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, Oak Ridge National Laboratory Site Office, and Oak Ridge Office of Environmental Management

National Nuclear Security Administration Production Office Public Affairs

Tennessee Emergency Management Agency

This document is also available at: *http://science.energy.gov/isc/emergency-information/*

March 2014

Emergency Public Information

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How Safe is the Oak Ridge Reservation?

The Department of Energy (DOE) is committed to the safety of our employees, the public, and the environment. Our missions are complex. Transformational research, science, national security, environmental cleanup and the next generation of nuclear energy technology are performed at three sites in Oak Ridge:

- East Tennessee Technology Park
- Oak Ridge National Laboratory
- Y-12 National Security Complex

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 is very low. That's because of extensive environmental, safety and health programs in place at our sites to protect the health and safety of employees and the public. If something happens, DOE, contractors, and state and local government agencies are trained to respond and ensure public safety and environmental protection.

The following sections highlight actions you should take in the event of an emergency along with background information about facilities at the Oak Ridge Reservation. Preparation is crucial, so please take a moment to become familiar with what you will need to do if an emergency occurs on the Oak Ridge Reservation.

Oak Ridge Reservation

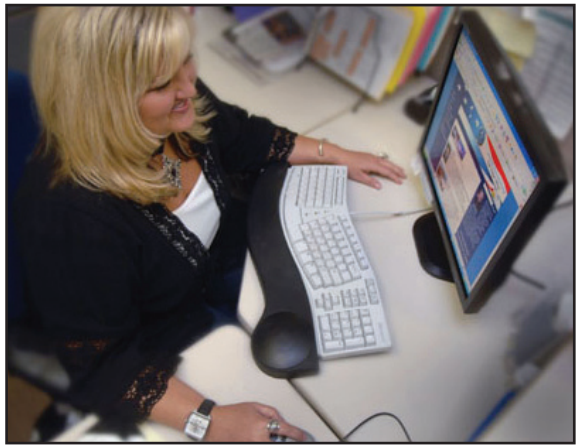
Key Emergency Information

What do I do if there is an emergency?

DOE is committed to public safety in the event an emergency arises. You will be informed of an emergency through the radio, television, and/or social media updates, and, depending on the level of emergency, the warning siren system and Emergency Alert System messages.

If an emergency occurs, emergency responders are dispatched to the scene and trained technical and management staff are called to the Emergency Operations Center. Conditions are assessed to determine what actions are necessary to protect the public and the environment. Information about the emergency will be provided through social media, news releases, and Emergency Alert System messages. The Emergency Alert System messages will provide specific protective actions the public should take, if necessary, as directed by the Tennessee Emergency Management Agency.

Often these events are confined to a building or site and only impact the employees working in the immediate area. Should an event impact the area beyond our site boundaries, warning sirens will sound to notify the public within two miles of the site. If you live in a potentially affected area, you may be asked to shelter-in-place or evacuate. The key is to stay tuned to the television, radio, and social media for instructions and the latest information.



The following pages of this book describe this process in detail. You will know the types of emergencies declared, some background on our sites, and a map of the sectors. By reading this publication, you will know what to do if an emergency occurs on the Oak Ridge Reservation.

Key Emergency Information

How We Notify the Public

For less severe emergencies, where 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.

If there is a release of hazardous materials resulting in a level of concern offsite, a combination of resources is utilized to notify the public to take protective actions. These include the Public Warning Sirens, the Emergency Alert System, social media, and news releases.

Categorization and Classification of Events

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

Events that do not involve the release of harmful levels of hazardous materials but require significant response by the site (such as evacuation of buildings and response by the Fire Department) are categorized as an **Operational Emergency**.

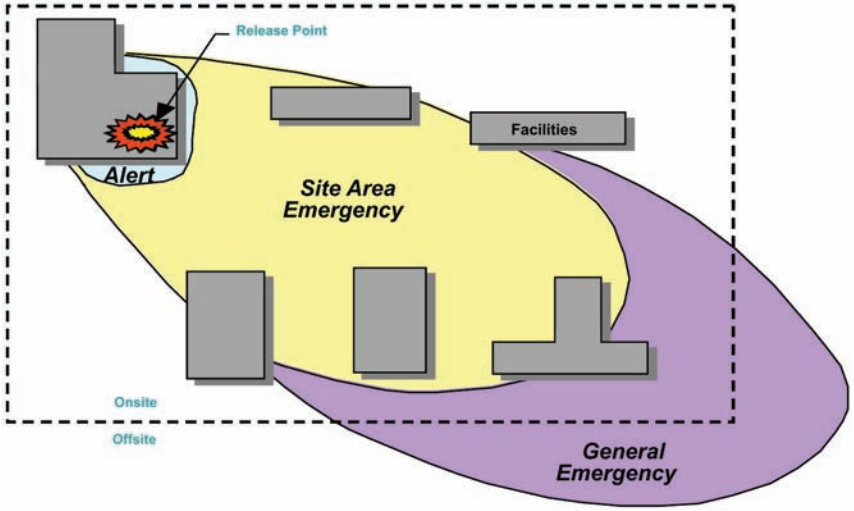
ORNL Fire Protection

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 (alert, site area emergency, general emergency).

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 airborne release not exceeding the facility boundary.

Site Area Emergency

Harmful airborne release that goes beyond the facility but is still onsite.

General Emergency

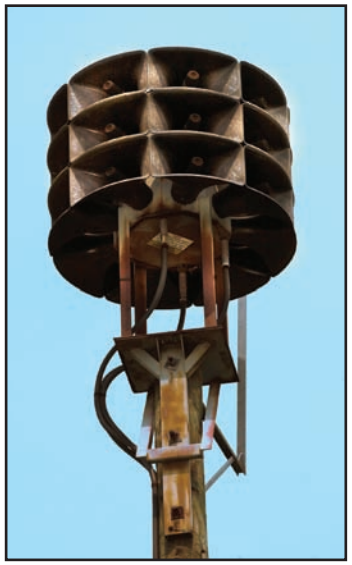
Harmful airborne release that has the potential to or has gone offsite.

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

If You Hear the Sirens

Public Warning Sirens

In the unlikely event that a release of hazardous materials causes a level of concern beyond the site's boundary, warning sirens will sound within two miles of the affected site. A steady wailing sound will be heard for three to five minutes.



Upon hearing the sirens, immediately go indoors or into a vehicle and tune to one of the local radio or television Emergency Alert System (EAS) stations for specific instructions. If you are on a lake or river, travel away from the sound of the sirens and tune to a local EAS station for specific instructions.

Emergency Alert System (EAS)

The EAS is a network of radio and television stations that provide emergency instructions to the public. The radio and television stations in the Oak Ridge area that broadcast EAS messages are listed on the following page. EAS messages providing specific protective action instructions may also be sent over 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.

Note: Public warning sirens are tested monthly, usually the first Wednesday between 11 a.m. and 2 p.m.

If You Hear the Sirens

EAS STATIONS

STATION NAME	STATION ID
EAS Radio	
WIVK (Primary - Knoxville)	FM 107.7
WJXB	FM 97.5
Local Television News	
WATE (regional ABC affiliate)	Channel 6
WBIR (regional NBC affiliate)	Channel 10
WVLT (regional CBS affiliate)	Channel 8
WTNZ (regional FOX affiliate)	Channel 43

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 will also be activated at (865) 362-8600 to answer questions from the public.

If You Are Advised to 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, the EAS will announce that sheltering-in-place has ended, and that it is safe 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 work, follow these guidelines:

Emergency Planning

- Write down the evacuation route and designated shelter provided by the EAS stations. These instructions will depend on what sector you are currently in (see map and shelter list) and what 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 evacuated.
- If you are at home, gather items you will need for a short stay away from home, such as:
  - ☐ This booklet
  - ☐ Medicine and all prescriptions
  - ☐ Personal health products
  - ☐ Special diet food and supplies
  - ☐ Food, water, and pet food
  - ☐ Blankets, pillows, and/or sleeping bag
  - ☐ Cash, checkbook, debit and credit credit cards, and important papers
  - ☐ Items for baby
  - ☐ Items for children
  - ☐ Change of clothing
  - ☐ Cell phone and charger

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 emergency management agency serving your residence to submit a special needs request.

Anderson County Emergency Management Agency	(865) 457-6765 or (865) 457-6767
Knox County/Knoxville Emergency Management Agency	(865) 215-1166
Loudon County Emergency Management Agency	(865) 458-7298
Roane County Office of Emergency Services	(865) 717-4115

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 transported by school officials to the following pre-determined locations.

School administration will handle emergency actions at their facilities.

[PARENTS: DO NOT pick up your children until you are told it is safe.]

ETTP Two-Mile Sector (K) School Relocations

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

ORNL Two-Mile Sector (X) School Relocations

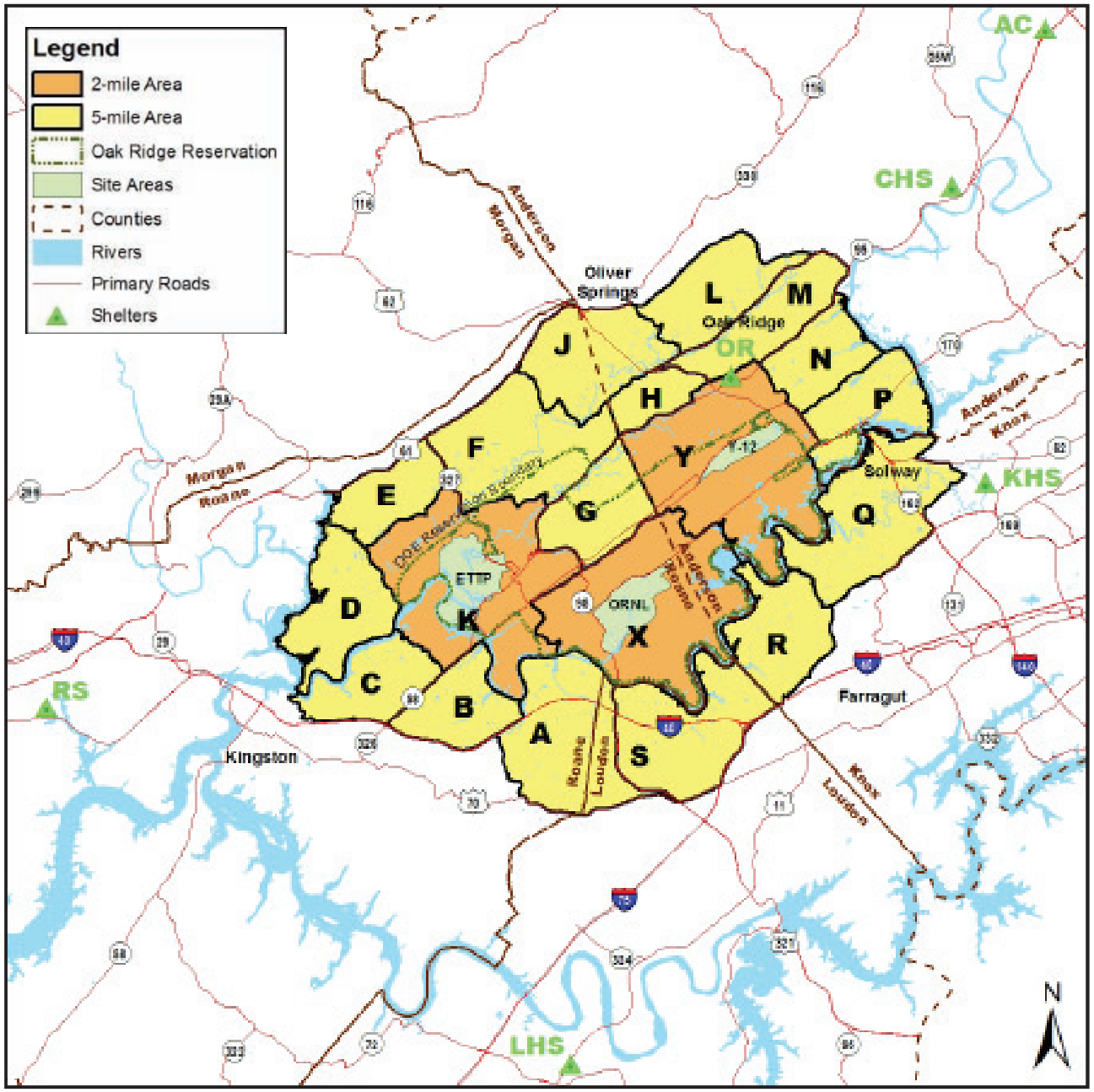
There are no permanent residences or schools located in the ORNL Immediate Notification Zone, which is entirely within the DOE Oak Ridge Reservation.

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.

Emergency Planning Sectors



Evacuation Shelters by Sector

Site

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

Evacuation Shelters by Sector

Legend:
AC - Anderson County High School
CHS - Clinton High School
KHS - Karns High School
LHS - Loudon High School
OR - Oak Ridge High School
RS - Roane State Community College

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

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

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

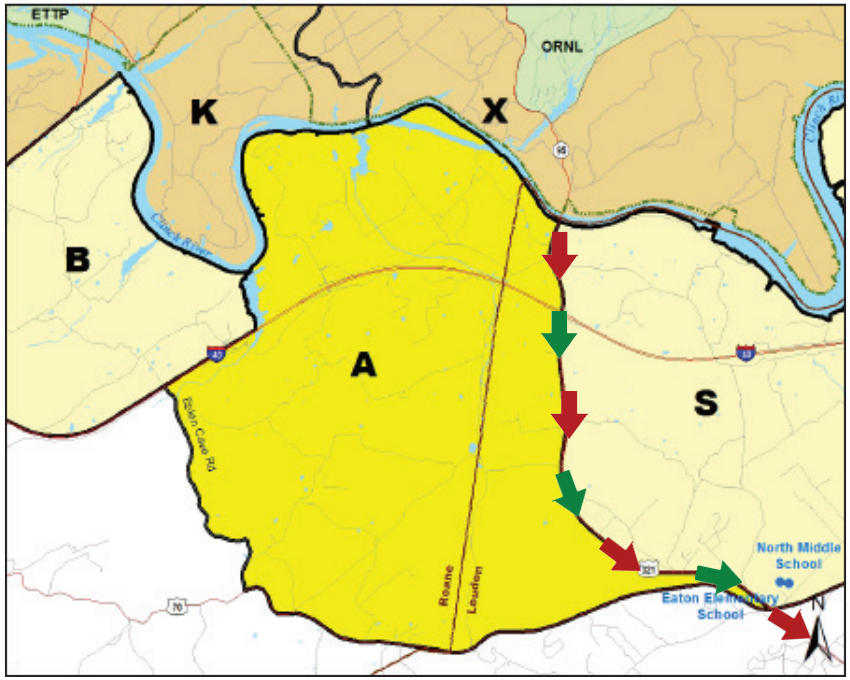
Where the Shelters are Located

Karns High School
2710 Byington Solway Road
Knoxville, Tennessee 37931

Loudon High School
1039 Mulberry St.
Loudon, Tennessee, 37774

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

Sector A



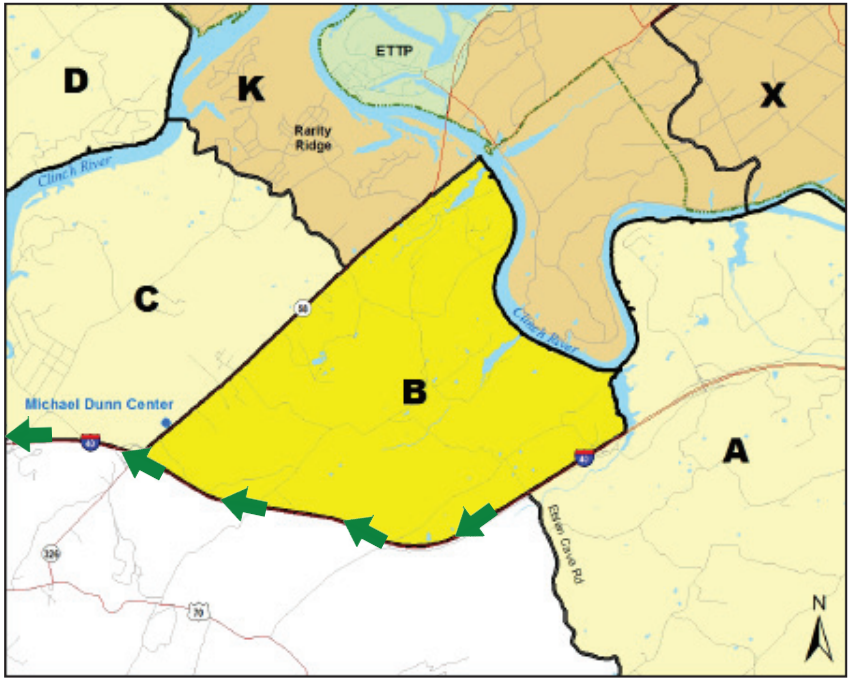
Relocation Shelters for Sector A

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

Loudon High School
1039 Mulberry St
Loudon, Tennessee, 37774

Take the most direct route to southbound Interstate 75. Travel south on Interstate 75 to Exit #72. Turn left (eastbound) onto State Route 72 towards Loudon. Travel east on State Route 72 for 2.3 miles to U.S. Highway 11. Turn left onto U.S. Highway 11 (northbound) to Loudon High School.

Sector B



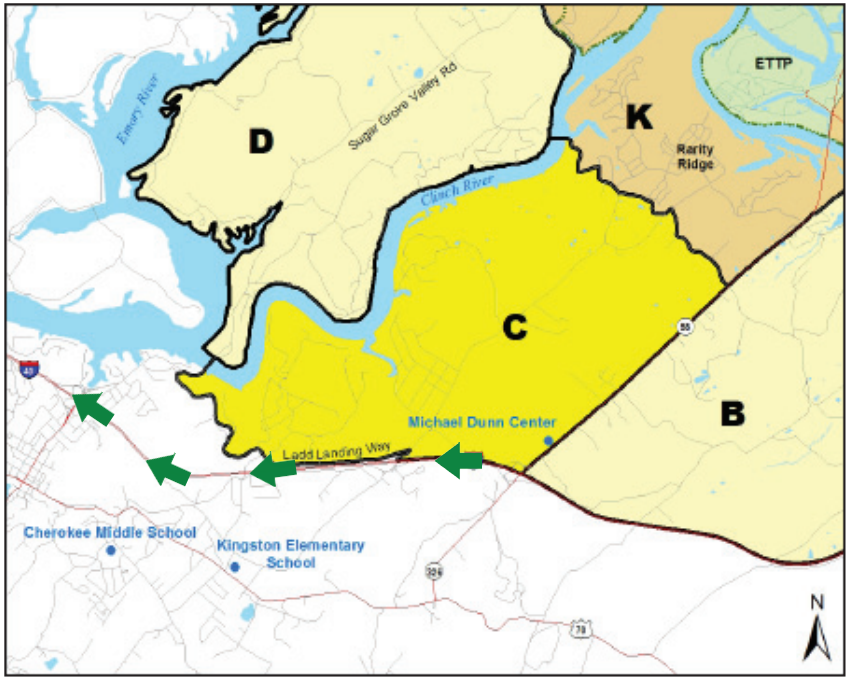
Relocation Shelters for Sector B

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 the most direct route to westbound Interstate 40. Travel west on Interstate 40 to Exit #347. Turn left onto State Route 61 (westbound) towards Rockwood. Travel 2.2 miles on State Route 61 to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

Sector C



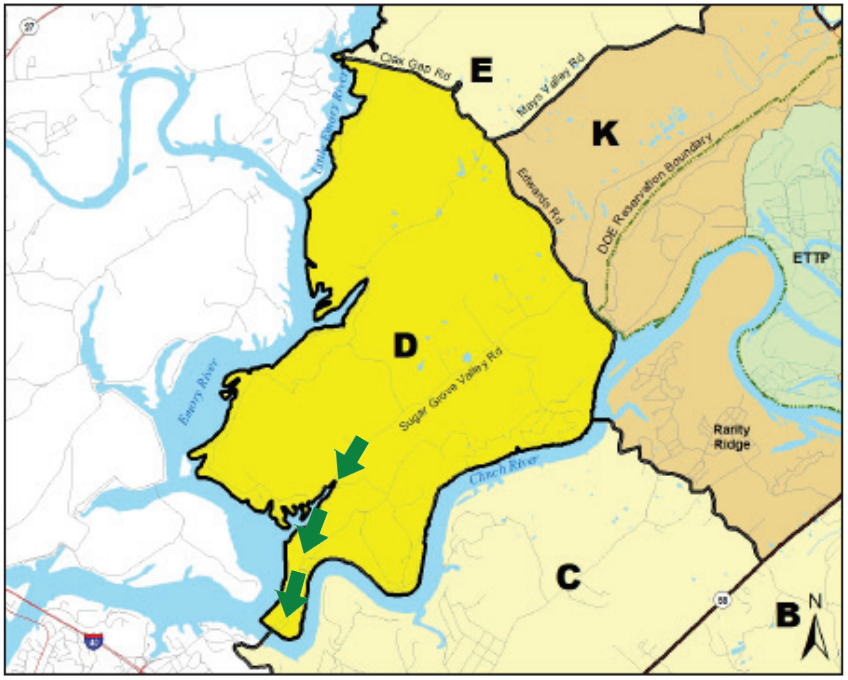
Relocation Shelters for Sector C

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

Roane State Community College
276 Patton Lane
Harriman, Tennessee 37748

Take the most direct route to westbound Interstate 40. Travel west on Interstate 40 to Exit #347. Turn left onto State Route 61 (westbound) towards Rockwood. Travel 2.2 miles on State Route 61 to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

Sector D



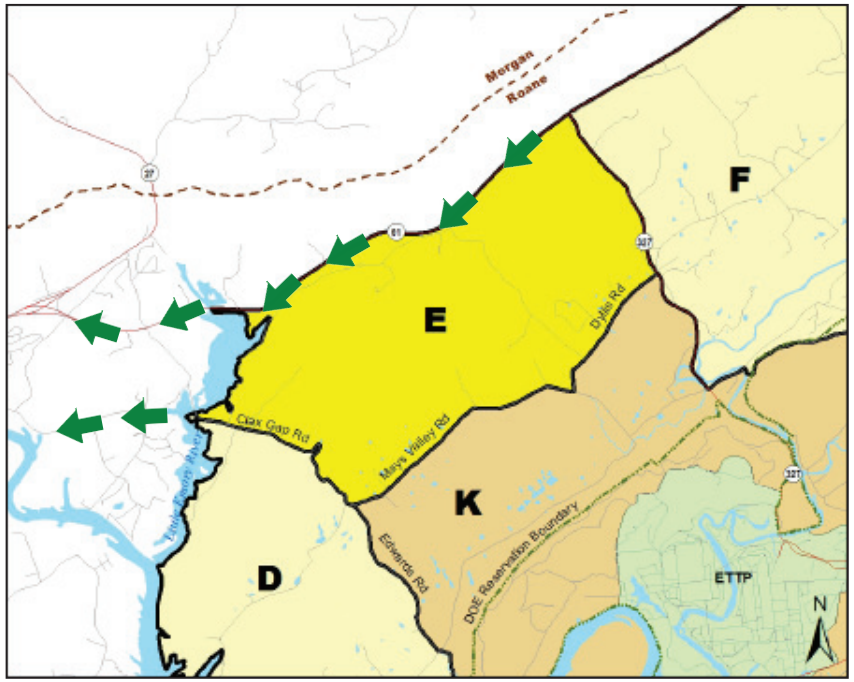
Relocation Shelters for Sector D

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

Roane State Community College
276 Patton Lane
Harriman, Tennessee 37748

Take the most direct route to Sugar Grove Valley Road. Take southbound Sugar Grove Valley Road over the Clinch River to North Kentucky Street. Travel south on North Kentucky Street to Interstate 40. Travel west on Interstate 40 to Exit #347. Turn left onto State Route 61 (westbound) towards Rockwood. Travel 2.2 miles on State Route 61 to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

Sector E



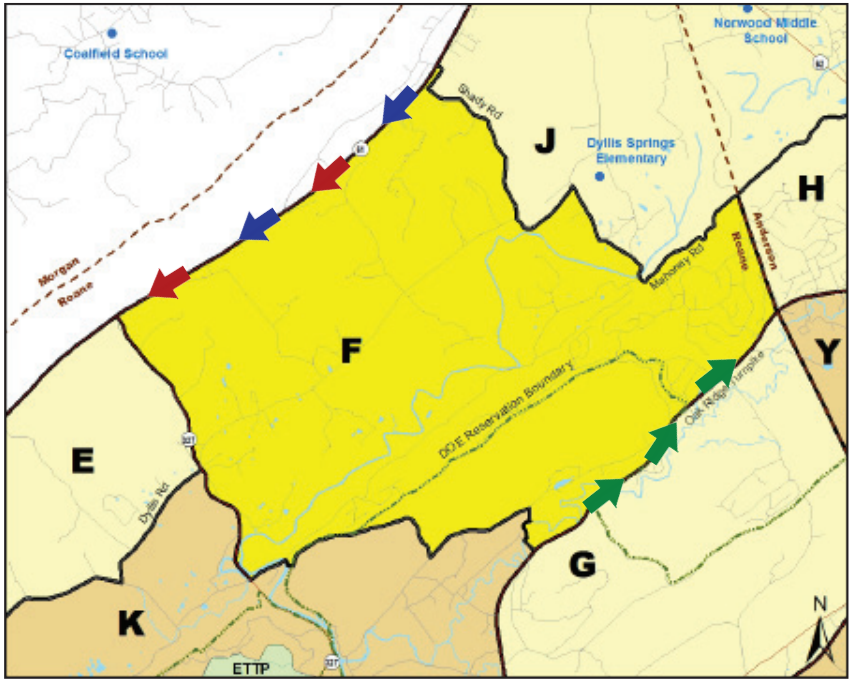
Relocation Shelters for Sector E

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 the most direct route to westbound State Route 61 (Harriman Highway). Travel west on State Route 61 to U.S. Highway 27. Travel south on U.S Highway 27 towards Rockwood for 8.8 miles to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

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

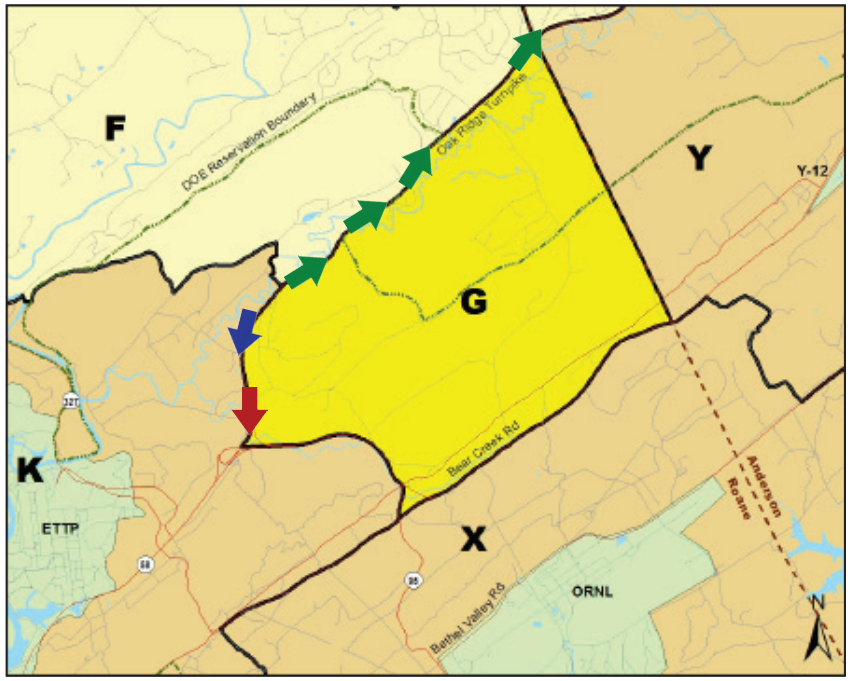
Take the most direct route to northbound State Route 95 (Oak Ridge Turnpike) to the City of Oak Ridge. Oak Ridge High School is on your left 0.5 miles past the intersection of State Route 95 and State Route 62 (Illinois Avenue).

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 the most direct route to westbound State Route 61 (Harriman Highway). Travel west on State Route 61 to U.S. Highway 27. Travel south on U.S Highway 27 towards Rockwood for 8.8 miles to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

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

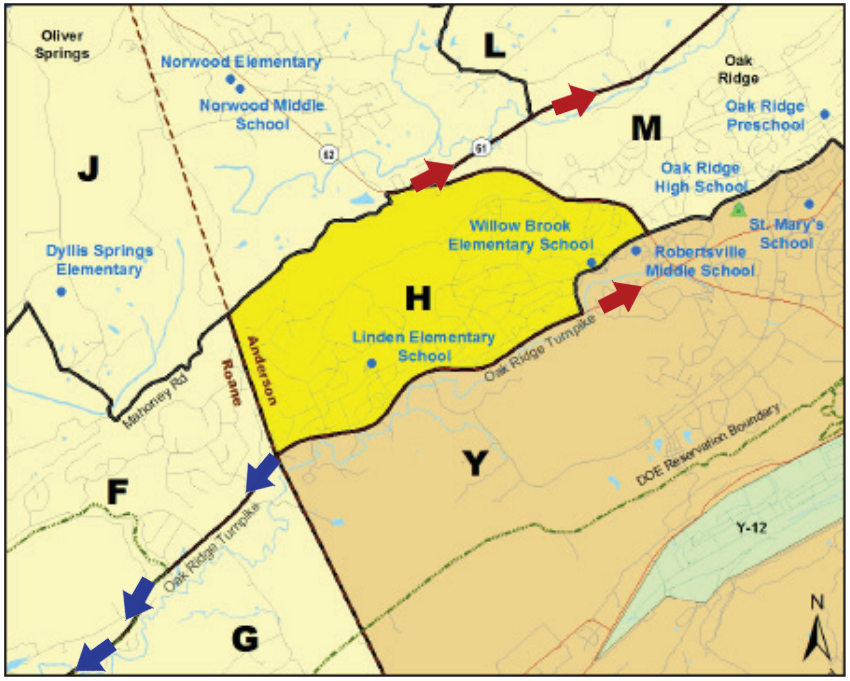
Take the most direct route to northbound State Route 95 (Oak Ridge Turnpike) to the City of Oak Ridge. Oak Ridge High School is on your left 0.5 miles past the intersection of State Route 95 and State Route 62 (Illinois Avenue).

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 the most direct route to westbound State Route 58 (Gallaher Road) to Interstate 40. Travel west on Interstate 40 to Exit #347. Turn left (westbound) onto State Route 61 towards Rockwood. Travel 2.2 miles on State Route 61 to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

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

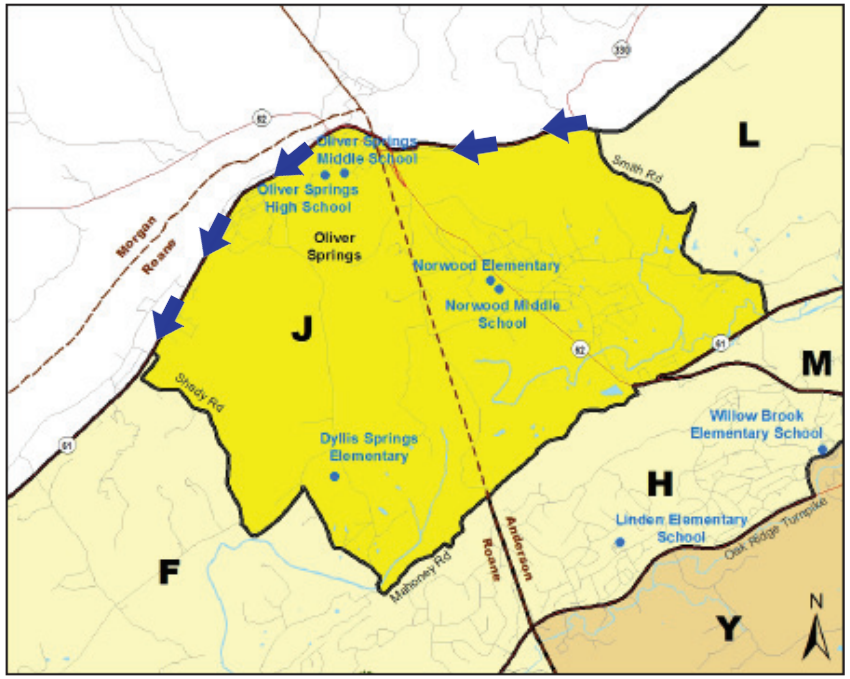
Take the most direct route to State Route 61 (via either State Route 61 or State Route 95) eastbound to Clinton. Turn left onto Maverick Circle to Anderson County High School, which is 4.7 miles past the intersection of State Route 61 and U.S. Highway 25 (Clinton Highway).

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 the most direct route to State Route 58.Take southbound State Route 58 (Gallaher Road) to Interstate 40. Travel west on Interstate 40 to Exit #347. Turn left onto State Route 61 (westbound) towards Rockwood. Travel 2.2 miles on State Route 61 to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

Sector J



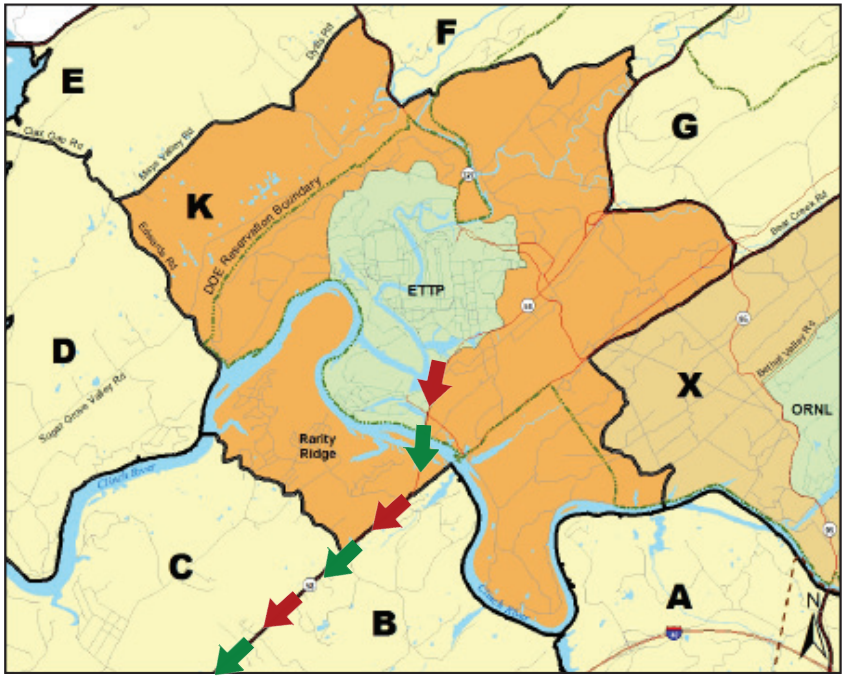
Relocation Shelters for Sector J

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 the most direct route to westbound State Route 61 (Harriman Highway). Travel west on State Route 61 to U.S. Highway 27. Travel south on U.S Highway 27 towards Rockwood for 8.8 miles to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

Sector K



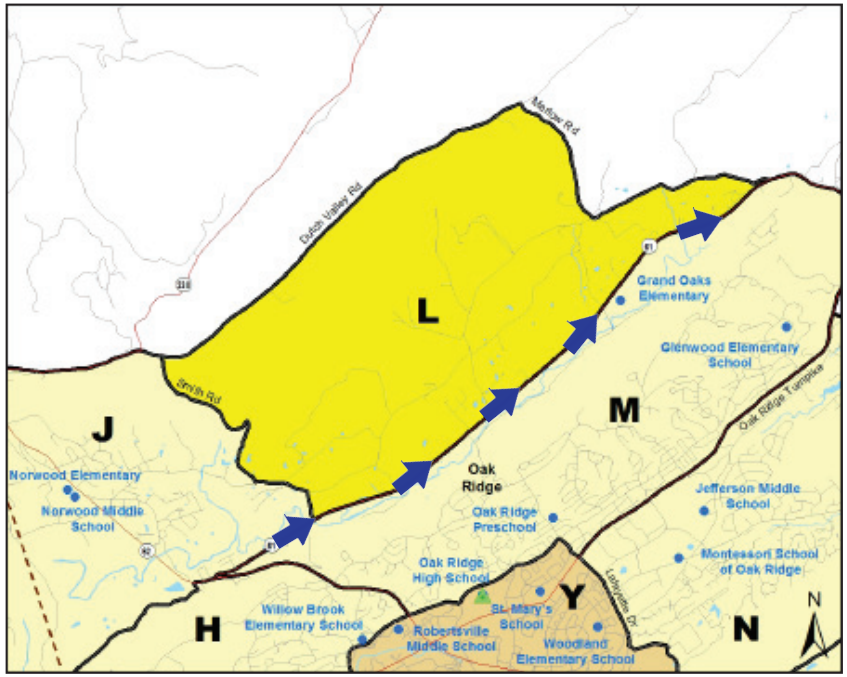
Relocation Shelters for Sector K

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

Roane State Community College
276 Patton Lane
Harriman, Tennessee 37748

Take the most direct route to westbound Interstate 40. Travel west on Interstate 40 to Exit #347. Turn left onto State Route 61 (westbound) towards Rockwood. Travel 2.2 miles on State Route 61 to State Route 382 (Patton Lane). Turn left onto State Route 382 (Patton Lane) to Roane State Community College.

Sector L



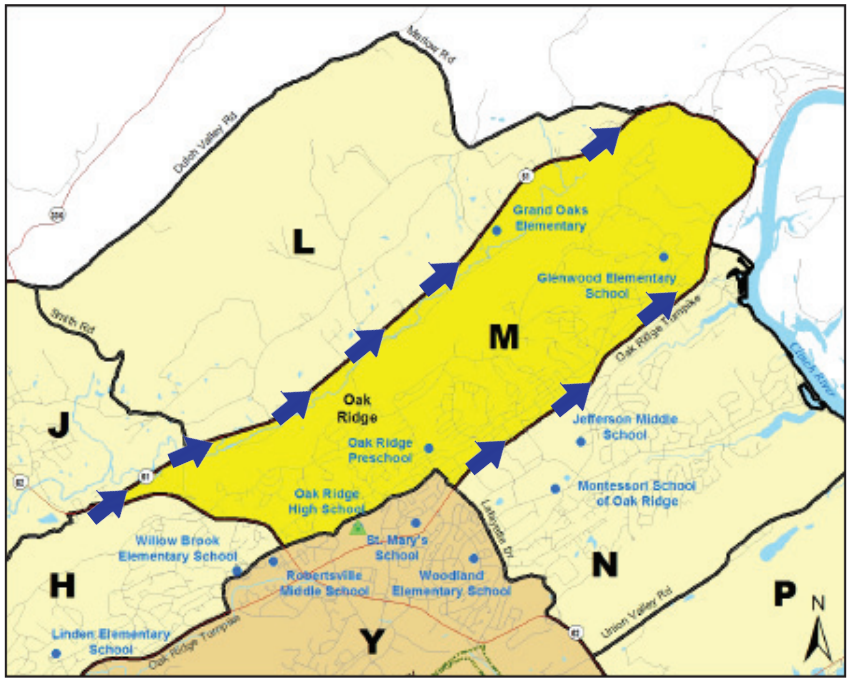
Relocation Shelters for Sector L

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 the most direct route to State Route 61 eastbound to Clinton. Turn left onto Maverick Circle to Anderson County High School, which is 4.7 miles past the intersection of State Route 61 and U.S. Highway 25 (Clinton Highway).

Sector M



Relocation Shelters for Sector M

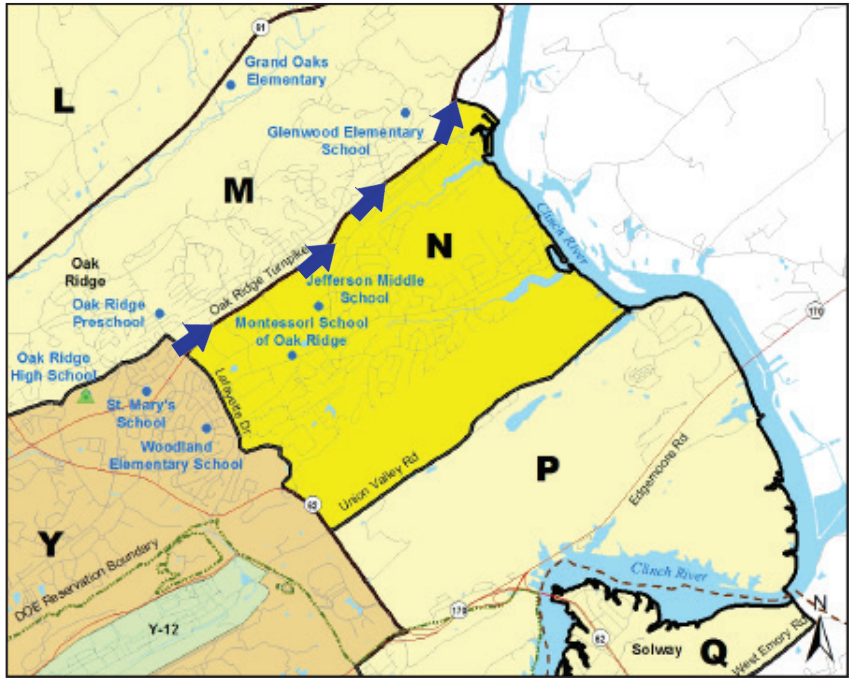
If there is an emergency at **Y-12** requiring evacuation, Sector M reports to the shelter at:

Anderson County High School
130 Maverick Circle
Clinton, Tennessee 37716

Take the most direct route to State Route 61 eastbound to Clinton. Turn left onto Maverick Circle to Anderson County High School, which is 4.7 miles past the intersection of State Route 61 and U.S. Highway 25 (Clinton Highway).

Note: Residents from Sector M will be routed to Karns High School once they report to Anderson County High School.

Sector N



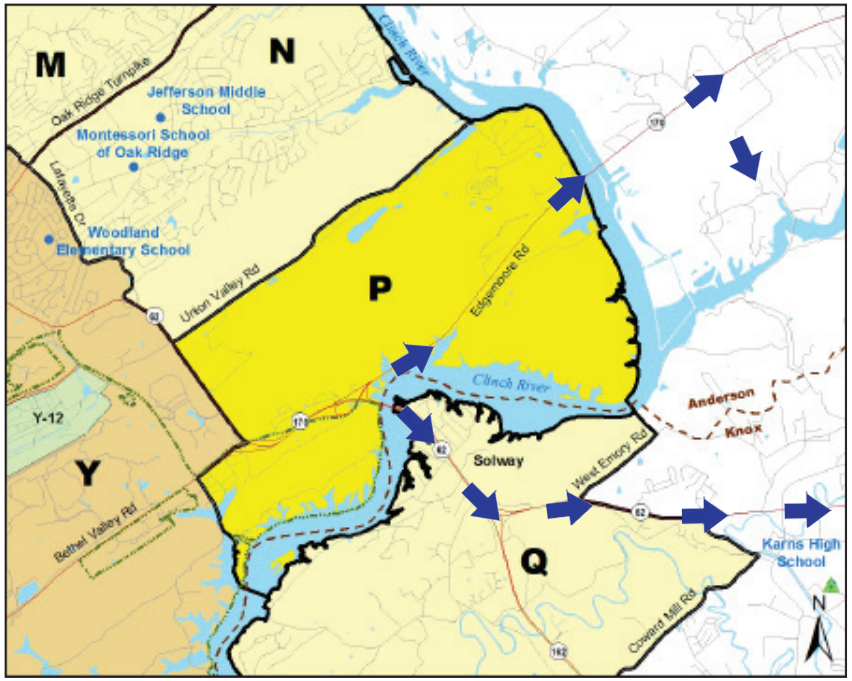
Relocation Shelters for Sector N

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 the most direct route to northbound State Route 95 (Oak Ridge Turnpike).Take State Route 61 eastbound to Clinton. Turn left onto Hillcrest Street, then right onto Dragon Drive to Clinton High School.

Sector P



Relocation Shelters for Sector P

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

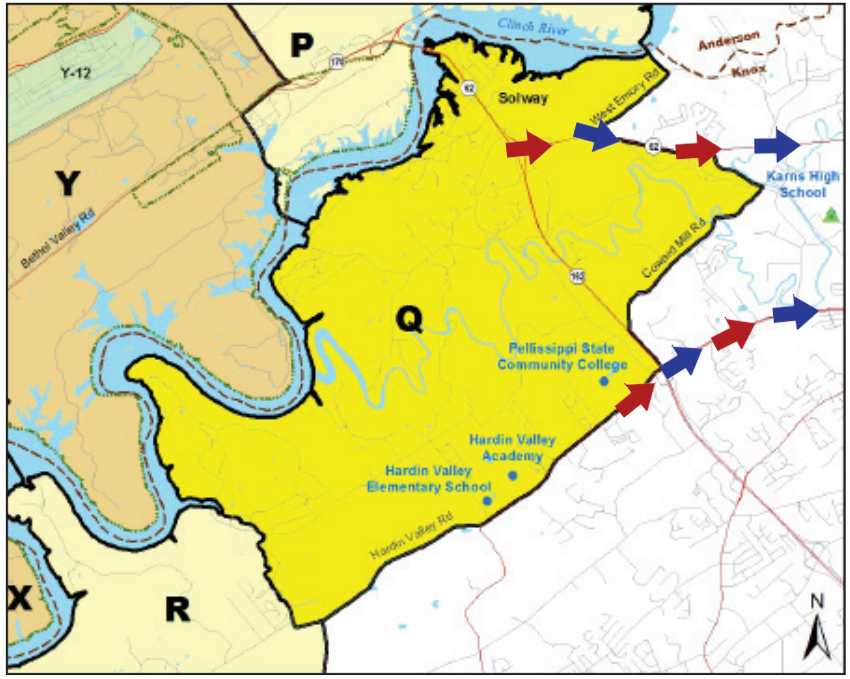
Karns High School
2710 Byington Solway Road
Knoxville, Tennessee 37931

Take the most direct route to eastbound State Route 170 (Edgemoor Road). Turn right (southbound) onto New Henderson Road (becomes Henderson Road). Travel South on Henderson Road to West Emory Road. Take a left (Eastbound) on to West Emory Road to State Route 131 (Beaver Ridge Road). Turn right (southbound) onto Beaver Ridge Road crossing Oak Ridge Highway onto Byington Beaver Ridge Road. Turn right onto Byington Solway Road to Karns High School.

OR

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

Sector Q



Relocation Shelters for Sector Q

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

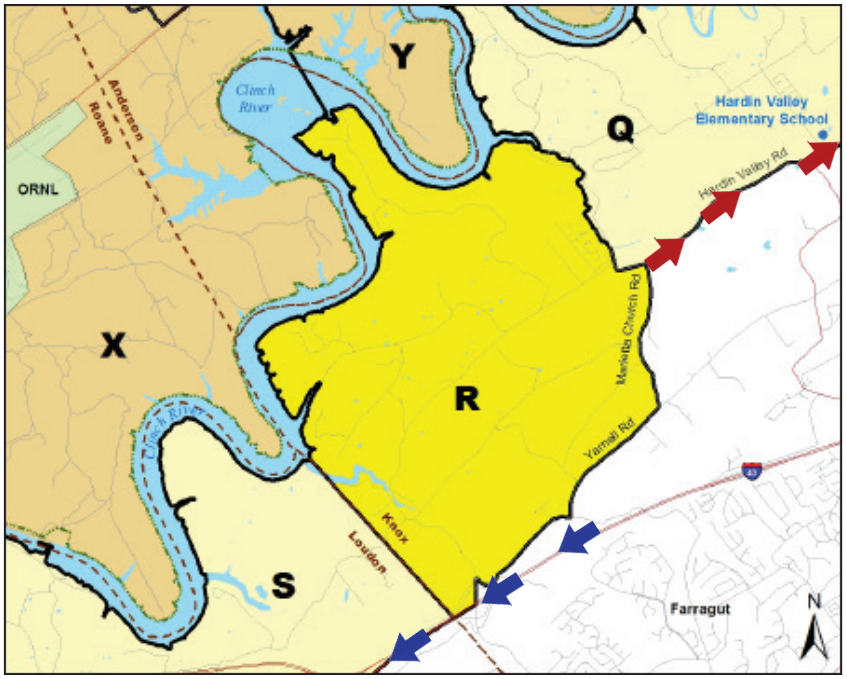
Karns High School
2710 Byington Solway Road
Knoxville, Tennessee 37931

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

OR

Take the most direct route to Hardin Valley Road (eastbound). Turn left onto Westcott Blvd. Continue right on Westcott Blvd and straight onto Byington Solway Road 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

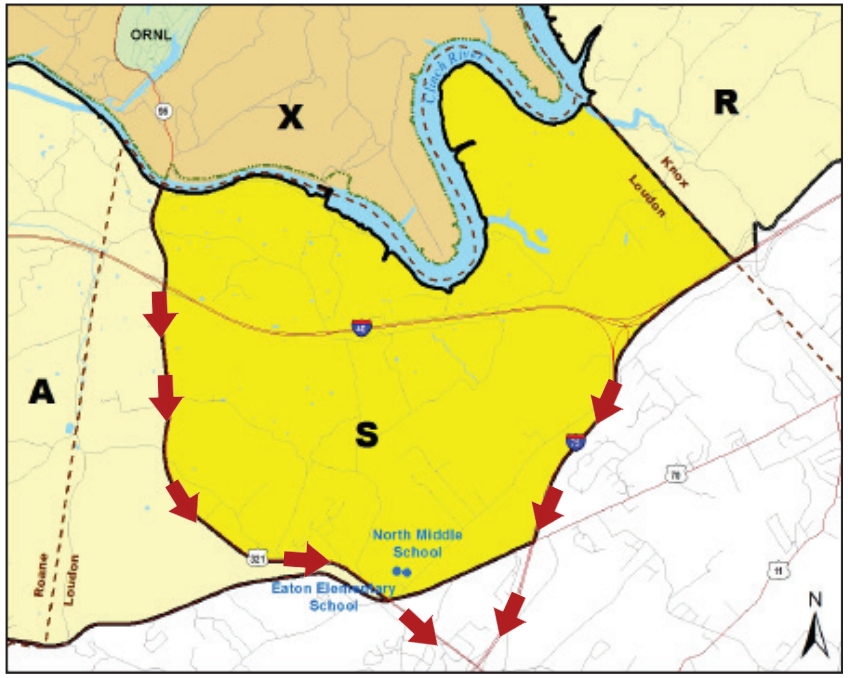
Take the most direct route to eastbound Hardin Valley Road. Turn left (northbound) onto State Route 131 (Ball Camp Byington Road). Turn left onto Crosslane Road. Turn right onto Byington Solway Road to Karns High School.

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

Loudon High School
1039 Mulberry St.
Loudon, Tennessee, 37774

Take the most direct route to southbound Interstate 75. Travel south on Interstate 75 to Exit #72. Turn left (eastbound) onto State Route 72 towards Loudon. Travel east on State Route 72 for 2.3 miles to U.S. Highway 11. Turn left onto U.S. Highway 11 (northbound) to Loudon High School.

Sector S



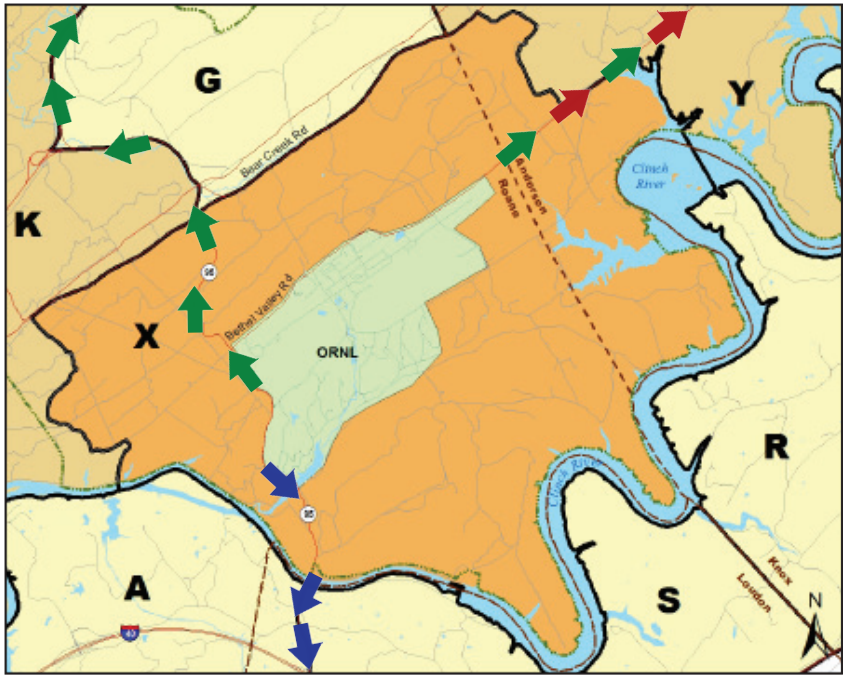
Relocation Shelter for Sector S

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

Loudon High School
1039 Mulberry St.
Loudon, Tennessee, 37774

Take the most direct route to southbound Interstate 75. Travel south on Interstate 75 to Exit #72. Turn left (eastbound) onto State Route 72 towards Loudon. Travel east on State Route 72 for 2.3 miles to U.S. Highway 11. Turn left onto U.S. Highway 11 (northbound) to Loudon 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 the most direct route to northbound State Route 95 (Oak Ridge Turnpike) to the City of Oak Ridge. Oak Ridge High School is on your left 0.5 miles past the intersection of State Route 95 and State Route 62 (Illinois Avenue).

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

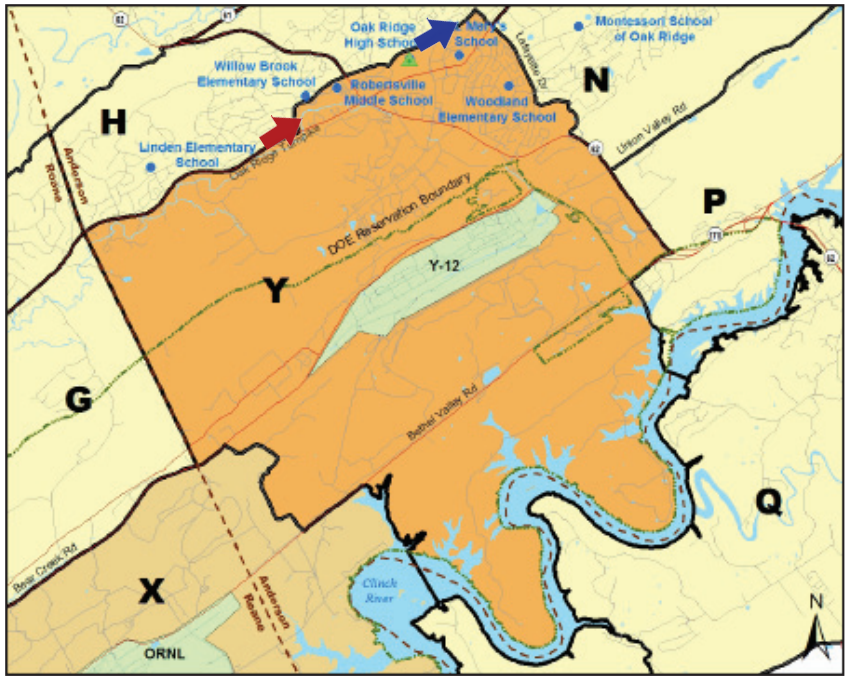
Take the most direct route to State Route 62 (Oak Ridge Highway) eastbound towards Knoxville. Turn right (southbound) onto State Route 131 (Byington Beaver Ridge Road). Turn right onto Byington Solway Road to Karns High School.

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

Loudon High School
1039 Mulberry St.
Loudon, Tennessee, 37774

Take the most direct route to southbound Interstate 75. Travel south on Interstate 75 to Exit #72. Turn left (eastbound) onto State Route 72 towards Loudon. Travel east on State Route 72 for 2.3 miles to U.S. Highway 11. Turn left onto U.S. Highway 11 (northbound) to Loudon High School.

Sector Y



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 the most direct route to northbound State Route 95 (Oak Ridge Turnpike).Take State Route 61 eastbound to Clinton. Turn left onto Hillcrest Street. Turn 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 the most direct route to State Route 61 eastbound to Clinton. Turn left onto Maverick Circle to Anderson County High School, which is 4.7 miles past the intersection of State Route 61 and U.S. Highway 25 (Clinton Highway).

Emergency Supplies Checklist

To help you prepare for any type of emergency, two supply lists are provided for your assistance.

The first list contains items you may need to keep in your home to aid in response to any emergency. The second list recommends supplies you should take with you if you are asked to evacuate. Add any additional supplies that you need. You may desire to prepare a to-go 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: (For at least 72 hours)

- 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, water, and pet food
- Blankets, pillows, and/or sleeping bag
- Cash, checkbook, debit and credit credit cards, and important papers
- Items for baby (diapers, formula, clothing)
- Items for children (toys, books, clothing)
- Change of clothing
- Cell phone and charger

About Radiation

What is radiation?

Radiation is a form of energy that is a part of our everyday lives. We are exposed to radiation every day. Most of the radiation dose we are exposed to 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 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.

The average dose to a member of the U.S. population is about 620 mrem. About 310 mrem is from natural sources, and the other 310 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 activities on the Oak Ridge Reservation in 2012 was 3 mrem. It is very unlikely any one person could have actually received this dose.

About Radiation

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 types of 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. Even 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.

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
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
**Maximum possible from normal operations on the Oak Ridge Reservation*	*3 millirem/year*

**Source, 2012 DOE Annual Site Environmental Report Summary*

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 used carelessly. 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 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.

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 the Department of Energy's facilities in Oak Ridge is included in this Inventory.

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 levels of material 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.

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 transitioning the site into a privately owned and operated industrial park. URS|CH2M Oak Ridge LLC (UCOR) is conducting cleanup at the site. As cleanup is completed, DOE transfers ownership of the uncontaminated buildings and land to the Community Reuse Organization of East Tennessee (CROET), who in turn leases this property for immediate private industrial use.

East Tennessee Technology Park

Some of the key facilities include:

K-27 Demolition Project

The K-27 Building is a rectangular building that is approximately 374,000 square feet. It was built in 1945. The building contains radioactive contamination and hazardous materials. The Office of Environmental Management plans to demolish it as quickly as possible.

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.

Several hundred above-ground facilities, including buildings, tanks, sheds, and other structures have been demolished. Most had actual or potential elevated concentrations of radiological and/or other hazardous substances.

The program has already removed large uranium enrichment facilities, such as K-25, K-29, K-33, the ETTP Steam Plant, the former administration building, cafeteria, and medical facility. 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.

K-27

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.

Oak Ridge National Laboratory

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 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.

Spallation Neutron Source

Oak Ridge National Laboratory

High Flux Isotope Reactor

The High Flux Isotope Reactor (HFIR) began full-power operations in 1966 and is the highest flux reactor-based source of neutrons for research in the United States. It provides one of the highest steady-state neutron fluxes of any research reactor in the world.

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 and industrial and medical applications. Today, HFIR's main mission is neutron scattering 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 Wastren Advantage Inc. The site is located on 5.2 acres of land off Highway 95.

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.

Oak Ridge National Laboratory

The site is the only facility of its type in the region specifically designed to accomplish this mission.

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 today's commercial power reactors do, 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.

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.

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

Radiochemical Development Facility - Building 3019

Building 3019 is the one of the nation's few repositories for uranium-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 uranium-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.

Y-12 National Security Complex

Y-12 National Security Complex

The **Y-12 National Security Complex (Y-12)** is a key site in the U.S. Nuclear Security Enterprise and is responsible for uranium storage, processing and manufacturing operations. Y-12 is managed by B&W Y-12 LLC for the National Nuclear Security Administration (NNSA) Production Office.

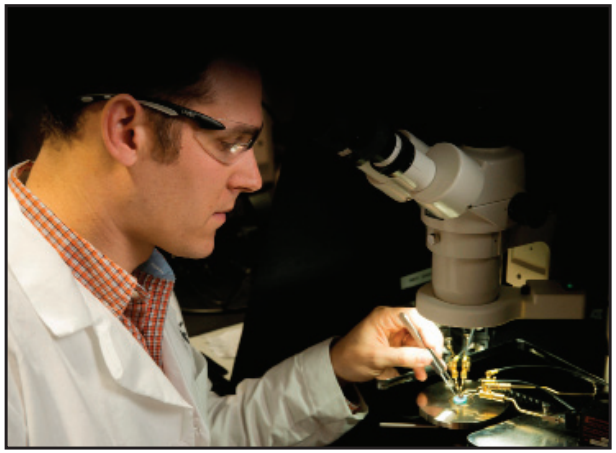
Y-12 is responsible for maintaining the safety, security and effectiveness of the U.S. nuclear weapons stockpile. Weapons component production, surveillance, dismantlement and storage are four distinct facets of this mission. ***Production*** includes the manufacture of new components, which oftentimes are combined with recycled components into subassemblies. This process, referred to as refurbishment, extends the lifetimes of systems in the active weapons stockpile and ensures their effectiveness. Another aspect of this mission is ***surveillance*** testing, which determines how weapons in the active stockpile are aging. ***Dismantlement*** involves separating components of retired weapons and recovering nuclear materials from them. Safe and secure ***Storage*** occurs throughout all these processes.

Y-12 works with NNSA and other federal agencies to secure vulnerable nuclear materials domestically and internationally. Activities encompass detection, removal and security of nuclear material and ultimately doing the swords-to-plowshares work of making weapons material available for peaceful uses such as fueling research reactors and producing medical isotopes. Through NNSA's Global Threat Reduction Initiative, Y-12 safely secures materials and transports them to Y-12 for ultimate storage

Facts: Y-12

- Sector Y
- Located on 811 acres in Anderson County on Bear Creek Road
- 2-½ miles long x ½ mile wide complex
- 4,800 B&W Y-12 employees
- 69 NPO employees at Y-12
- 343 buildings
- 7.3 million square feet of floor space on 811 acres
- www.y12.doe.gov

Y-12 National Security Complex



million lives worldwide. Afterward, Y-12 provided lithium separation and key components for the thermonuclear weapons that helped end the Cold War. Using its precision machining capabilities, Y-12 produced the "moon boxes" in which Apollo astronauts brought material from the lunar surface back to Earth. Y-12's expertise in machining, handling and protecting radiological materials has made the Oak Ridge site central to the nation's nuclear security.

or disposition. Additionally, Y-12 works domestically and internationally to ensure that materials are appropriately protected through training of protective forces.

Y-12 provides highly enriched uranium (HEU) used in the fabrication of fuel for reactors in the Navy's nuclear-powered aircraft carriers and submarines under an agreement with NNSA's Naval Reactors Office requiring the availability of HEU through 2050.

Constructed as part of the World War II Manhattan Project, Y-12 provided the enriched uranium for "Little Boy," the atomic bomb dropped on Hiroshima, Japan, to help the United States and her allies end a war that had taken 63

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 Production Office
(865) 576-9918

Tennessee Emergency Management Agency
1-800-533-7343

This brochure is available on the DOE Emergency Communications website at:

http://science.energy.gov/isc/emergency-information/