



# AK RIDGE

## Reservation

Annual Site Environmental Report Summary

2002



***Taking a Close Look Together***



## Message from the Students

Dear DOE Stakeholder:

We're the **2003 Applied Communications Class** at Karns High School. We wrote down our thoughts on what we wanted to tell you about the Oak Ridge Reservation and about working on this document for the Department of Energy. At the beginning of this project we didn't know much at all about the Oak Ridge Reservation and even thought the Department of Energy produced energy in Oak Ridge and that bombs were kept at the facilities. We had the opportunity to tour each facility, read documents and see videos about the history, learn about the research going on, and talk to scientists about environmental monitoring, the pollution that comes from the site, and all the cleanup work.

We learned so much that it's hard to summarize, and we wish you could have been with us working on this project so you'd get a better idea and respect for the work being done there. Activities on the Oak Ridge Reservation include all kinds of research, including product development, medicine, making new materials, nuclear applications, supercomputer development, and numerous projects that will help this nation in many ways. Parts are made for nuclear weapons, and assistance is provided to other nations to help dismantle their old bombs. It surprised us to see that millions of dollars are spent each year to monitor the environment, and we learned all the ways that the environment is protected and cleaned up.

We tried to write this summary in a way that will let you better understand how much effort goes into monitoring and protecting the environment and the public. Despite all the myths, the Oak Ridge Reservation is valuable and is helping the environment in many ways. Oak Ridge is not about the bomb, it's about the community and cleaning up the environment and protecting it, and it's a safe place. We looked closely at the levels of radiation and other pollutants from the Oak Ridge Reservation and can now better interpret how they impact the environment. We see that the facilities comply with environmental laws and regulations and that pollutants released from the reservation are very rarely above what the regulations allow.

The theme for this summary is "Taking a Close Look Together." Hopefully, we've helped you better understand the Oak Ridge Reservation and the kind of neighbor it is. Thanks go to our trusty teacher, Jennifer Webster, for her help and for letting us do this project, Joan Hughes from Oak Ridge National Laboratory, and Dr. Tim Joseph from the Department of Energy for working with us so closely and showing us how creative we really can be. And thank you, Department of Energy stakeholders, for wanting us to do this document. We hope we've been able to help you better understand and appreciate the Oak Ridge Reservation. We surely do.

Have a great year.

William Reed, Diana Davis, Nicole Kimber, Tiffany Turner, Justina Chaubone, Brittany Hill, Powell, and others.

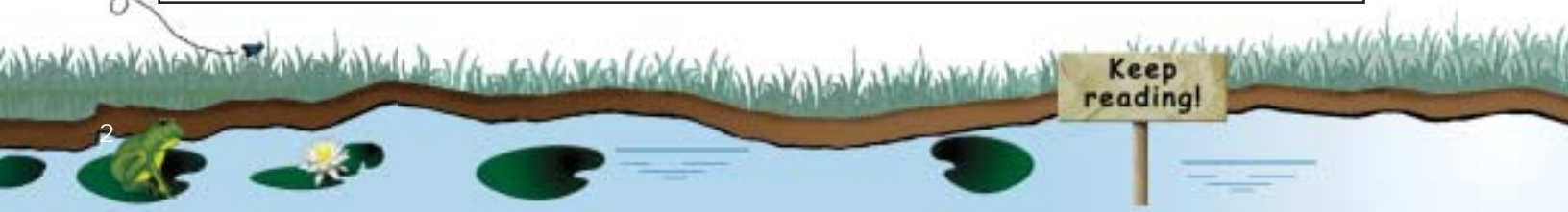
### About the cover

"Taking a Close Look Together" A small frog, a water lily, and the water in the pond tell us so much if we look closely. Together we must never stop looking at what is being shown to us by the environment, for it calls out to us as clearly as the frog's nightly ballad, constantly telling us how it's doing and what it may need. As the Department of Energy, industry, stakeholders, and the public, we must look, listen, understand, and respond. Always. — **Timothy Joseph**

**Cover photography:** Katelyn R. Oliver, Karns High School student photographer

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Keep reading!





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Student art, left to right: Chelsea Brown and Lydia Mills





## Credits

Department of Energy photo by Lynn Freeneey



Front row left to right: Justina Claiborne, Nicole Kimber, Britney Coile, Dana Davis, Lindsey Kelley, and Timothy Joseph  
Second row left to right: Jason Sherrod, Josh Powell, Tiffany Turner, Michelle Washington, and Chris Noe  
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Oak Ridge Reservation Annual Site Environmental Report Summary for 2002  
on the World Wide Web: <http://www.ornl.gov/aser>

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## Preface

### *Annual Site Environmental Report Summary—2002*

The “state of the environment” on and around the Oak Ridge Reservation is a mission of highest importance to the Department of Energy and our contractors. In order to be fully aware of the consequences of our operations and cleanup, an annual multimillion-dollar monitoring and surveillance program collects and analyzes tens of thousands of samples from air, surface and groundwater, soil, mud, plants, and animals.

A mission of equal importance is to provide our stakeholders a complete understanding of this program. To do this we publish a detailed *Annual Site Environmental Report* and this summary document. The raw data are published separately in the Data Volume. All three documents can be found on the web, along with past documents, at <http://www.ornl.gov/aser>.

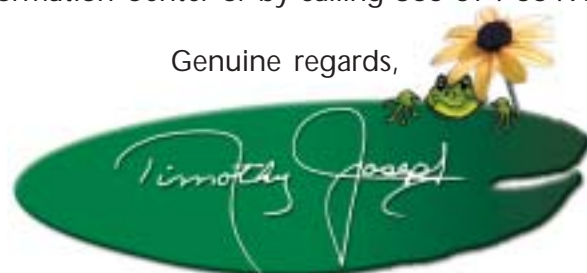
Though I work on numerous technical documents throughout the year no document is more important to me than the *Annual Site Environmental Report* and this summary because

1. they represent the efforts of many dedicated environmental scientists who carry out this extensive program and who work hard to protect and enhance the environment;
2. they set out the programs in great detail to our legislators, stakeholders, and the public; and
3. the summary is directed to the public with the hope that the information is understandable and of value in gaining an accurate picture of the Oak Ridge Reservation as a neighbor.

I thank the Karns High School students and their teacher for accepting my challenge in writing this *Annual Site Environmental Report Summary*, for thinking out of the box, for doing such a fine job, and for all the artwork and photographs (the morning coffee in the classroom was greatly appreciated, leaks and all). They were an especially enjoyable class to work with, and I hope you, our stakeholders and the public, find their efforts of value.

As the *Annual Site Environmental Report* project manager, it is my ardent hope you find this summary useful and easy to read. I am always interested in stakeholder feedback on how I can improve the report and this summary document, for they are written for you. I invite your comments and can be reached by phone at 865-576-1582, or by email at [joseph.t@oro.doe.gov](mailto:joseph.t@oro.doe.gov). Additional printed reports are available at the Department of Energy Information Center or by calling 865-574-6649.

Genuine regards,



Timothy Joseph, Ph.D.  
Senior Scientist  
U.S. Department of Energy  
Oak Ridge Operations





## Oak Ridge Reservation History

*The history of the Oak Ridge Reservation is very important to the nation and to the world because of its contributions to the birth of the atomic age. No matter how much is understood about it, some misunderstanding will probably remain about the historical and present activities at the three Oak Ridge sites. We hope that this section provides a better understanding.*

On December 7, 1941, the Japanese attacked Pearl Harbor. In 1942, with the world at war the United States government purchased a rural area in East Tennessee to build secret plants for the war effort. The plant sites and the community originally called Clinton Engineer Works, later to be named Oak Ridge, reached a population of more than 75,000 by the end of World War II. Only when the war ended was the role of this secret city revealed. Oak Ridge had been hurriedly constructed as part of the Manhattan Project, a secret program to develop an atomic bomb, a powerful explosive nuclear weapon. The



*Saturday night fever, 1940s*

first major challenge faced in the Manhattan Project was the ability to develop an acceptable and plentiful source of fuel for the bombs. At Oak Ridge techniques were devised to produce and purify the large quantities of fissionable uranium and plutonium that would be needed.

Massive research and production efforts were parceled out around the country. Teams of scientists and engineers undertook secret tasks at several closely guarded sites in addition to the Oak Ridge site, including a remote mesa at Los Alamos, New Mexico; the experimental cyclotron and labs of the University of California; and the stark, remote valley of the upper Columbia River at Hanford, Washington. More resources were devoted to Oak Ridge than to any other site associated with the Manhattan Project.

### Why Oak Ridge?

The Oak Ridge site is located along the Clinch River twenty miles west of Knoxville, Tennessee. The area was chosen for its temperate climate, surrounding mountains and isolating ridges, availability of a labor pool from the nearby city of Knoxville, an abundant source of water from the Clinch River, nearby highways and railroads, and access to the Tennessee Valley Authority's abundant electrical power. The site was also chosen because fewer people would need to be relocated from this area than from other candidate locations.





## Construction

Construction began on Oak Ridge's three facilities in 1943. Built in record time under a cloak of great secrecy during World War II, Oak Ridge came into being as a major site in the Manhattan Project. Each plant was given a code name to disguise its operation. These code names — Y-12, K-25, and X-10 —are still frequently used today to identify the three sites. The three plants were located in different valleys within a tightly controlled security area. All three sites continued operation after World War II and played major roles during the Cold War era.



*Y-12 construction during the 1940s*

## X-10

The X-10 Plant was a pilot project. It consisted of the first full-scale nuclear reactor and support buildings for the production and chemical separation of plutonium. The X-10 Graphite Reactor was designed and built in ten months. The facility went into operation on November 4, 1943, and was decommissioned in 1963. Its purpose was to create plutonium-239, a new element. The facility used chemical separation through a technique called the bismuth phosphate process. The process was so successful that the laboratory in Los Alamos received its first samples of the new element in the spring of 1944. After being decommissioned in 1963, the X-10 Graphite Reactor became a national landmark, and public tours are regularly scheduled.



*Helping the war effort*

## Y-12

The Y-12 Electromagnetic Separation Plant was designed to produce enough enriched uranium to make fissionable material for an atomic bomb. It used large electromagnets for uranium separation in units called calutrons. All stops were pulled out to ensure the successful completion of Y-12's war mission. Over 13,500 tons of silver — valued then at more than \$300 million — were loaned from the United States Treasury for use in the electromagnets at the Y-12 plant when copper was in short supply. Production began in November of 1943. In 1945, Y-12's construction was finished, and the plant was at its peak with more than 22,000 workers. When gaseous diffusion became the accepted uranium enrichment process in 1946, Y-12's magnetic separators were taken out of commission except one set of calutrons used to produce medical and industrial isotopes. The Y-12 National Security Complex is currently operated by BWXT. The plant stretches over 811 acres with more than 600 buildings. The primary missions of Y-12 now are producing, refurbishing, and dismantling nuclear weapons components; safeguarding special nuclear material; providing the United States Navy with nuclear material for safe, effective nuclear propulsion systems; and providing support for other national security needs as required.





# Taking a Close Look Together

## K-25

The K-25 Site was developed to separate uranium by use of the gaseous diffusion process. The plant became operational in 1945, but it only produced half of the enriched uranium initially intended.



*Atoms were serious business with everyone, even the kids, 1940s*

Original construction was finished in 1946, but the site was expanded during the period from 1950 to 1954. Through 1964 the plant was primarily used for production of high-grade uranium for nuclear weapons, and later production shifted to commercial-grade uranium to support the nuclear power industry. In 1985 the plant was put on standby and in 1987 was shut down permanently. After the shutdown of the gaseous diffusion process in the 1980s, K-25, now called the East Tennessee Technology Park, focused on environmental management. The site's primary mission today is to reindustrialize and reuse site

assets through leasing of vacated facilities. Other ongoing activities include operation of the Toxic Substances Control Act Mixed Waste Incinerator and conduct of environmental restoration, waste management, and related support activities.



*Young patriots, 1940s*



*A young man receives his Oak Ridge resident's badge, 1940s*







## Environmental Compliance

*In this section we have tried to help you understand the environmental laws and regulations that affect activities on the Oak Ridge Reservation and to describe compliance status with these requirements for 2002.*

Activities on the Oak Ridge Reservation that generate hazardous wastes and deal with the cleanup of waste from past work are subject to federal, state, and local laws that are intended to protect the environment and public health. These laws limit or prohibit the emission of toxic substances into the air, water, and the ground and include requirements for plans to prevent accidents, spills, and unplanned releases. Environmental laws also call for programs to monitor, measure, document, and report on compliance to regulatory agencies and the public.

The United States Environmental Protection Agency and the Tennessee Department of Environment and Conservation are the primary regulators of Oak Ridge Reservation activities. These agencies issue permits, review compliance reports, participate in joint monitoring programs, inspect facilities and operations, and oversee compliance with applicable regulations. The Department of Environment and Conservation's Department of Energy Oversight Division is located in Oak Ridge to verify that public safety and health and the environment are protected as activities on the Oak Ridge Reservation are carried out.

### 2002 Compliance Status

- Each site achieved a National Pollutant Discharge Elimination System permit compliance rate greater than 99.9%.
- All three Oak Ridge Reservation facilities operated in compliance with the Tennessee regulatory dose limits for Hazardous Air Pollutants for Radionuclides and met all emission and test procedures.
- There were no releases by any of the facilities of reportable quantities of hazardous chemicals or asbestos. Releases are required to be reported under the Comprehensive Environmental Response, Compensation, and Liability Act.

*Note: Several private businesses operate under leasing arrangements at the East Tennessee Technology Park under the Department of Energy Reindustrialization Program. Lessees are accountable for complying with all applicable standards and regulations and for obtaining permits and licenses with local, state, and federal agencies as appropriate.*



Student art, left to right: John Bambrug, Blake Violette, Brittany Scott, Christina Baloga, and Jordan Chester





# Taking a Close Look Together

The following table identifies a few of the many environmental laws that regulated activities on the Oak Ridge Reservation during 2002.



COMPLIANCE PROGRAM	INFORMATION
<a href="#">Clean Air Act</a>	This act protects and improves air quality in the United States. It establishes a dose limit of 10 millirem per year for air emissions. The total 2002 dose from Oak Ridge Reservation activities was 0.3 millirem.
<a href="#">Clean Water Act</a>	This law was passed in response to growing public awareness and concern for controlling water pollution. The act established the basic structure for regulating discharges of pollutants into the waters of the United States. The compliance rate for all three sites was greater than 99.9%.
<a href="#">Safe Drinking Water Act</a>	This statute establishes drinking water regulations.
<a href="#">Endangered Species Act</a>	This act dictates that plant and animal species be considered when projects could alter their habitats.
<a href="#">Comprehensive Environmental Response, Compensation, and Liability Act</a>	Congress passed this law (also known as "Superfund") in response to a growing national concern about the release of hazardous substances from abandoned waste sites. Compliance with this act ensures that the environmental impacts of past and present activities on the reservation are investigated and that measures are taken to protect the public and the environment. There were no reportable releases from the reservation under this act during 2002.
<a href="#">Resource Conservation and Recovery Act</a>	This act gives the Environmental Protection Agency the authority to control hazardous waste "from cradle to grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste.
<a href="#">Federal Facilities Compliance Act</a>	This act was passed to bring federal facilities into compliance with the Resource Conservation and Recovery Act.
<a href="#">Federal Insecticide, Fungicide, and Rodenticide Act</a>	The primary focus of this act was to provide federal control of pesticide distribution, sale, and use. No restricted-use pesticides are used at any of the three sites.
<a href="#">National Environmental Policy Act</a>	This act requires the evaluation of environmental impacts of proposed projects and the examination of alternatives.
<a href="#">National Historic Preservation Act</a>	This act provides for the preservation of historic properties throughout the nation.
<a href="#">Toxic Substances Control Act</a>	This law regulates the manufacture, use, and disposal of chemical substances.







## The Basics of Radiation

*Though radiation may be hard to comprehend and even confusing, like all things it can be made easier to understand. We hope this section helps clear up some of the concerns or questions you may have about radiation and its effects.*

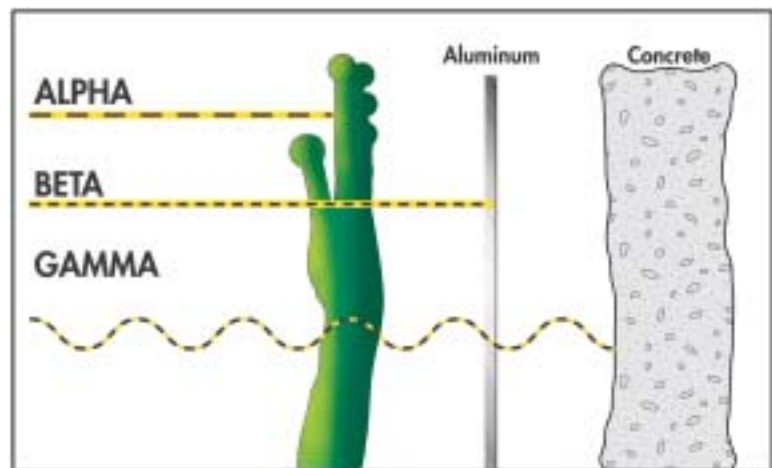
### What is Radiation?

Radiation is simply energy in the form of waves or particles moving through space. It is either natural or human-made. Sunshine is one of the most familiar forms of natural radiation, while X rays and radio waves are familiar forms of human-made radiation. We all benefit from a multitude of products and services made possible by the careful use of radiation.

All matter is composed of chemical elements such as carbon, oxygen, or hydrogen. An atom is the smallest particle of an element that can exist. All atoms are composed of three basic particles: protons, neutrons, and electrons. The proton carries a positive charge of electricity the electron carries a negative charge, and the neutron has no charge. Protons and neutrons form the nucleus of the atom while electrons orbit around the nucleus. The number of protons and neutrons in the nucleus determines the chemical and physical properties of an atom. Some atoms are unstable due to an imbalance in the forces among the particles that make up the nucleus and are characterized as being radioactive. To reach a stable state, a radioactive atom (radionuclide) releases energy from its nucleus and forms an atom of a different element. The kinds of radiation are electromagnetic (like light) and particulate. Gamma radiation and X rays are examples of electromagnetic radiation. Alpha and beta radiation are examples of particulate radiation.



Alpha particles are composed of two protons and two neutrons. Alpha particles do not travel very far from their radioactive source. They cannot pass through a piece of paper, clothes, or even the layer of dead cells that normally protects the skin. Because alpha particles cannot penetrate human skin, they are not considered an "external exposure hazard" (this means that if the alpha particles stay outside the human body they cannot harm it). However, alpha-emitting materials can be harmful to humans if

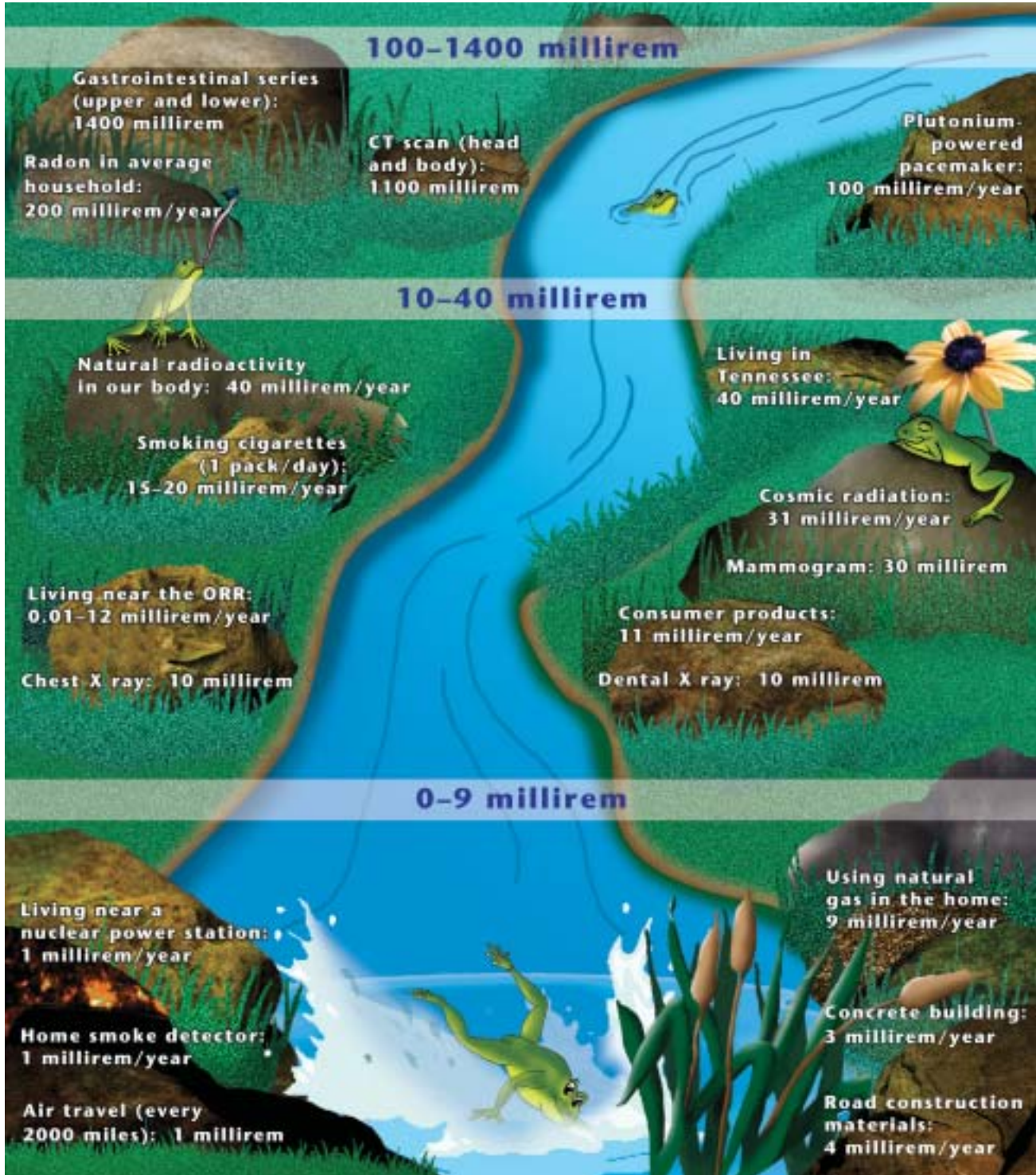




# Taking a Close Look Together

the materials are inhaled, swallowed, or absorbed through open wounds. Therefore, they are considered to be an "internal exposure hazard."

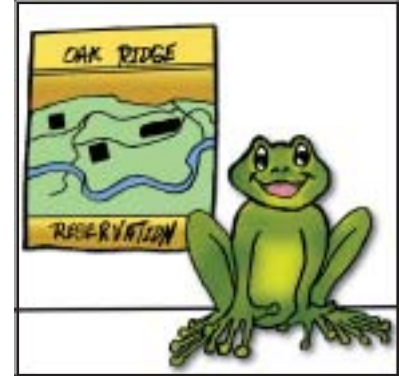
## Levels of Radiation



Keep reading!



Beta particles cannot travel very far from their radioactive source, and they are only moderately penetrating. For example, they can travel only about half an inch in human tissue, and they may travel a few yards in air. They are not capable of penetrating a book or a pad of paper, and clothing can be effective in preventing skin exposure to beta particles. However, beta-emitting contaminants that do reach the skin and are allowed to remain there for a prolonged period of time may cause skin injury.



Gamma radiation originates from the nucleus of an atom and is able to travel many meters in air and pass through the body. In fact, it is often referred to as "penetrating radiation." Radioactive materials that emit gamma radiation and X rays constitute both an external and internal hazard to humans. Dense materials such as lead or concrete are needed for shielding from gamma radiation. Clothing can prevent contamination of the skin by radioactive materials but does not shield the body from penetrating radiation.

In our daily lives we are exposed to various types of naturally occurring radiation from cosmic rays, radioactive substances in the earth, and naturally occurring radiation in our bodies. We are also exposed to human-made sources of radiation such as X rays, building masonry, gas stoves, computer monitors, and televisions. Radiation has many applications in agriculture, medicine, industry, and research and greatly improves the day-to-day quality of our lives. On the average, naturally occurring sources contribute about four to five times as much to an individual's exposure as human-made sources. Average radiation exposure in the United States from natural and human-made sources is about 360 millirem per year. Levels of natural radiation can vary greatly. People living in granite areas receive more terrestrial radiation than others, while people living or working at high altitudes receive more cosmic radiation. A lot of our natural exposure is due to radon, a gas that seeps from the earth's crust and is present in the air we breathe. Our bodies also contain natural radionuclides such as potassium-40 which contributes an average dose of approximately 40 millirem per year.

## What is dose?

*Dose* is a general term denoting the quantity of radiation or energy absorbed by the body. It is a measure of the effect of exposure and the potential for damage rather than just the amount of the exposure. Whether natural or human-made, a specific dose of radiation has the same effect on people. Radiation dose is usually expressed in a unit called *rem*. There are 1000 *millirem* in a *rem*. In the United States, the average person receives 360 millirem of radiation dose per year. Dose is measured by considering the potential types of exposure, including direct radiation and the ingestion of food and water containing radioactive materials. If an individual received a dose of 100,000 to 200,000 millirem, he or she would show signs of radiation sickness but would most likely recover completely. A dose of 800,000 millirem or more would probably be fatal without medical treatment. It is highly unlikely for anyone to receive this amount of radiation. The maximum allowable exposure for people who work with radiation at Department of Energy sites is 5,000 millirem per year. In 2002 the highest dose to a worker at ORNL was 700 millirem, the highest dose to a Y12 worker was 535 millirem, and the highest worker dose at ETP was 300 millirem.

## Are we at risk?

The annual radiation dose to individuals living near the Department of Energy's Oak Ridge facilities is between 0.01 and 12 millirem per year. This is less than is received in schools, stores, buildings, or



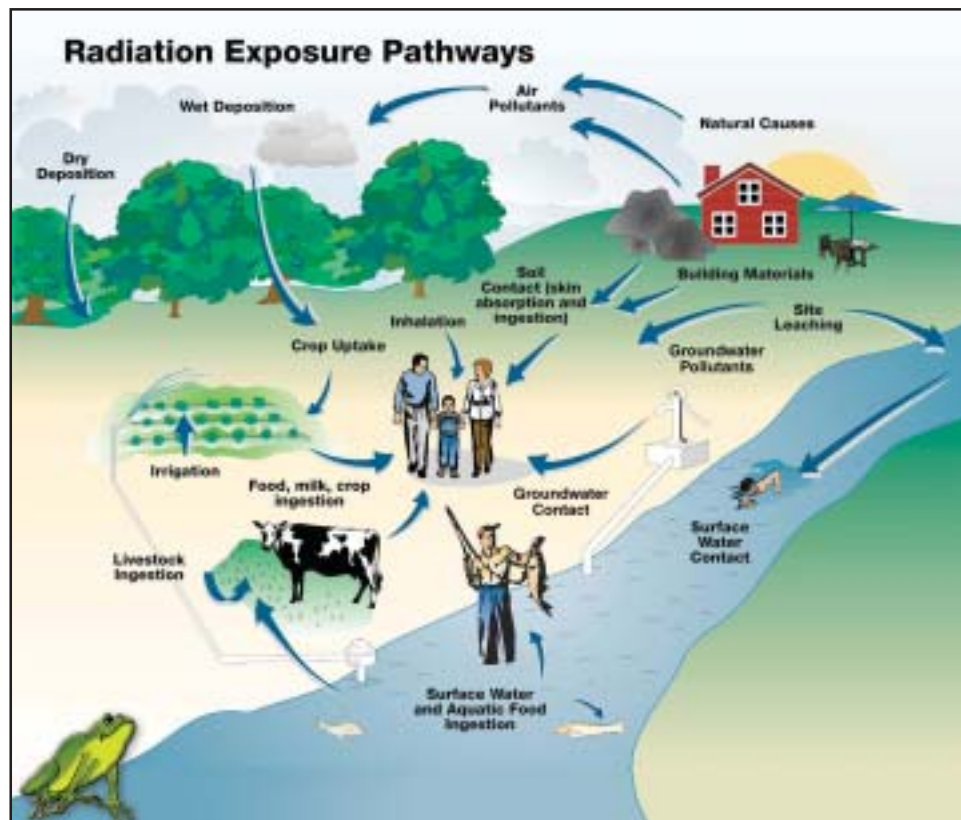


## Taking a Close Look Together

homes made of concrete. Smoking cigarettes can result in exposures of 15 to 20 millirem per year. Radon, which is natural in the earth, can lead to doses of 200 millirem per year in some areas. The amount of radiation dose to people living near the reservation is insignificant when compared with the approximately 360 millirem most people receive from background sources.

### How are we exposed?

We are exposed to radiation in many different ways. Simply breathing particles suspended in air results in some exposure. Every time we eat food or drink water we receive radiation. We can be exposed directly to radiation from cosmic rays, and airborne contaminants can settle on grass in pastures and can be eaten by cows, resulting in exposures from milk and beef. Medical tests such as X rays and CAT scans give an average annual dose of approximately 1200 millirem. Radiation is everywhere and has been here since the earth was formed. While it can be dangerous if not adequately controlled, radiation has vastly improved our quality of life.







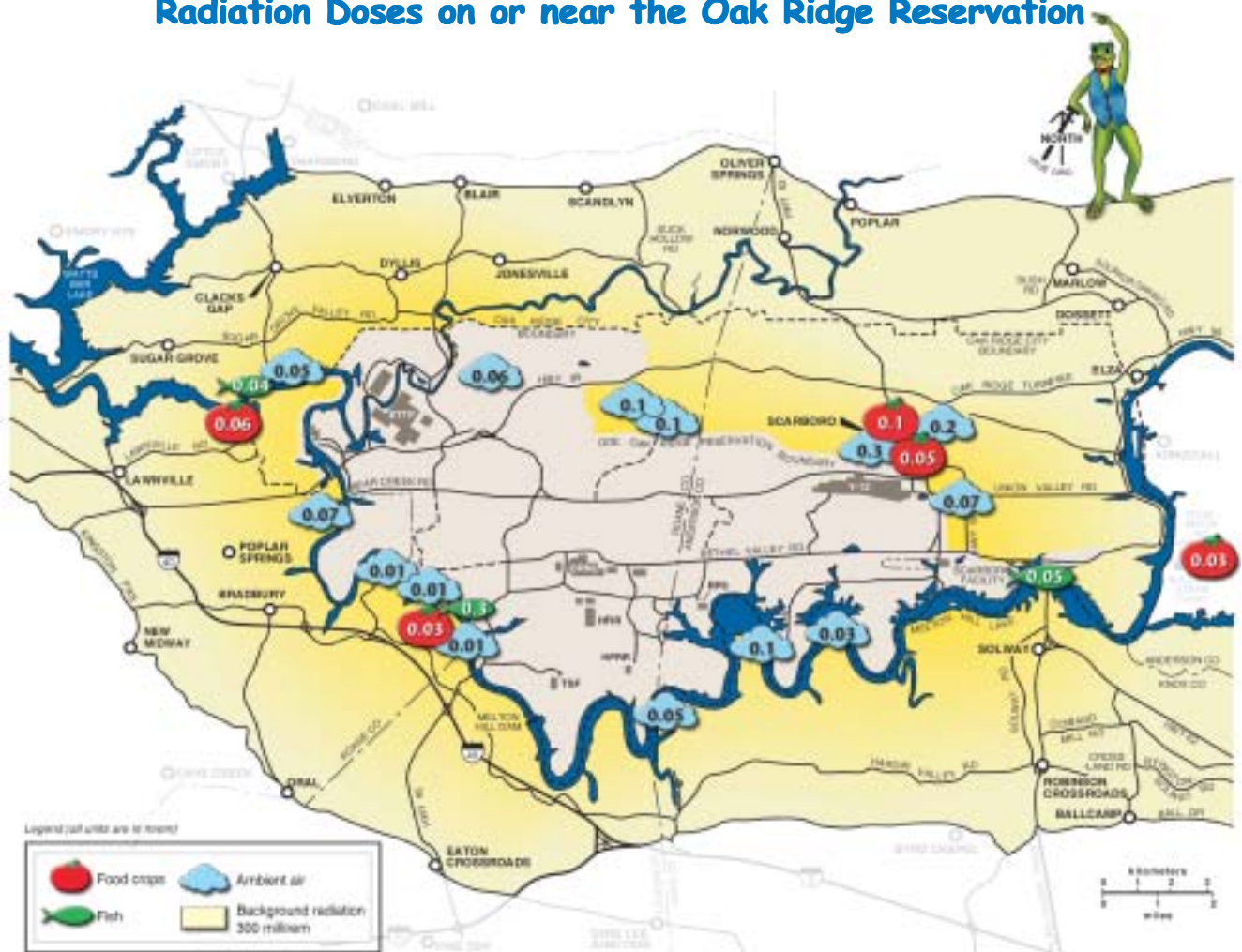
## Dose Map

Everyone is exposed to radiation through normal daily activities. A typical person in the United States receives approximately 300 millirem per year from all natural sources of radiation, such as cosmic rays from outer space; radon from the ground; and natural radioactive elements found in soil, water and food. In addition, about 60 millirem per year comes from human-made sources, such as medical and dental exams, air travel, and consumer products.

Monitoring of air, water, and wildlife on and near the reservation provides data that are used to confirm that doses from radionuclides released from the Department of Energy activities are low and are in compliance with all laws.

The radiation dose (a measurement of the amount of energy from radiation absorbed by the body) varies depending on location. If you live in the vicinity of the Oak Ridge Reservation, eat lots of contaminated fish and wildlife harvested locally, drink gallons of local river water, and get all the highest exposures possible, you could receive up to 12 millirem per year, about 3% of natural background.

### Radiation Doses on or near the Oak Ridge Reservation





## Environmental Monitoring

*Every year the Department of Energy spends millions of dollars on environmental monitoring to ensure that the environment and the public are protected. We hope this section will help you understand the wide variety of environmental monitoring programs conducted on and off the reservation.*

### Air

Both effluent and ambient air are sampled on the Oak Ridge Reservation. Effluent air flows into the environment from a source, such as an exhaust stack, and ambient air is the air that exists in the surrounding area. Radiological and nonradiological air emissions at the three sites and on the reservation as a whole are monitored. The results show that Oak Ridge Reservation operations have an insignificant effect on local air quality.

### External Gamma Radiation

External gamma radiation exposure rates are measured at many different locations on and off the Oak Ridge Reservation to determine whether radioactive releases from the reservation are above background levels. Normal levels of external gamma radiation exposure in Tennessee range from approximately 20 to 73 millirem per year. This means that everyone living in Tennessee receives a dose of direct radiation from the natural environment, the average being 45 millirem per year. The average exposure rate at ambient air stations around the three major Oak Ridge sites in 2002 was approximately 35 millirem per year. This is within the range of normal background levels in Tennessee (20 to 73 millirem) and is not an addition to the background. Activities on the Oak Ridge Reservation contribute insignificantly to external gamma levels in the area.

### Surface Water

Water that is discharged from the Department of Energy's Oak Ridge facilities directly into lakes and streams is called effluent discharge. Each of the three major sites has a permit for water discharges, and all effluents are monitored according to the permit requirements. Additionally, surface water from 38 locations at the three sites and around the reservation is monitored to detect any contaminant releases.

Based on detected concentrations of radionuclides that could have come from the Oak Ridge facilities, there is no dose above background from drinking water sources in the vicinity. The dose from the reservation does not exceed levels normally found in nature, and the sampling locations are not all drinking water sources.



### Groundwater

Most Oak Ridge area residents do not rely on groundwater for drinking water. However, local groundwater provides for some domestic, municipal, and farm irrigation and is used for industrial purposes. It is therefore viewed as a potential pathway for exposure to hazardous wastes and as a means of transporting contaminants off the Oak Ridge Reservation. Groundwater is monitored for organic compounds, metals, and radionuclides. Contamination is found mainly in former waste sites, and there are no users of the groundwater in these locations. Groundwater monitoring programs at





the Oak Ridge National Laboratory and at the East Tennessee Technology Park have not detected groundwater contamination migrating off Department of Energy property. At the Y-12 National Security Complex, chlorinated volatile organic compounds have migrated off the Oak Ridge Reservation east of the plant into Union Valley at depths between 200 and 500 feet. Remediation is being conducted to mitigate plume migration. Meanwhile, there are no users of the groundwater, and restrictions have been established to prevent future use.

## Canada Geese

Open hunts for Canada geese are held in counties near the Oak Ridge Reservation each year. Therefore, geese from on and around the reservation are rounded up each summer for radiation screenings. The 2002 roundup was held June 20 and 21, and 105 geese were screened for radiological activity. None of these geese had radiation levels exceeding release limits.

## Eastern Wild Turkeys

Wild turkey hunts were held on the Oak Ridge Reservation on April 6 and 7, 2002, and on April 13 and 14, 2002. Hunting was open for both shotguns and archery. Thirty-eight turkeys were killed during the 2002 hunts, and none were confiscated because of radiation levels. Turkey hunts have been held on the reservation each year since 1997, and a total of 344 turkeys has been harvested. Of these, only two have been kept because of radiation levels exceeding release limits.

## Fish

Sunfish and catfish are collected from three locations on the Clinch River annually, and edible portions are analyzed for contaminants originating from the Oak Ridge Reservation. Consumption of fish caught around the Oak Ridge facilities is limited due to advisories issued by the Tennessee Department of Environment and Conservation for polychlorinated biphenyls. Polychlorinated biphenyls are found all over the United States, and the local advisories are for the entire reservoir and not just the areas around the Oak Ridge Reservation. The maximum radiation dose from eating local fish was calculated to be approximately 2.4 millirem. Two millirem of this dose is due to the presence of naturally occurring potassium 40. Therefore, only 0.4 millirem could potentially be due to Oak Ridge Reservation activities.

## Vegetables

Tomatoes, lettuce, and turnips were bought from farmers near the reservation. Locations were chosen based on availability and on their likelihood of being affected by routine releases from the Oak Ridge facilities. All radionuclides found in the food crops are found in the natural environment. The highest dose to consumers of garden vegetables in the vicinity of the Oak Ridge Reservation could have been about 0.1 millirem from eating all three types of these vegetables.



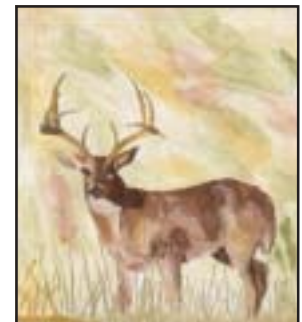
Student art, Victoria Drew



Student art, Austin Hale



Student art,  
Chelsea Brooks



Student art,  
Jarrett Benson





## Taking a Close Look Together

### White-tailed deer

Annual deer hunts on the reservation resumed in 2002 after hunts scheduled during 2001 were cancelled due to security concerns. Shotgun/muzzle loader and archery hunts were held on October 19 and 20, November 9 and 10, and December 7 and 8 with about 650 shotgun/muzzle loader permitted hunters and 350 archery permitted hunters for each hunt. The year's total harvest was 421 deer (297 bucks, 124 does). Of the deer harvested, three exceeded the radiological release limit and were retained for additional testing. The dose from consuming a white-tailed deer with average radionuclide concentrations was estimated to be 0.2 millirem.

### Hay

Hay is gathered from six different locations on or adjacent to the Oak Ridge Reservation and is checked for radionuclide concentrations. Almost all of the dose from consuming beef and milk from cattle that eat this hay comes from naturally occurring isotopes.



### Milk

The 2002 milk-sampling program consisted of samples collected every other month from three locations. One is from a commercial dairy in Powell that processes milk from all over east Tennessee. The second location is in Claxton, and the third is in Maryville. The Maryville location is used as a background location for comparison purposes and is not in an area that would be affected by Oak Ridge releases. Milk is analyzed for gamma-emitting radionuclides. A comparison of data from milk sampled at the three sites in 2002 indicated that there was no impact from Oak Ridge operations on radionuclide concentrations in the milk.



Student art from left to right, Kayla Houser and Robert Buffalo

Keep reading!





## Environmental Management

*This section will show you how you can be a part of decision making for the Oak Ridge Reservation and how you can stay informed about activities carried out by the Department of Energy.*

### Public Involvement

The Department of Energy Oak Ridge Operations Office encourages stakeholders to participate in decisions and to exchange information regarding remediation of contaminated areas on the Oak Ridge Reservation. Stakeholders include individual groups, host communities, and other entities in the public and private sectors that are interested in or affected by Department of Energy activities and decisions. The following sources of information are available to stakeholders and the general public.

- The Oak Ridge Site Specific Advisory Board, a federally appointed citizen panel, provides advice and recommendations to Department of Energy on environmental activities (<http://www.oro.doe.gov/em/ssab>).
- The Oak Ridge Reservation Health Effects Subcommittee, funded by the Department of Energy and administered through the Agency for Toxic Substances and Disease Registry, performs public health assessments for contaminants by looking at present and historical releases from the Oak Ridge Reservation and their potential impact on the health of nearby residents. Subcommittee meetings and technical work group meetings are open to the public.
- The Tennessee Department of Environment and Conservation Department of Energy Oversight Office provides independent state oversight of the Department of Energy's Oak Ridge activities (<http://www.state.tn.us/environment>).
- The Local Oversight Committee provides public oversight of the environmental management activities of the Department of Energy Oak Ridge Operations Office (<http://www.local-oversight.org>).
- The Department of Energy Information Center provides newsletters, reports, and tapes and transcripts of public meetings and Department of Energy activities (phone: 865-241-4582).
- The City of Oak Ridge Environmental Quality Advisory Board, appointed by the Oak Ridge City Council, provides counsel to the city government on environmental matters (<http://www.ci.oak-ridge.tn.us/ComDev-html/EQAB.htm>).



*Student art from left to right, Kamillia Halloun, Tyler Blazer, and Kayce Baker*

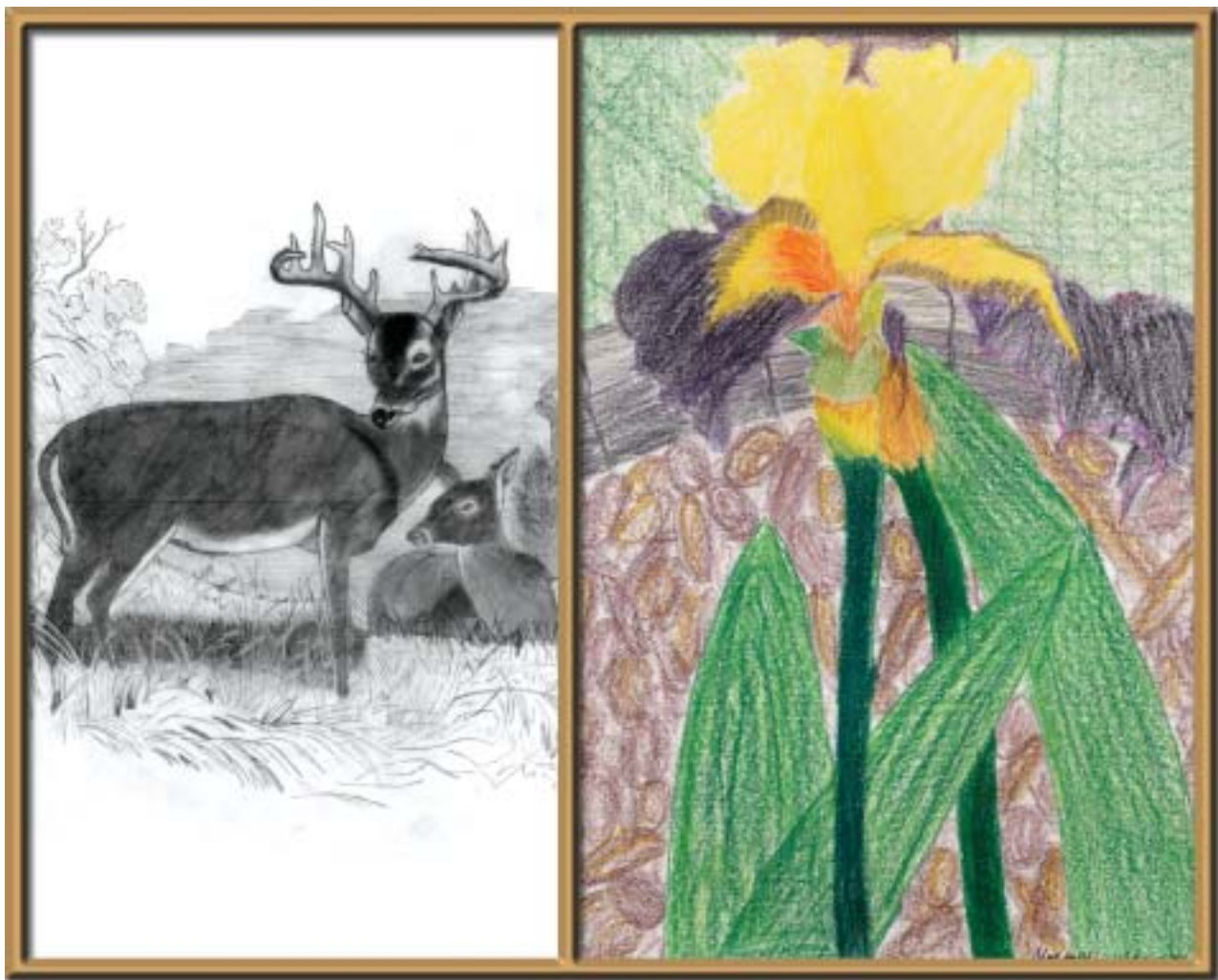




## Taking a Close Look Together

Other means for the public to get information on Oak Ridge activities and public meetings include

- fact sheets describing various Oak Ridge environmental management projects ([http://www.bechteljacobs.com/ettp\\_factsheets.shtml](http://www.bechteljacobs.com/ettp_factsheets.shtml));
- information on public involvement opportunities ([http://www.oro.doe.gov/public\\_activ.html](http://www.oro.doe.gov/public_activ.html));
- newsletters, reports, tapes, and transcripts of public meetings (<http://www.oakridge.doe.gov>);
- the schedule for upcoming public meetings (<http://www.oakridge.doe.gov/meetings.htm>); and
- the *DOE Public Involvement Plan for CERCLA Activities at the U.S. Department of Energy Oak Ridge Reservation* and the monthly DOE publication *Public Involvement News* (865-576-0885).



Student art from left to right, Kristina Scalf and Morgan Wallace





## Student Tour of Facilities

*Summarizing the 350-page Annual Site Environmental Report could have been an overwhelming task for us, a group of high school students, since many of us have had little or no education in radiation, environmental compliance, chemistry, graphics, or technical writing. In order to make this undertaking less daunting, Department of Energy and UT-Battelle project managers worked with us on a routine basis for the entire semester and brought scientists from each of the sites, dose assessment personnel, and a graphic artist to the classroom for special instruction. We also visited the reservation in order to better understand the history, geography, and activities associated with the Department of Energy's facilities in Oak Ridge. Environmental-sampling technicians conducted tours of air- and water-sampling stations and demonstrated the instrumentation used to collect environmental samples. Representatives from each of the three major sites provided historical information and showed our class the major areas of interest at each facility. We then returned to the classroom to produce this environmental summary, which describes the Oak Ridge Reservation's environmental-monitoring programs and compliance status. Here we are below at one of the surface water sampling stations that we visited at the Y-12 National Security Complex.*

*BWXT Y-12 photo by Brett Pate*



*Front row left to right: Steve Field, Jennifer Webster, Julie Hardie, Michelle Washington, Dana Davis, Rosario Belmares, Tiffany Turner, Nicole Kimber, Justina Clairborne, Chris Noe, and Jason Sherrod*

*Back row left to right: Don Bohrman, Timothy Joseph, Joan Hughes, Samantha Wilson, Brittany Day, Will Peyrot, Tim Johnson, Wes Forman, Logan Lunsford, Chris Price, and Josh Powell*



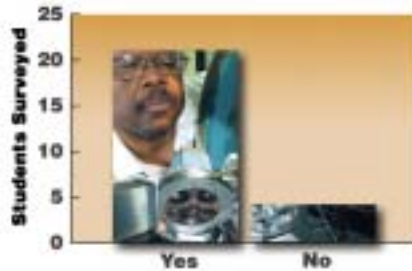


## Student Survey

We were curious as to whether other students had accurate knowledge and interest in the activities conducted on the Department of Energy's Oak Ridge Reservation. We asked fellow Karns High School students three questions in order to evaluate whether they were worried about reservation activities, whether they valued the facilities as important to the area and the country, and whether they felt like they were informed on what the Department of Energy is doing in Oak Ridge. The following summarizes the results of our survey.



Do you feel that Oak Ridge is a threat to the public health?



Do you think that Oak Ridge is an important government facility?



Do you know what is being done at the Department of Energy facilities in Oak Ridge?



Student art, Ashley Hopkins

Keep reading!

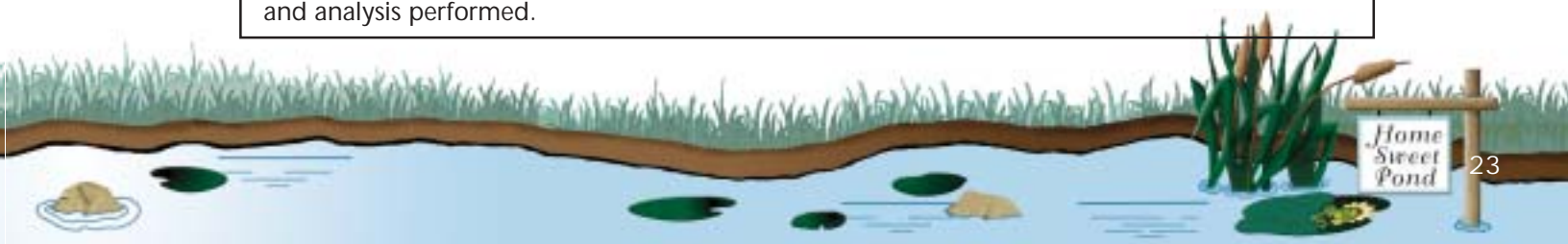




*Student art from left, Krista Torrey and Sarah Price*

**Disclaimer**

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