, a senior at Karns High School. In addition to being an accomplished artist, Michelle loves the scenery and recreational opportunities the region offers, and hikes and camps frequently. Her painting was inspired by one of her favorite places on a mountain stream near the Oak Ridge Reservation.

The Department of Energy would like to thank the twenty student artists who participated in the cover design contest and to express appreciation to Robert A. Tino, who served as the judge for this year's contest.

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**Oak Ridge Reservation Annual Site
Environmental Report for 2005**

on the World Wide Web
<http://www.ornl.gov/aser>

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Acronyms and Abbreviations

AM	action memorandum
ANSI	American National Standards Institute, Inc.
AOC	area of concern
ARAP	aquatic resource alteration permit
ASER	annual site environmental report
ATDD	Atmospheric Turbulence and Diffusion Division
BCG	biota concentration guide
BCK	Bear Creek kilometer
BFK	Brushy Fork kilometer
BJC	Bechtel Jacobs Company LLC
BMAP	Biological Monitoring and Abatement Program
BNFL	British Nuclear Fuels Ltd.
CAA	Clean Air Act
CBOD	carbonaceous biochemical oxygen demand
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFC	chlorofluorocarbon, chlorinated fluorocarbon
CFR	<i>Code of Federal Regulations</i>
Chla	chlorophyll a
CNF	Central Neutralization Facility
CRK	Clinch River kilometer
CROET	Community Reuse Organization of East Tennessee
CWA	Clean Water Act
CX	categorical exclusion
CY	calendar year
CYRTF	Coal Yard Runoff Treatment Facility
D&D	decontamination and decommissioning
DCG	derived concentration guide
DOE	Department of Energy
DOE-EM	DOE Office of Environmental Management
DOE-HQ	DOE Headquarters
DOE-ORO	DOE Oak Ridge Office
dps	disintegrations per second
DWI	David Witherspoon, Inc.
EDE	effective dose equivalent
EFK	East Fork Poplar Creek kilometer
EM	(DOE Office of) Environmental Management
EMC	event mean concentration
EMS	environmental management system
EMWMF	Environmental Management Waste Management Facility
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPT	Ephemeroptera, Plectoptera, and Trichoptera (taxa)

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ETTP	East Tennessee Technology Park
EWQP	ETTP Water Quality Program
FCK	First Creek kilometer
FFK	Fifth Creek kilometer
FONSI	finding of no significant impact
FY	fiscal year
HCK	Hinds Creek kilometer
HFIR	High Flux Isotope Reactor
HQ	hazard quotient
HRE	Homogeneous Reactor Experiment
ICK	Ish Creek kilometer
ICP	inductively coupled plasma
ICP-MS	inductively coupled plasma mass spectrometry
ID	identification (number)
INEEL	Idaho National Engineering and Environmental Laboratory
ISMS	Integrated Safety Management System
ISO	International Organization for Standardization
JTU	Jackson turbidity unit
LC ₅₀	concentration of an aqueous sample lethal to 50% of test organisms in a given time span
LEED	Leadership in Energy and Environmental Design
LLLW	liquid low-level radioactive waste
LLW	low-level radioactive waste
MACT	Maximum Achievable Control Technology
MCL	maximum contaminant level
MDA	minimum detectable activity
MEK	Melton Branch kilometer
MIK	Mitchell Branch kilometer
MLLW	mixed low-level waste
MOA	memorandum of agreement
MRF	Multiprogram Research Facility
MSDS	material safety data sheet
MSRE	Molten Salt Reactor Experiment
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NHPA	National Historic Preservation Act
NIST	National Institute of Standards and Technology
NNSA	National Nuclear Security Administration
NOAA	National Oceanic and Atmospheric Administration
NOEC	no-observed-effect concentration
NOV	notice of violation
NPDES	National Pollutant Discharge Elimination System
NTRC	National Transportation Research Center
NTU	nephelometric turbidity unit
NWTK	Northwest Tributary kilometer

OCF	Oxide Conversion Facility
ODS	ozone-depleting substance
ORAU	Oak Ridge Associated Universities
OREIS	Oak Ridge Environmental Information System
ORGDP	Oak Ridge Gaseous Diffusion Plant
ORISE	Oak Ridge Institute for Science and Education
ORNL	Oak Ridge National Laboratory
ORR	Oak Ridge Reservation
ORR/PCB/FFCA	Oak Ridge Reservation Polychlorinated Biphenyl Federal Facilities Compliance Agreement
ORSSAB	Oak Ridge Site Specific Advisory Board
OST	Office of Secure Transportation
OSTI	DOE Office of Scientific and Technical Information
PAM	perimeter air monitoring
PCB	polychlorinated biphenyls
PM ₁₀	particulate matter with an aerodynamic diameter less than or equal to 10 micrometers
PM _{2.5}	particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers
PWTC	Process Waste Treatment Complex
QA	quality assurance
QC	quality control
R&D	research and development
RAM	remote air monitoring
RCK	Raccoon Creek kilometer
RCRA	Research Conservation and Recovery Act
REDC	Radiochemical Engineering Development Center
RfD	reference dose
ROD	record of decision
SADA	spatial analysis and decision assistance
SARA	Superfund Amendments and Reauthorization Act
SBMS	Standards-Based Management System
SC	DOE Office of Science
SDWA	Safe Drinking Water Act
SF	slope factor
SNS	Spallation Neutron Source
sodar	sonic detection and ranging
SWEIS	sitewide environmental impact statement
SWMU	solid waste management unit
SWSA	solid waste storage area
TDEC	Tennessee Department of Environment and Conservation
TRC	total residual chlorine
TRU	transuranic
TSCA	Toxic Substances Control Act
TSP	total suspended particulate
TVA	Tennessee Valley Authority
TWPC	Transuranic Waste-Processing Center
TWRA	Tennessee Wildlife Resources Agency

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UEFPC	Upper East Fork Poplar Creek
UST	underground storage tank
UT	University of Tennessee
VMF	Vehicle Maintenance Facility
VOC	volatile organic compound
WAG	waste area grouping
WBK	Walker Branch kilometer
WCK	White Oak Creek kilometer
WIPP	Waste Isolation Pilot Plant
WOC	White Oak Creek
WQC	Water quality criteria
Y-12	Y-12 National Security Complex

Units of Measure and Conversion Factors

Units of measure and their abbreviations

acre	acre	millimeter	mm
becquerel	Bq	million	M
centimeter	cm	millirad	mrad
curie	Ci	millirem	mrem
day	day	millisievert	mSv
degrees Celsius	°C	minute	min
degrees Fahrenheit	°F	nephelometric turbidity unit	NTU
foot	ft	parts per billion	ppb
gallon	gal	parts per million	ppm
gallons per minute	gal/min	parts per trillion	ppt
gram	g	picocurie	pCi
hectare	hectare	pound	lb
hour	h	pounds per square inch	psi
kilogram	kg	quart	qt
kilometer	km	rad	rad
kilowatt	kW	roentgen	R
liter	L	roentgen equivalent man	rem
megawatt	MW	second	s
meter	m	sievert	Sv
microcurie	μCi	standard unit (pH)	SU
microgram	μg	ton, short (2000 lb)	ton
millicurie	mCi	yard	yd
milligram	mg	year	year
milliliter	mL		

Quantitative prefixes

tera	$\times 10^{12}$	pico	$\times 10^{-12}$
giga	$\times 10^9$	nano	$\times 10^{-9}$
mega	$\times 10^6$	micro	$\times 10^{-6}$
kilo	$\times 10^3$	milli	$\times 10^{-3}$
hecto	$\times 10^2$	centi	$\times 10^{-2}$
deka	$\times 10^1$	deci	$\times 10^{-1}$

Unit conversions

Unit	Conversion	Equivalent	Unit	Conversion	Equivalent
Length					
in.	× 2.54	cm	cm	× 0.394	in.
ft	× 0.305	m	m	× 3.28	ft
mile	× 1.61	km	km	× 0.621	mile
Area					
acre	× 0.405	ha	ha	× 2.47	acre
ft ²	× 0.093	m ²	m ²	× 10.764	ft ²
mile ²	× 2.59	km ²	km ²	× 0.386	mile ²
Volume					
ft ³	× 0.028	m ³	m ³	× 35.31	ft ³
qt (U.S. liquid)	× 0.946	L	L	× 1.057	qt (U.S. liquid)
gal	× 3.7854118	L	L	× 0.264172051	gal
Concentration					
ppm	× 1	mg/L	mg/L	× 1	ppm
Weight					
lb	× 0.4536	kg	kg	× 2.205	lb
ton	× 907.1847	kg	kg	× 0.00110231131	ton
Temperature					
°C	F = (9/5) C + 32	°F	°F	C = (5/9) (F - 32)	°C
Activity					
Bq	× 2.7 × 10 ⁻¹¹	Ci	Ci	× 3.7 × 10 ¹⁰	Bq
Bq	× 27	pCi	pCi	× 0.037	Bq
mSv	× 100	mrem	mrem	× 0.01	mSv
Sv	× 100	rem	rem	× 0.01	Sv
nCi	× 1000	pCi	pCi	× 0.001	nCi
mCi/km ²	× 1	nCi/m ²	nCi/m ²	× 1	mCi/km ²
dpm/L	× 0.45 × 10 ⁹	μCi/cm ³	μCi/cm ³	× 2.22 × 10 ⁹	dpm/L
pCi/L	× 10 ⁻⁹	μCi/mL	μCi/mL	× 10 ⁹	pCi/L
pCi/m ³	× 10 ⁻¹²	μCi/cm ³	μCi/cm ³	× 10 ¹²	pCi/m ³

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