

# What to Do if an Emergency Occurs on the Oak Ridge Reservation

A cooperative publication of the following agencies:



- United States Department of Energy  
Oak Ridge Office



- National Nuclear Security Administration  
Y-12 Site Office



- Tennessee Emergency Management Agency

This document is also available on the Internet  
at [www.oakridge.doe.gov/emergency](http://www.oakridge.doe.gov/emergency)  
DOE/ORO-2224  
December 2006

*On the cover:* Melton Hill Lake, Oak Ridge, TN

Emergency Public Information

# What to Do if an Emergency Occurs on the Oak Ridge Reservation



United States Department of Energy  
Oak Ridge Office



National Nuclear Security Administration  
Y-12 Site Office



Tennessee Emergency Management Agency



# Contents



How Safe is the Oak Ridge Reservation? 4



Key Emergency Information 5



If You Hear the Sirens 8



If You Are Advised to Shelter-In-Place 10



If You Are Asked to Evacuate to Shelters 11



Evacuation Sector Maps and Shelters 14



Emergency Supplies Checklist 37



About Radiation 38



About Chemical Hazards 40



Oak Ridge Reservation Facilities 42



# How Safe is the Oak Ridge Reservation?

The Department of Energy (DOE) places its highest importance on the safety of our employees and the public while protecting the environment. Our missions are complex. They include cutting-edge science, national security, environmental cleanup, and the next generation of nuclear energy technology.

Our employees perform this work at three major sites spread across Anderson and Roane counties, including the Oak Ridge National Laboratory (ORNL), the Y-12 National Security Complex (Y-12), and the East Tennessee Technology Park (ETTP)/Heritage Center.

**FACTS: DOE in Oak Ridge**

- 13,000 employees
- \$2.7 billion budget
- 33,725 acres
- 1,456 buildings

*Dec. 2006*

Each site is unique. Some of our operations involve handling radioactive and hazardous materials while others involve tearing down old industrial facilities that are no longer needed. Whatever the task, we diligently strive to understand the hazards involved and take the proper precautions to protect our workers and the public.

The risk of a major emergency, however, is very low. That's because of extensive environment, safety and health programs in place at our facilities to protect the health and safety of employees and the public. That means that DOE, its contractors, and state and local governments are trained to respond to ensure public safety and protection of the environment if something happens.

The following sections highlight actions you should take in the event of an emergency along with background information on our facilities. Preparing makes sense, so take a moment to become familiar with what you will need to do if an emergency occurs on the Oak Ridge Reservation.



Gerald Boyd  
Oak Ridge Office  
Manager



Ted Sherry  
Y-12 Site Office  
Manager

# Key Emergency Information

What do I do when there is an emergency?

DOE is committed to public safety in the event an emergency arises. You will likely be made aware that an emergency is happening through the television or radio and, depending on the level of emergency, the public warning siren system.

If an emergency is declared, trained responders are paged to the site's Emergency Operations Center. Conditions are then assessed to determine what should be done to protect the public and the environment. Within an hour, a news release would be issued to the media stating that an emergency is in progress along with any protective actions the public should take as directed by the Tennessee Emergency Management Agency.

Often these events are confined to the building or site and, therefore, impact only the employees working in the immediate area. Should an event affect the area beyond our site boundaries, warning sirens located

within two miles of the site would be sounded. If you live in an affected area, you may be asked to remain in your residence if you are at home, or you may be asked to change your route if you are driving. When these announcements are made, specific instructions will be given and will vary depending on where you live. The key is to stay tuned to the television and radio media for the latest information.

The pages that follow describe this process in detail. You will know the types of emergencies declared, some background on our facilities, and a map to locate where you live and work. By the end of this publication, you will know what to do if an emergency occurs on the Oak Ridge Reservation.



Emergency Web site:  
[www.oakridge.doe.gov/emergency](http://www.oakridge.doe.gov/emergency)



## Key Emergency Information

### How We Notify the Public

For less severe emergencies, when there is not a hazardous materials release or the release is not causing a level of concern off the Oak Ridge Reservation, news releases will be issued. Protective actions by the public may not be necessary.

When there has been a release of hazardous materials resulting in a level of concern off the Oak Ridge Reservation, a combination of resources is utilized to notify the public to take protective actions. These include the Public Warning Siren System and the Emergency Alert System.

### Categorization and Classification of Events

The following describes how emergencies are classified at DOE facilities. These levels increase in severity based on the emergency. You will hear these terms used during public announcements.

Events that do not involve a significant offsite release of hazardous materials but require significant response by the site, such as evacuation of buildings and response by the Fire Department, may be categorized as an Operational Emergency.



Oak Ridge Protective Force

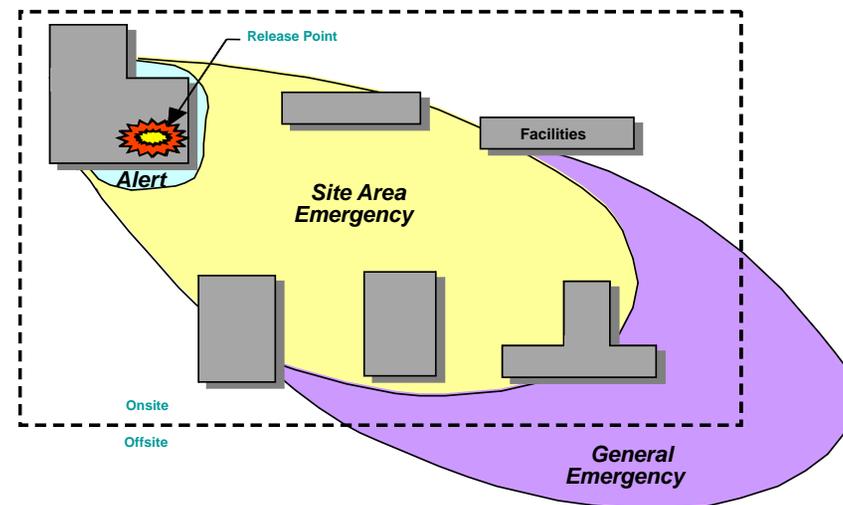


## Key Emergency Information

Events resulting in the airborne release of hazardous materials are further classified into one of three levels in order of increasing severity.

The figure below provides a representation of the classification levels. Classifying the event into a severity level activates the needed resources for the given condition.

### Emergency Classification



#### Alert

Harmful levels of release not exceeding the facility boundary.

#### Site Area Emergency

Harmful levels of release go beyond the building but are still onsite.

#### General Emergency

Harmful levels of release have either the potential to or have gone offsite.

*Site is defined as the boundaries of either Y-12, ETTP or ORNL.*



## If You Hear the Sirens

### Public Warning Sirens

Sirens are placed around each of the three sites to alert individuals within an approximate two-mile area of each site. The sirens are designed to provide warning to the public. In the unlikely event that an emergency impacts the area beyond our reservation boundary, warning sirens located within 2 miles of the affected site will be sounded, and a steady wailing sound will be heard for three to five minutes.



Public Warning Sirens are tested the first Wednesday of each month around noon.

Upon hearing the sirens, immediately go inside a building or automobile and tune to a local radio or television station for specific instructions received over the Emergency Alert System (EAS). If you are on a lake or a river, leave the area by turning away from the sirens and tune to a radio station for specific instructions broadcast over the EAS.

### Emergency Alert System

The EAS is a network of radio and television stations on which emergency instructions are provided to the public. The radio and television stations in the Oak Ridge area that broadcast EAS messages are listed on the following page. Warning messages may also be sent over the weather alert radios.

### Protective Actions

Protective actions are taken to avoid or minimize the exposure of individuals to the hazard. During emergencies, the local authorities may direct the public to take protective actions. The two primary protective actions are to shelter-in-place or evacuate. These are described in further detail on the following pages.



## If You Hear the Sirens

### STATION NAME

### STATION ID

#### Radio

WIVK (Primary - Knoxville)

FM 107.7



WNML (Knoxville)

FM 99.1/  
AM 990



WOKI (Knoxville)

FM 98.7



WNOX (Knoxville)

FM 100.3



#### Television

WATE (regional ABC affiliate)

Channel 6



WBIR (regional NBC affiliate)

Channel 10



WVLT (regional CBS affiliate)

Channel 8



WTNZ (regional FOX affiliate)

Channel 43



BBB Communications Cable

Channel 12



If an emergency situation requires continuous updates to the public, a Joint Information Center will be opened for the media to obtain the latest information for broadcast to the public. A citizen's hotline may also be activated at (865) 362-8600 to answer questions from concerned citizens. Information may also be posted to the Internet at [www.oakridge.doe.gov/emergency](http://www.oakridge.doe.gov/emergency).



## If You Are Advised to Shelter-in-Place

### Shelter-in-place

Sheltering-in-place provides protection from potential airborne hazardous materials that may have been released.

If you are asked to shelter-in-place at work or at home, follow these instructions:

- Bring everyone inside (including pets).
- Close all doors and windows.
- Turn off or close all ventilation systems, including:
  - Air conditioning
  - Attic & exhaust fans
  - Furnaces
  - Fireplace dampers
  - Heating/cooling systems

- Determine what sector you are in (see pages 14-15).
- Continue to shelter-in-place and listen to one of the EAS stations.
- When the outside air is no longer dangerous, you will be instructed by the EAS that sheltering-in-place has ended and to open and ventilate your home or building.
- Shelters may be opened for individuals who cannot return home because a shelter-in-place has been ordered for the area in which they live. If you are affected in this manner, please listen to EAS stations for announcements of shelters being opened or go to the home of a friend or relative that is outside the area of concern.



Oak Ridge Emergency Operations Center

## If You Are Asked to Evacuate to Shelters

### Evacuation

An evacuation may be conducted when there is a concern that hazardous materials may impact people in a certain area. If you are directed to evacuate from your home or while at your workplace, follow these guidelines:



Emergency Planning

- Write down the evacuation route and designated shelter provided over the EAS station. These instructions will depend on what sector you are currently in (see map and shelter list on pages 14-15 ) and what plant site is involved in the emergency.
- If you do not have transportation, call a neighbor or co-worker for assistance. **DO NOT CALL 911.**
- Keep your vehicle windows closed and turn off air systems to eliminate the possible intake of outside air into your vehicle.
- Tune your vehicle's radio to one of the EAS stations listed on page 9.

- Secure your home or workplace. Before leaving home, tie a white cloth or towel on your front door to indicate to emergency officials that you have gone.
- If you are at home, gather items you will need for a short stay away from home, such as:
  - cellular phone
  - medications
  - toiletries
  - special diet food
  - blankets & pillows
  - checkbook
  - credit cards
  - important papers
  - a change of clothing



## If You Are Asked to Evacuate to Shelters

### Special Needs

If you or someone in your household has special needs, such as hearing or physical impairments that would prevent taking protective actions, contact the local government serving your residence to submit a special needs request.

For citizens in the city limits of Oak Ridge, contact the Oak Ridge Police Department at 425-4399.

For county residents, contact the identified office in your respective county: Roane County Sheriff's Department at 354-8045, Anderson County Sheriff's Department at 457-2414, and Loudon County Emergency Management Agency Office at 988-0175.



Special needs assistance is available through local governments.

## If You Are Asked to Evacuate to Shelters

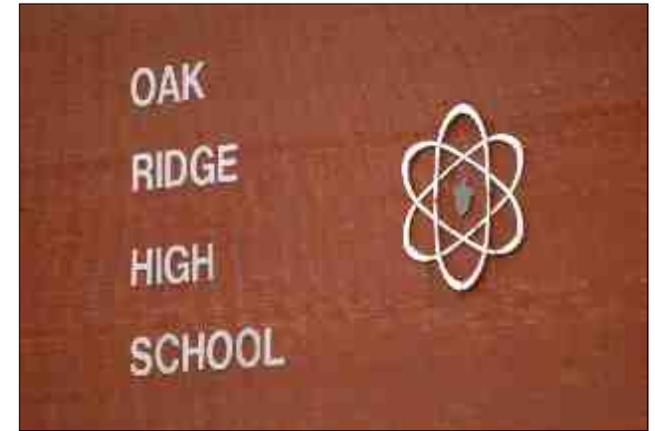
### Children in School

During an emergency, affected schools will be contacted immediately by local officials. Your children will be sheltered in their school until it is safe to leave. In the event of a relocation, your children will be evacuated to a pre-determined location, away from the affected area by school officials.

*Do not pick your children up from their school or shelter until you are told it is safe to do so.*

### *ETTP Two-Mile Sector (K) School Relocations*

Schools and daycares will relocate to Roane State Community College in Harriman.



School administration will handle emergency actions at their facilities.

### *ORNL Two-Mile Sector (X) School Relocations*

There are no permanent residences or schools located in the ORNL Immediate Notification Zone, which is entirely within the DOE Oak Ridge Reservation.

### *Y-12 Two-Mile Sector (Y) School Relocations*

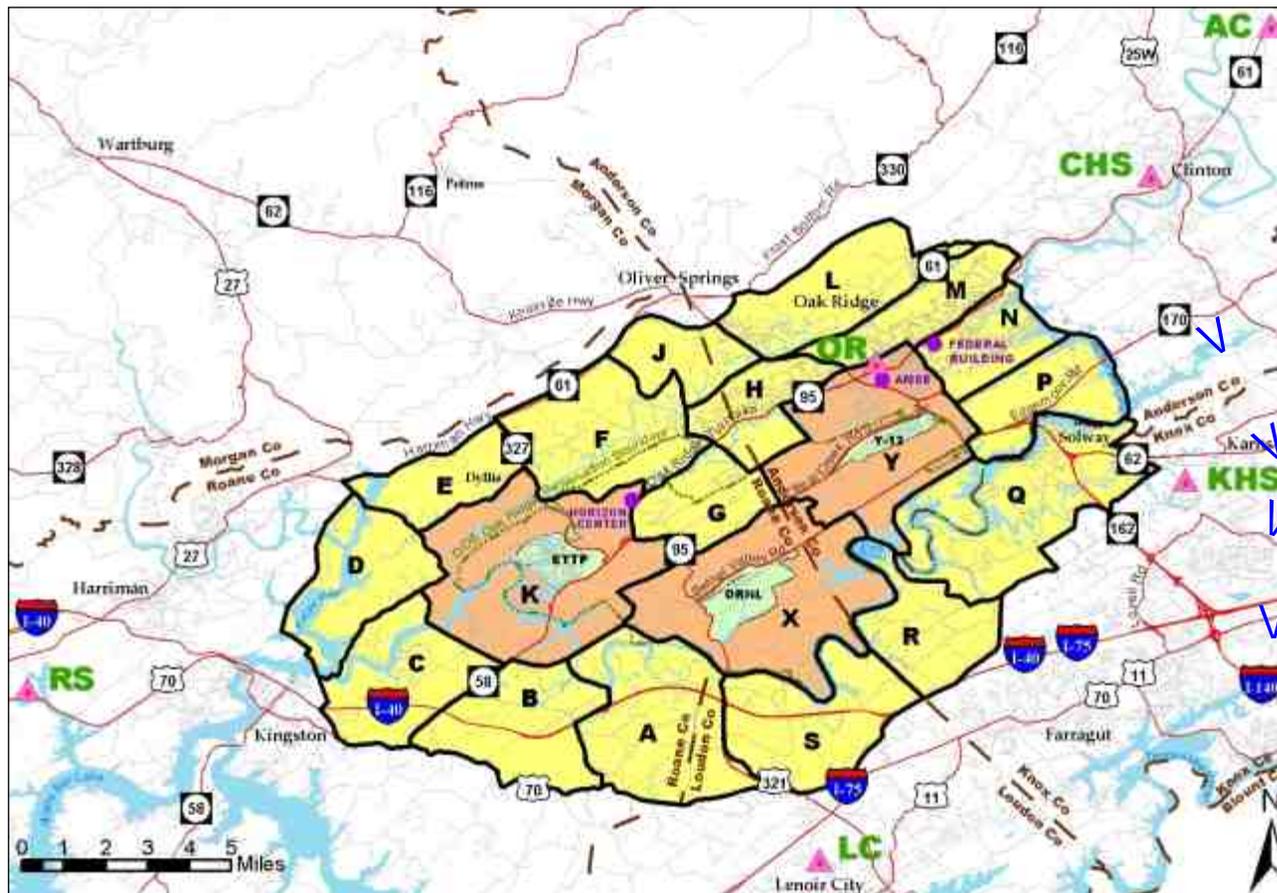
Schools and daycares will relocate to Anderson County High School in Clinton.

If relocation is necessary for sectors beyond the two-mile area, relocation information will be released through media broadcasts.



# Evacuation Shelters by Sector

# Evacuation Shelters by Sector



The following pages show sectors on and around the Oak Ridge Reservation. Each sector has at least one evacuation shelter. Shelters are opened based on the site where the incident has occurred and the impacts of the event.

Sector

Site

	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	X	Y
ETTP	LC	RS	RS	RS	RS	OR	OR	-	-	RS	-	-	-	-	-	-	-	OR	-
ORNL	LC	-	-	-	-	RS	RS	AC	-	RS	-	-	-	-	KHS	KHS	LC	KHS	CHS
Y-12	-	-	-	-	-	RS	RS	RS	RS	-	AC	AC	CHS	KHS	KHS	LC	-	LC	AC

AC - Anderson County High School, CHS - Clinton High School, KHS - Karns High School, LC - Lenoir City High School, OR - Oak Ridge High School, RS - Roane State Community College (Harriman campus)

A dash in a sector's box indicates that no action is required.



## Where the Shelters are Located



Anderson County High School  
130 Maverick Circle  
Clinton, Tennessee 37716



Clinton High School  
425 Dragon Drive  
Clinton, Tennessee 37716



Oak Ridge High School  
127 Providence Road  
Oak Ridge, Tennessee 37830



## Where the Shelters are Located



Karns High School  
2710 Byington Solway Road  
Knoxville, Tennessee 37931



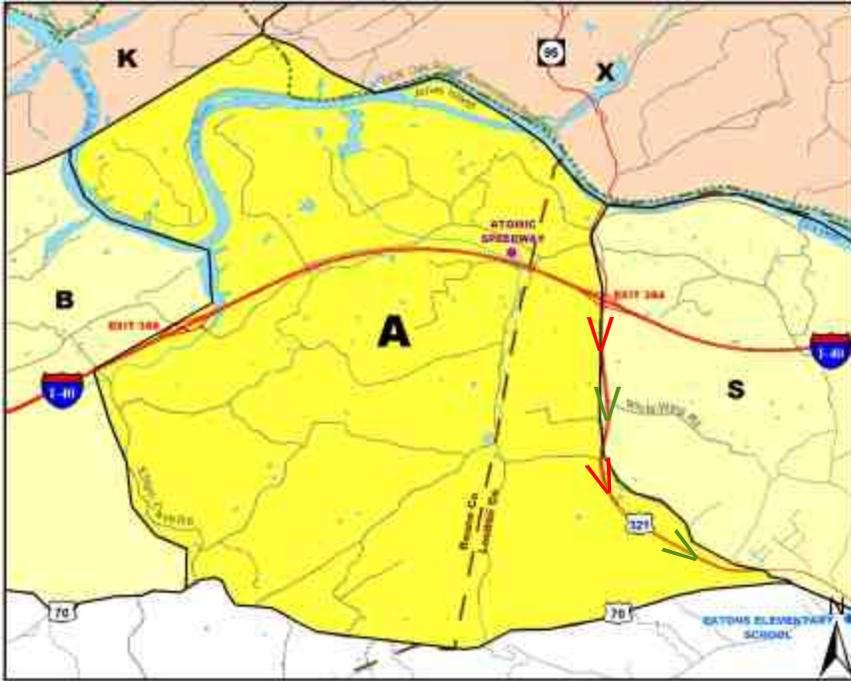
Lenoir City High School  
1485 Old Highway 95  
Lenoir City, Tennessee 37771



Roane State Community  
College - Harriman Campus  
276 Patton Lane  
Harriman, Tennessee 37748



## Sector A



### Relocation Shelter for Sector A

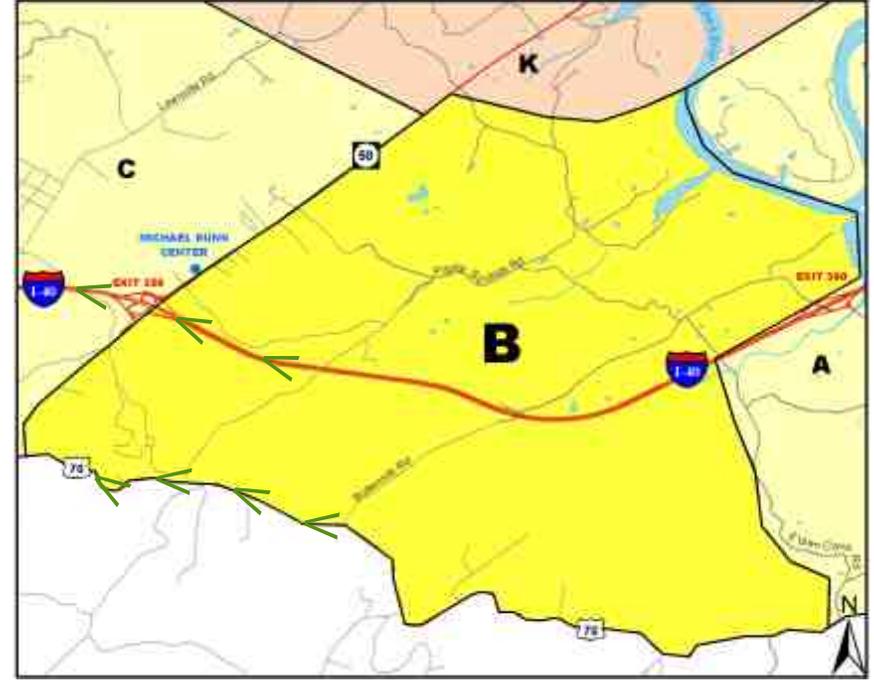
If there is an emergency at **ETTP** or **ORNL** requiring evacuation, Sector A reports to the shelter at:

Lenoir City High School  
1485 Old Highway 95  
Lenoir City, Tennessee 37771

Take most direct route to Highway 321. Travel on Highway 321 South toward Lenoir City to Old Highway 95. Travel for approximately 2 miles on Old Highway 95 to Lenoir City High School.



## Sector B



### Relocation Shelter for Sector B

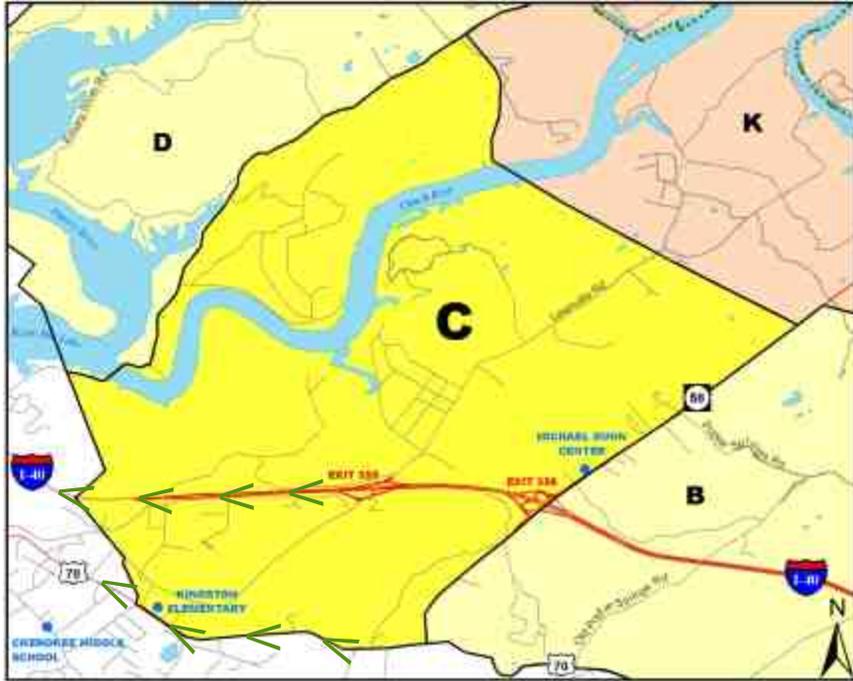
If there is an emergency at **ETTP** requiring evacuation, Sector B reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Interstate 40 westbound. Take Midtown Exit 350 to Highway 70 West. Travel toward Rockwood for 7 miles to Patton Lane. Turn right onto Patton Lane to Roane State Community College.



## Sector C



### Relocation Shelter for Sector C

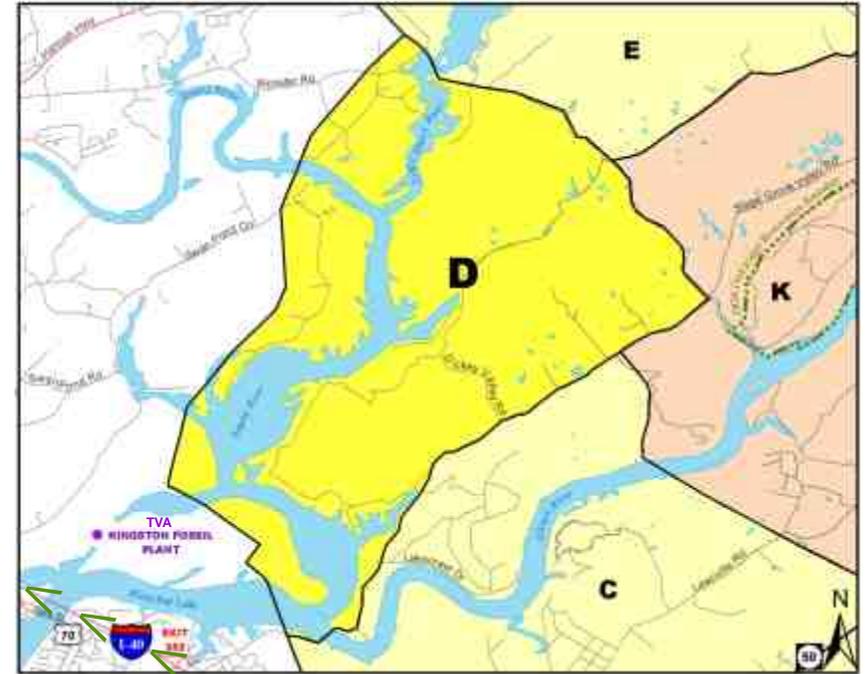
If there is an emergency at ETPP requiring evacuation, Sector C reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Interstate 40 westbound. Take Midtown Exit 350 to Highway 70 West. Travel toward Rockwood for 7 miles to Patton Lane. Turn right onto Patton Lane to Roane State Community College.



## Sector D



### Relocation Shelter for Sector D

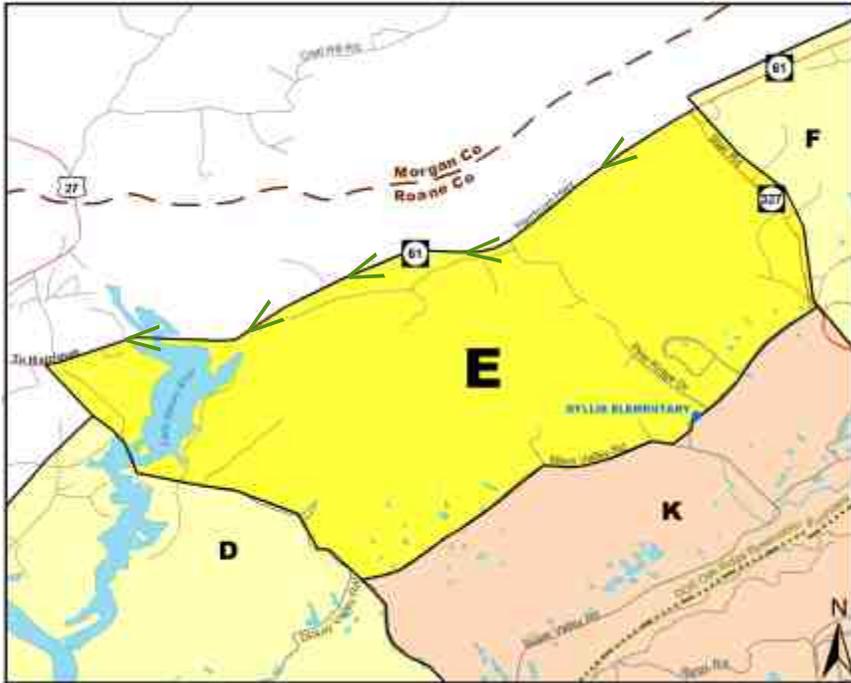
If there is an emergency at ETPP requiring evacuation, Sector D reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Highway 27-61 southbound toward Rockwood. Turn left onto Patton Lane, approximately 2 miles after crossing under Interstate 40. Roane State Community College is on Patton Lane.



## Sector E



### Relocation Shelter for Sector E

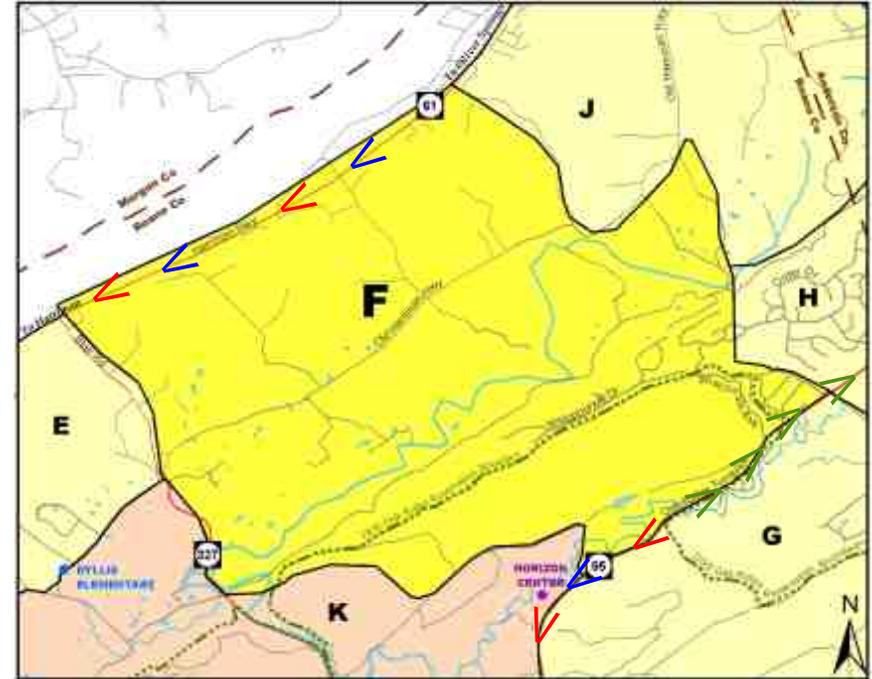
If there is an emergency at **ETTP** requiring evacuation, Sector E reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Highway 27-61 southbound toward Rockwood. Turn left onto Patton Lane, approximately 2 miles after crossing under Interstate 40. Roane State Community College is on Patton Lane.



## Sector F



### Relocation Shelters for Sector F

If there is an emergency at **ETTP** requiring evacuation, Sector F reports to the shelter at:

Oak Ridge High School  
127 Providence Road  
Oak Ridge, Tennessee 37830

Take most direct route to northbound Oak Ridge Turnpike to Oak Ridge. Oak Ridge High School is on the left.

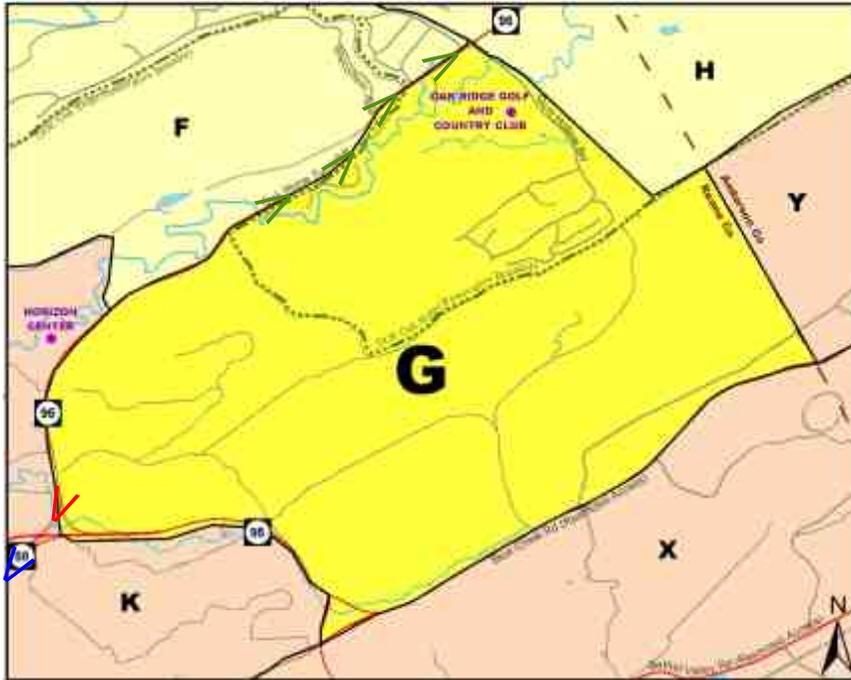
If there is an emergency at **ORNL** or **Y-12** requiring evacuation, Sector F reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Highway 27-61 southbound toward Rockwood. Turn left onto Patton Lane, approximately 2 miles after crossing under Interstate 40. Roane State Community College is on Patton Lane.



# Sector G



## Relocation Shelters for Sector G

If there is an emergency at **ETTP** requiring evacuation, Sector G reports to the shelter at:

Oak Ridge High School  
127 Providence Road  
Oak Ridge, Tennessee 37830

Take most direct route to northbound Oak Ridge Turnpike to Oak Ridge. Oak Ridge High School is on the left.

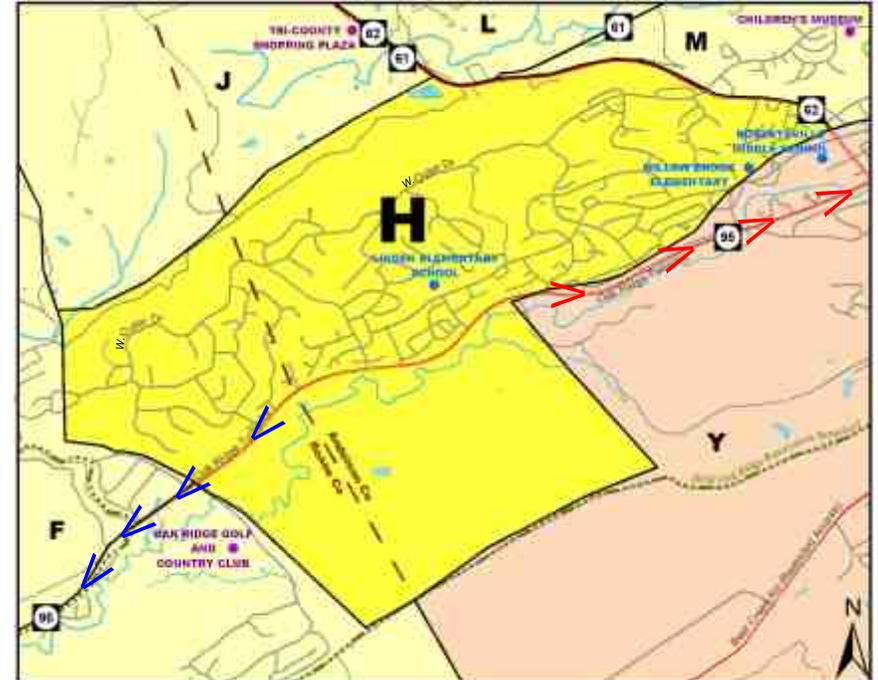
If there is an emergency at **ORNL** or **Y-12** requiring evacuation, Sector G reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Highway 27-61 southbound toward Rockwood. Turn left onto Patton Lane, approximately 2 miles after crossing under Interstate 40. Roane State Community College is on Patton Lane.



# Sector H



## Relocation Shelters for Sector H

If there is an emergency at **ORNL** requiring evacuation, Sector H reports to the shelter at:

Anderson County High School  
130 Maverick Circle  
Clinton, Tennessee 37716

Take most direct route to Oak Ridge Turnpike going east. Continue east until road turns into Highway 61. Follow this northbound into Clinton. Turn left onto Maverick Circle to Anderson County High School.

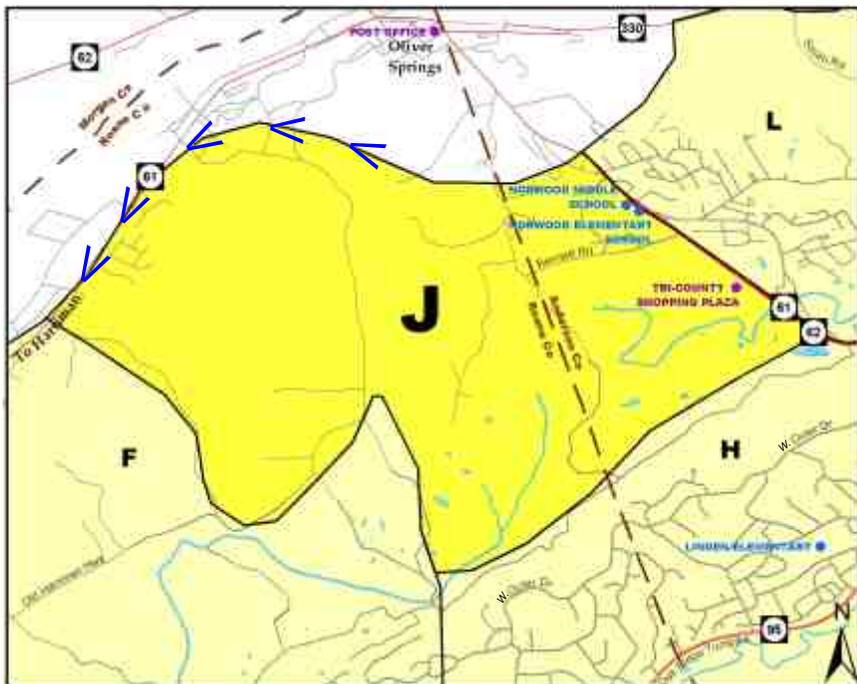
If there is an emergency at **Y-12** requiring evacuation, Sector H reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to southbound Oak Ridge Turnpike. Then take westbound Highway 58 (Gallaher Highway) to I-40 westbound. Take Exit 350 (Midtown) off I-40 to Highway 70, and travel toward Rockwood for 7 miles to Patton Lane. Turn right to Roane State Community College.



## Sector J



### Relocation Shelter for Sector J

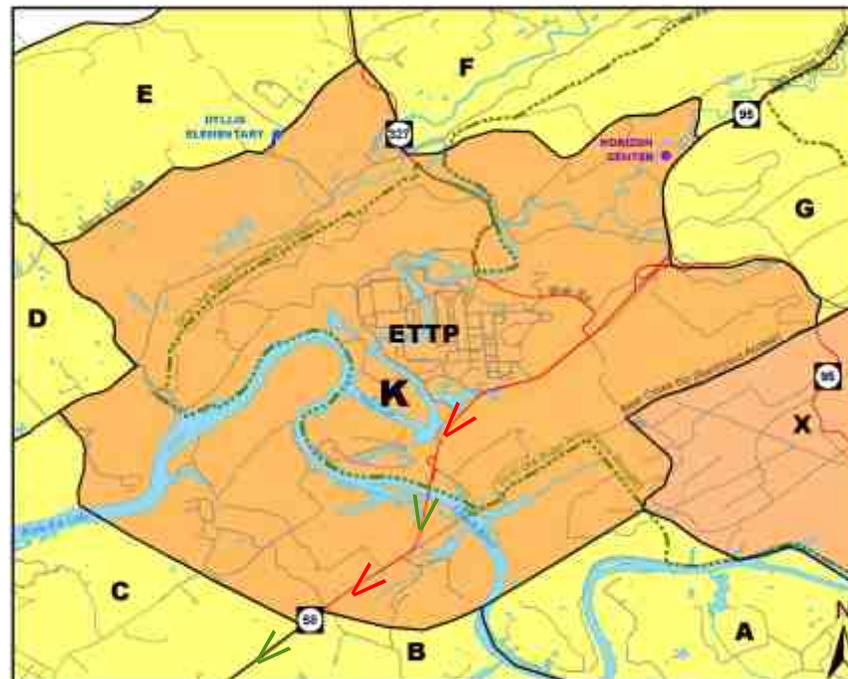
If there is an emergency at **Y-12** requiring evacuation, Sector J reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Highway 27-61 southbound toward Rockwood. Turn left onto Patton Lane, which is 2 miles after crossing under I-40. Roane State Community College is on Patton Lane.



## Sector K



### Relocation Shelter for Sector K

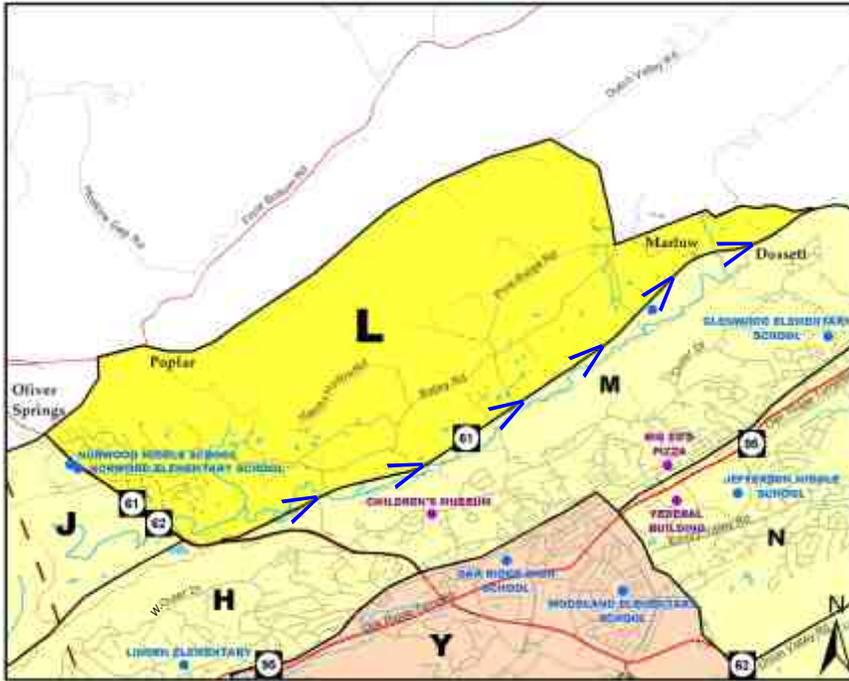
If there is an emergency at **ETPP** or **ORNL** requiring evacuation, Sector K reports to the shelter at:

Roane State Community College  
276 Patton Lane  
Harriman, Tennessee 37748

Take most direct route to Interstate 40 westbound. Take Midtown Exit 350 to Highway 70 West. Travel toward Rockwood for 7 miles to Patton Lane. Turn right onto Patton Lane to Roane State Community College.



## Sector L



### Relocation Shelter for Sector L

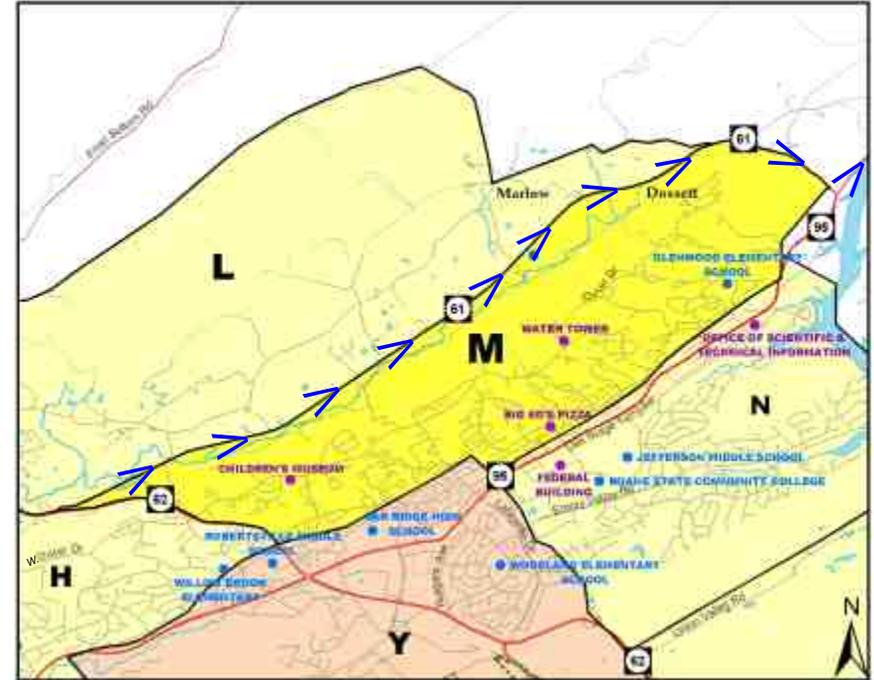
If there is an emergency at [Y-12](#) requiring evacuation, Sector L reports to the shelter at:

Anderson County High School  
130 Maverick Circle  
Clinton, Tennessee 37716

Take most direct route to State Route 61 northbound to Clinton. Turn left onto Maverick Circle to Anderson County High School.



## Sector M



### Relocation Shelter for Sector M

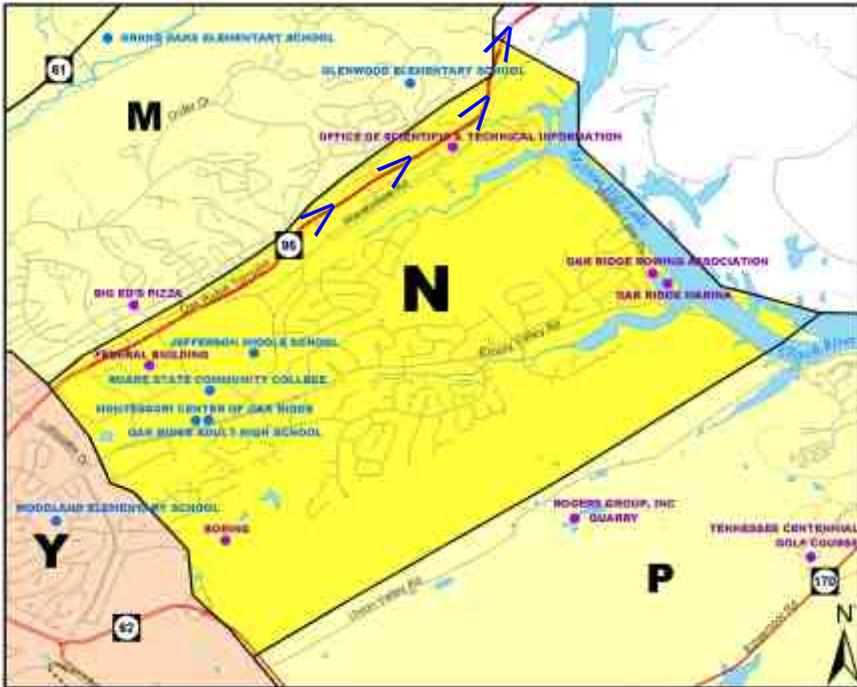
If there is an emergency at [Y-12](#) requiring evacuation, Sector M reports to the shelter at:

Anderson County High School  
130 Maverick Circle  
Clinton, Tennessee 37716

Take most direct route to State Route 61 northbound to Clinton. Turn left onto Maverick Circle to Anderson County High School.



## Sector N



### Relocation Shelter for Sector N

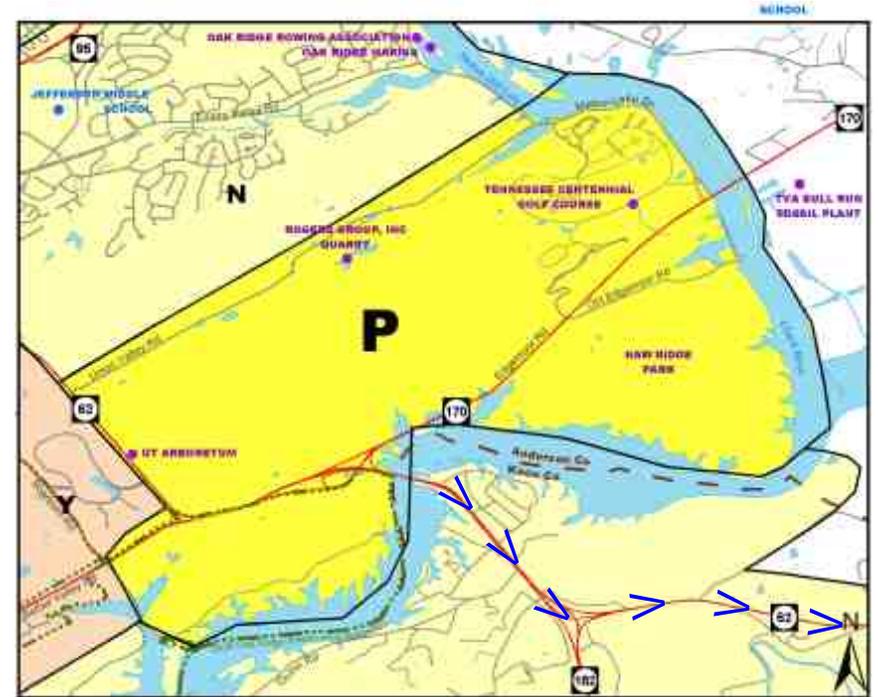
If there is an emergency at Y-12 requiring evacuation, Sector N reports to the shelter at:

Clinton High School  
425 Dragon Drive  
Clinton, Tennessee 37716

Take most direct route to Oak Ridge Turnpike (Highway 95) going east. Continue east until road turns into Highway 61. Follow this northbound into Clinton. Turn left onto Hillcrest St., then right onto Dragon Drive to Clinton High School.



## Sector P



### Relocation Shelter for Sector P

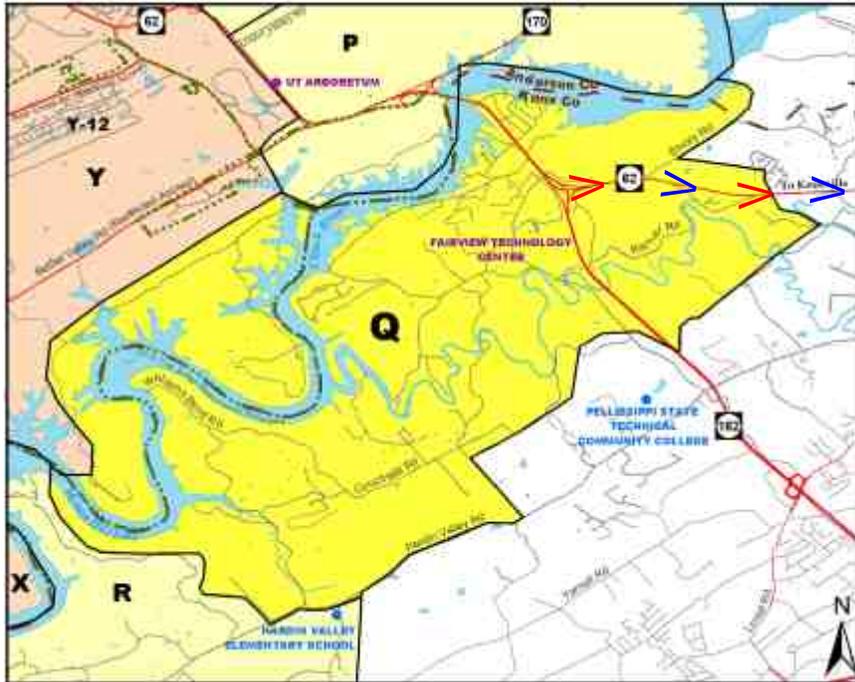
If there is an emergency at Y-12 requiring evacuation, Sector P reports to the shelter at:

Karns High School  
2710 Byington Solway Road  
Knoxville, Tennessee 37931

Take most direct route to State Route 62 (Oak Ridge Highway) eastbound to Knoxville. Turn right (south) onto State Route 131 (Byington Beaver Ridge) to Byington Community to Karns High School.



## Sector Q



### Relocation Shelter for Sector Q

If there is an emergency at **ORNL** or **Y-12** requiring evacuation, Sector Q reports to the shelter at:

Karns High School  
2710 Byington Solway Road  
Knoxville, Tennessee 37931

Take most direct route to State Route 62 (Oak Ridge Highway) eastbound to Knoxville. Turn right (south) onto State Route 131 (Byington Beaver Ridge) to Byington Community to Karns High School.



## Sector R



### Relocation Shelters for Sector R

If there is an emergency at **ORNL** requiring evacuation, Sector R reports to the shelter at:

Karns High School  
2710 Byington Solway Road  
Knoxville, Tennessee 37931

Take most direct route to Hardin Valley Road eastbound. Then turn left onto State Route 131 to the Byington Community to Karns High School.

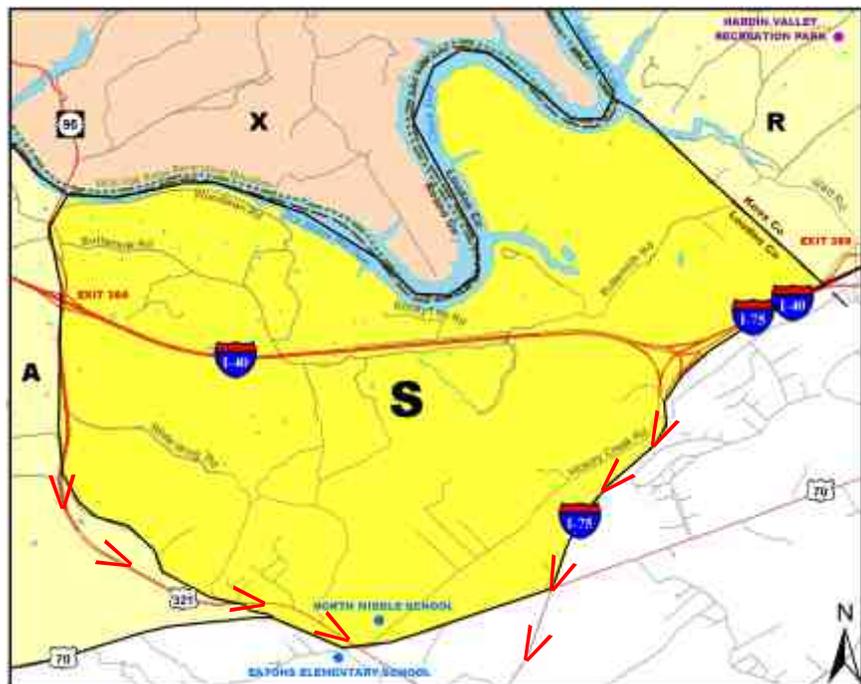
If there is an emergency at **Y-12** requiring evacuation, Sector R reports to the shelter at:

Lenoir City High School  
1485 Old Highway 95  
Lenoir City, Tennessee 37771

Take most direct route to Interstate 75 southbound toward Lenoir City. Take Exit 81 (Lenoir City) to Highway 321 into Lenoir City. Turn right onto McGee Boulevard for about 6/10 mile to Kingston Street. Turn right on Kingston Street for 2 miles to Lenoir City High School.



## Sector S



### Relocation Shelter for Sector S

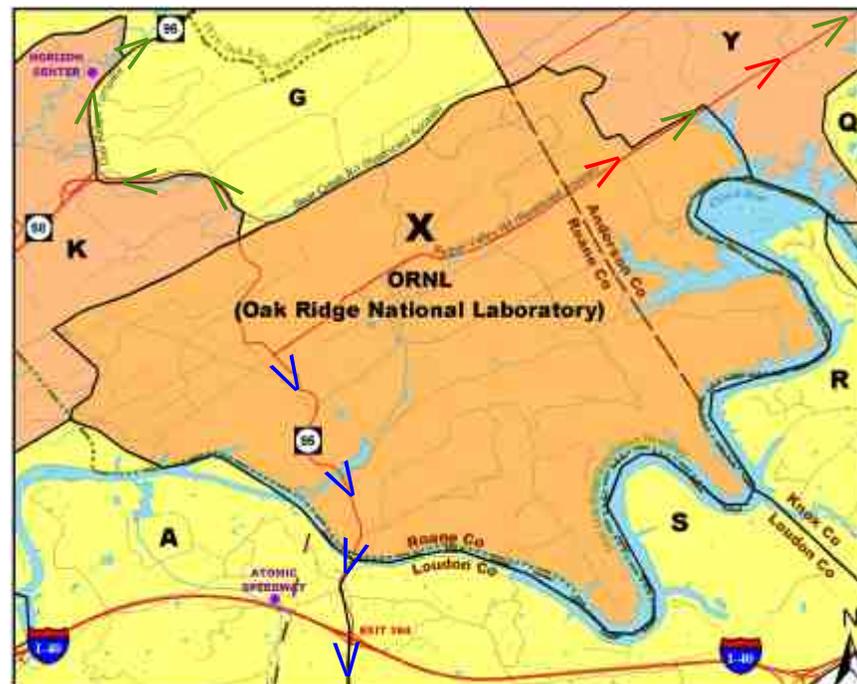
If there is an emergency at **ORNL** requiring evacuation, Sector S reports to the shelter at:

Lenoir City High School  
1485 Old Highway 95  
Lenoir City, Tennessee 37771

Take most direct route to Interstate 75 southbound toward Lenoir City. Take Exit 81 (Lenoir City) to Highway 321 into Lenoir City. Turn right (west) onto McGee Boulevard for about 6/10 mile to Kingston Street. Turn right (north) on Kingston Street for 2 miles to Lenoir City High School.



## Sector X



### Relocation Shelters for Sector X

If there is an emergency at **ETTP** requiring evacuation, Sector X reports to the shelter at:

Oak Ridge High School  
127 Providence Road  
Oak Ridge, TN 37830

Take most direct route to northbound Bethel Valley Road toward Oak Ridge. Turn left onto Illinois Avenue (Highway 62). Turn right onto Oak Ridge Turnpike and turn left to Oak Ridge High School.

If there is an emergency at **ORNL** requiring evacuation, Sector X reports to the shelter at:

Karns High School  
2710 Byington Solway Road  
Knoxville, TN 37931

Take most direct route to northbound Bethel Valley Road toward Knoxville. Then take a left at Highway 62 (Oak Ridge Highway) eastbound to Knoxville. Take a right onto State Route 131 (Byington Beaver Ridge) to Karns High School.

If there is an emergency at **Y-12** requiring evacuation, Sector X reports to the shelter at:

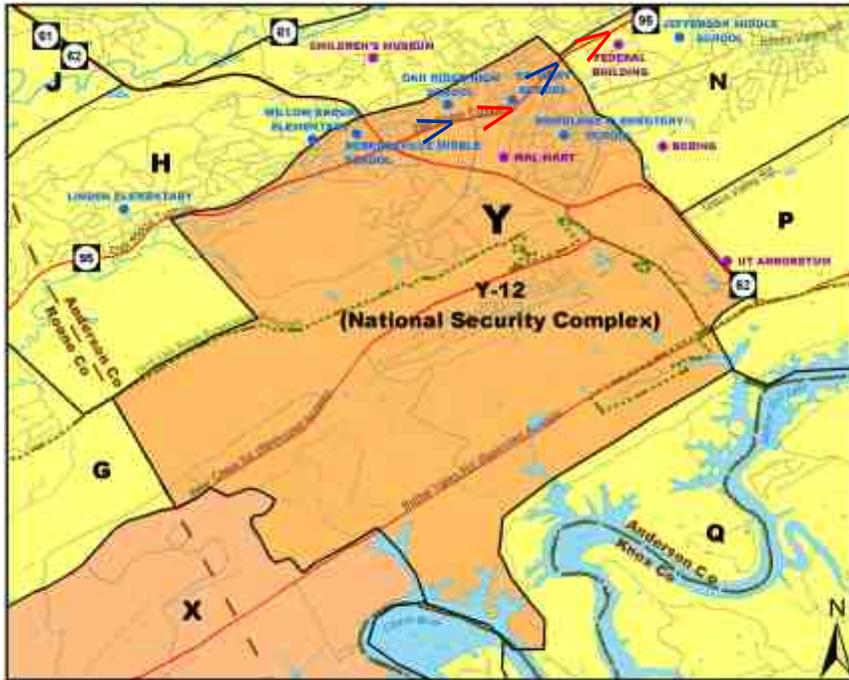
Lenoir City High School  
1485 Old Highway 95  
Lenoir City, TN 37771

Take most direct route to State Route 95 southbound toward Lenoir City. Then to Highway 321 toward Lenoir City. Then travel south on Old Highway 95 for two miles to Lenoir City High School.



# Sector Y

# Emergency Supplies Checklist



## Relocation Shelters for Sector Y

If there is an emergency at **ORNL** requiring evacuation, Sector Y reports to the shelter at:

Clinton High School  
425 Dragon Drive  
Clinton, Tennessee 37716

Take most direct route to Oak Ridge Turnpike (Highway 95) going east. Continue east until road turns into Highway 61. Follow this northbound into Clinton. Turn left onto Hillcrest Street, then right onto Dragon Drive to Clinton High School.

If there is an emergency at **Y-12** requiring evacuation, Sector Y reports to the shelter at:

Anderson County High School  
130 Maverick Circle  
Clinton, Tennessee 37716

Take most direct route to Oak Ridge Turnpike going east. Continue east until road turns into Highway 61. Follow this northbound into Clinton. Turn left onto Maverick Circle to Anderson County High School.

To help you prepare for any type of emergency, we have provided two lists of supplies.

The first contains items you may need to keep in your home to aid in response to any emergency. The second contains supplies to take with you if you are asked to evacuate. Add any additional supplies that you need. You may desire to prepare an overnight bag in case of an emergency. *If you are evacuating with a pet, please ensure you transport your pet in a carrier with plenty of food and water.*

## Emergency supplies for your home:

- This booklet
- First aid kit
- Toolbox
- Candles and matches
- Portable radio
- Flashlight
- Extra batteries
- Food and water

## Evacuation supplies:

- This booklet
- Medicine and all prescriptions
- Personal health products (shaving cream, deodorant, and toothbrush)
- Special diet food and supplies
- Food and water
- Blankets and pillows or sleeping bag
- Cash, checkbook, credit cards, important papers
- Items for baby (diapers, formula, clothing)
- Items for children (toys, books, clothing)
- Change of clothing
- Cellular phone



## About Radiation

### What is radiation?

Radiation is a form of energy that is a part of our everyday lives. All of us receive a "dose" of radiation each day. Most of the dose comes from naturally occurring radioactive materials such as uranium, thorium, radon, and certain forms of potassium and carbon. The air we breathe contains radon, the food we eat contains uranium and thorium from the soil, and our bodies contain radioactive forms of potassium and carbon. Cosmic radiation from the sun also contributes to our natural radiation dose.

We also receive radiation doses from man-made sources such as X-rays, nuclear medical procedures, power plants, smoke detectors and older television sets. Some people, such as nuclear plant operators, flight crews, and nuclear medicine staff may also receive an occupational radiation dose.

### Measuring Dose

Radiation doses are normally measured in a unit called the rem. The dose is based both on the amount of radiation received by an individual and the biological

effect associated with the particular type of radiation. Since our radiation doses are normally very small, we usually record the dose in millirem (mrem). One rem equals 1,000 mrem.

Most of us receive about 360 mrem a year from the radioactive sources listed above. About 300 mrem comes from natural sources, and the other 60 mrem from man-made sources. To put this in perspective, the average dose from a chest X-ray is about 10 mrem, and we get about 3 mrem when we make a cross country flight.

The DOE has established a 100-millirem dose limit to members of the public from exposure pathways that are the result of its operations. The maximum dose any member of the public could have possibly received from normal operations on the Oak Ridge Reservation in 2004 was 12 mrem. This includes eating deer, turkey, fish, and geese harvested on or near the Reservation; drinking the most contaminated water; and breathing the most contaminated air. It is very unlikely any one person could have actually received this dose.

### Types of Radiation

You may be familiar with some of the common types of radiation: alpha and beta particles, gamma rays and neutrons. Alpha and beta particles are usually hazardous only if inhaled or ingested. Gamma rays and neutrons can penetrate the body from the outside. All radioactive materials emit at least one of these radiations. If a nuclear emergency occurs in Oak Ridge, it is not necessary to remember the differences in the types of radiation, since all of the types could be encountered.

### Levels of Radiation

Gastrointestinal series (upper and lower).....	1400 millirem
CT scan (head and body).....	1100 millirem
Radon in average household.....	200 millirem/year
Plutonium-powered pacemaker.....	100 millirem/year
Natural radioactivity in our body.....	40 millirem/year
Cosmic radiation.....	31 millirem/year
Mammogram.....	30 millirem
Smoking cigarettes (1 pack/day).....	15-20 millirem/year
<i>*Maximum possible from normal operations on the Oak Ridge Reservation.....</i>	
Consumer products.....	11 millirem/year
Chest X-ray.....	10 millirem
Dental X-ray.....	10 millirem
Using natural gas in the home.....	9 millirem/year
Road construction materials.....	4 millirem/year
Living near a nuclear power station.....	1 millirem/year
Air travel (every 2000 miles).....	1 millirem

## About Radiation

### A Nuclear Emergency in Oak Ridge?

While it is possible that a nuclear emergency impacting the Oak Ridge area could occur, it is not likely. If there is a nuclear emergency, most members of the public would not be expected to receive a radiation dose. For those people who did, the average doses would be expected to be less than the 360 mrem the public receives each year.





## About Chemical Hazards

### What Is a Chemical Hazard?

A chemical hazard is any substance that can cause harm, primarily to people. Chemicals of all kinds are stored in our homes and can result in serious injuries if not properly handled. Household items such as bleach can result in harmful chlorine gas or hydrochloric acid if carelessly used. Gasoline fumes from containers for lawnmowers or boats can result in major health hazards if inhaled.

DOE Oak Ridge uses thousands of chemicals in its varied research and other operations. New chemicals are or can be created as a result of the research or other activities. DOE follows national safety requirements in storing and handling these chemicals to minimize the risk of injuries from its chemical usage. However, accidents can occur despite careful attention to proper handling and storage procedures.

### Types of Chemicals Used at the Oak Ridge Facilities

- Acetonitrile
- Acids
- Asbestos
- Beryllium
- Cadmium
- Cyanide compounds
- Hydrogen Chloride
- Hydrogen Fluoride
- Lead
- Lithium compounds
- Mercury
- Methylene Chloride
- Nickel
- PCBs
- Sodium
- Uranium

A federal law called the Emergency Planning and Community Right to Know Act gives you the right to know about toxic chemicals being released into the environment. The Toxics Release Inventory maintained by the U.S. Environmental Protection Agency provides information about the types and amounts of toxic chemicals that are released each year to the air, water, and land as well as information on the quantities of toxic chemicals sent to other facilities for further waste management.

Data for Department of Energy facilities in Oak Ridge is included in this Inventory. You can view this information at the Web site [www.epa.gov/tri](http://www.epa.gov/tri). By entering the Oak Ridge zip code "37831" at the prompt, you can view information on the types of chemicals used at the DOE facilities.



## About Chemical Hazards

### Chemical Emergency in Oak Ridge

DOE Oak Ridge has dozens of facilities engaged in chemical operations. Most operations involve such small quantities of chemicals that an accident poses little threat to people. However, DOE also has some larger chemical operations and, in some locations, larger amounts of stored chemicals where workers and the public can be impacted by accidents.

While accidents are possible, DOE believes the risk of exposure to its workers is low due to the safety precautions followed throughout the DOE Oak Ridge Reservation. The risk to the public from harmful

being released outside of the DOE property areas is even lower. In the event of a chemical release with the potential for off-site impacts, the sirens will sound and a message will be broadcast on the Emergency Alert System.

However, as a matter of simple prudence and for compliance with Federal government safety requirements, DOE has prepared emergency response plans for accidents that could occur. DOE and its contractors maintain an experienced group of emergency response personnel trained to respond to chemical accidents.



Laboratory testing activities



## East Tennessee Technology Park

The East Tennessee Technology Park was originally named "The Oak Ridge Gaseous Diffusion Plant." As part of the Manhattan Project, the Plant was designed to produce enriched uranium for use in atomic weapons operations during World War II.



East Tennessee Technology Park

After the war, this Plant was renamed the Oak Ridge K-25 Site and produced enriched uranium for the commercial nuclear power industry from 1945 to 1985. In 1987, DOE renamed the site the East Tennessee Technology Park (ETTP) and began a major environmental cleanup project with the long-term goal of

### FACTS: ETTP

- Sector K
- Located approximately 13 miles west of downtown Oak Ridge off Highway 58 in Roane County
- 2,400 employees
- 640 acres
- [www.bechteljacobs.com](http://www.bechteljacobs.com)
- [www.croet.com](http://www.croet.com)

industrial park called Heritage Center. Cleanup activities are being conducted by Bechtel Jacobs Company. As cleanup is completed, DOE transfers ownership of the uncontaminated buildings to the Community Reuse Organization of East Tennessee (CROET), who in turn leases this property for immediate private industrial use.

Some of the key facilities include:

### TSCA Incinerator

ETTP is home to the DOE Toxic Substances Control Act (TSCA) Incinerator off Blair Road, the only U.S. facility permitted to burn certain radioactive and/or hazardous wastes. The Incinerator treats both solid and liquid wastes originating from DOE sites.

The Incinerator is located on the



## East Tennessee Technology Park

Incinerator operator develops and follows detailed procedures to ensure safety and compliance with rules and regulations issued by DOE, the Environmental Protection Agency, and the State of Tennessee.

Periodic tests and evaluations are conducted to ensure performance meets requirements. A burn plan detailing what waste will be treated is available on the Web site <http://www.bechteljacobs.com/tsca>.

### K-25/27 Demolition Project

The U-shaped K-25 Building is approximately one mile long and has 44 acres under one roof. The building is near the center of ETTP and was built in 1943. The K-27 Building is a rectangular building that is approximately 374,000 square feet. It was built in 1945. Except for the shape and size, the two buildings are very similar in construction and materials.

Both buildings contain radioactive contamination and hazardous materials in the building structures and plans are to demolish them.

### Main Plant

Most facilities at ETTP, except those designated for reuse, have

been, or are scheduled to be, demolished as part of DOE's Environmental Cleanup Program.

Approximately 500 above-ground facilities, including buildings, tanks, sheds, and other structures have been demolished. Most have actual or potential elevated concentrations of radiological and/or other hazardous substances. Several large industrial buildings at the site will be demolished within the next two years.

More than 150 facilities, including the former administration building, cafeteria, and medical facility, have already been demolished. Other buildings, including K-1225, K-1330, K-1007, K-1580, K-1036, and K-1400, have been transferred to CROET for reuse by private industry.



TSCA Incinerator



# Oak Ridge National Laboratory

The Oak Ridge National Laboratory (ORNL) is DOE's largest multipurpose science laboratory and is managed by UT-Battelle LLC. ORNL was established in 1943 as a part of the Manhattan Project and was formerly known as the X-10 site.

Today, ORNL is an international leader in a range of scientific areas that support DOE's mission in the Office of Science. The Laboratory's six major scientific competencies include neutron science, energy, high performance computing, complex biological systems, advanced materials, and national security.

## Spallation Neutron Source

This one-of-a-kind facility was built on Chestnut Ridge by a partnership of six DOE laboratories to provide the most intense pulsed neutron beams in the world for scientific research and industrial development. Neutron research at the Spallation Neutron Source helps researchers improve materials



Spallation Neutron Source

### FACTS: ORNL

- Sector X
- Located on Bethel Valley Road in the Roane County section of Oak Ridge
- 4,000 employees and 3,000 guest researchers annually
- 4,470 acres
- [www.ornl.gov](http://www.ornl.gov)

used in high-temperature superconductors, powerful lightweight magnets, aluminum bridge decks, and stronger, lighter plastic products. This research has already led to improved shatter-proof windshields, pocket calculators, adjustable seats, and more accurate satellite weather forecast information.



# Oak Ridge National Laboratory

## High Flux Isotope Reactor

The High Flux Isotope Reactor (HFIR) began full-power operations in 1966 and is one of the world's most powerful research reactors.



High Flux Isotope Reactor

One of the original primary purposes of the HFIR was the production of californium-252 and other transuranium isotopes for research, industrial, and medical applications. Today, the principal use of HFIR is for neutron physics research.

## Radiochemical Engineering Development Center - Building 7920

Since the mid-1960s, the Radiochemical Engineering Development Center (REDC) has been the production, storage, and distribution center for the heavy-element research program of DOE. This includes work with transuranic elements, such as neptunium, americium, and californium. These elements are used in a number of applications, including medical research and industry.

The heart of the REDC is a battery of nine heavily shielded hot cells housed in a two-story building. Of the nine cells, four contain chemical processing equipment for dissolution, solvent extraction, ion exchange, and precipitation operations. Three contain equipment for the preparation and inspection of transuranic element targets, while one cell is used for analytical chemistry operations, and another is used for waste collection and sorting.

## Transuranic (TRU) Waste Facility

The Transuranic Waste Processing Center is managed by EnergyX on behalf of Foster Wheeler. The site is located on 5.2 acres of land off Highway 95.



# Oak Ridge National Laboratory

The TWPC mission is to receive legacy TRU wastes and future wastes to be generated from decontamination and decommissioning, remediation, and ongoing mission operations at the ORNL complex. The facility processes, treats, repackages and ships the waste for final disposal at the Waste Isolation Pilot Plant, Nevada Test Site, or any other designated disposal facility.

The site is the only facility of its type in the region specifically designed to accomplish this mission. Low-level and low-level mixed wastes generated as a byproduct of TRU process operations are also processed for shipment to the Nevada Test Site or other appropriate disposal facility.



Transuranic Waste Facility

## Molten Salt Reactor Experiment Facility

The Molten Salt Reactor Experiment (MSRE) operated at ORNL from 1965 to 1969. Its purpose was to test an alternative concept for powering a nuclear reactor. Rather than using fuel rods to contain the radioactive source, as do today's commercial power reactors, the MSRE pumped a mixture of radioactive molten salt through a series of pipes to generate heat and power the reactor.

When the reactor was shut down, the fuel salt was drained into two large metal tanks. A flush salt was then circulated through the tank and drained into a third storage tank. In late 1994, researchers detected that radioactive material had traveled from the storage tanks into pipes connected to the drain tanks. The material was removed from the pipes, and DOE is now planning the removal of fuel salts from the drain tanks.



# Oak Ridge National Laboratory

An expected nine metric tons of material will be removed from the tanks and transported to a storage facility at ORNL, where it will await final disposal at an appropriate site.

## Radiochemical Development Facility - Building 3019

Building 3019 is one of the nation's few repositories for uranium-233 (U-233) and other special nuclear materials, with a history dating back to the Manhattan Project. Located near the center of the ORNL campus, 3019 is where the majority of the nation's separated U-233 is stored.

U-233 is an alpha-particle emitter, similar to the better-known isotope, U-235. Associated with the U-233 and regarded as a contaminant is U-232. This uranium isotope emits high-energy gamma radiation that requires extensive shielding to protect workers.



ORNL Fire Protection



# Y-12 National Security Complex



Built between two mountain ridges, the Y-12 (previously Y-12 Plant) mission was to process uranium for the first atomic bomb. Construction of Y-12 began in February 1943; enriched uranium production began in November 1943. Construction, however, was not finished until 1945.

## Y-12 National Security Complex

The focus of the Y-12 National Security Complex (Y-12) is the production and refurbishment of weapons components, storage of nuclear material and prevention of the spread of weapons of mass destruction. Y-12 is managed by BWXT Y-12 LLC for the National Nuclear Security Administration.

After World War II, Y-12 evolved into a high-precision manufacturing, assembly and inspection facility while maintaining the nation's uranium and lithium technology base. Every weapon in the stockpile has some components manufactured at Y-12.

Y-12 has five primary missions:

- Producing, refurbishing and dismantling nuclear weapons components;
- Safeguarding special nuclear materials;
- Preventing the proliferation of weapons of mass destruction;
- Providing the U.S. Navy with safe, effective nuclear propulsion systems; and
- Providing support for other national security needs and customers, as required.

**FACTS: Y-12**

- Sector Y
- Located on 800 acres in Anderson County off Bear Creek Road
- 2-½ miles long x ½ mile wide complex
- 4,500 BWXT Y-12 employees
- 80 NNSA employees
- 500 buildings
- 7 million square feet of floor space on 811 acres
- [www.y12.doe.gov](http://www.y12.doe.gov)

*See Map and Remember...*

I live in Sector: \_\_\_\_\_

I work in Sector: \_\_\_\_\_

Evacuation Locations for my Children's Schools:

For More Information:

- DOE Oak Ridge Office Public Affairs (865) 576-0885
- NNSA Y-12 Site Office Public Affairs (865) 576-9918
- Tennessee Emergency Management Agency 1-800-533-7343

This brochure is available on the DOE Emergency Communications Web Site at:

<http://www.oakridge.doe.gov/emergency>

Copies may also be obtained at:

The DOE Information Center  
475 Oak Ridge Turnpike  
Oak Ridge, Tennessee 37830  
(865) 241-4780