



2019
DO NOT DISCARD

Emergency Planning Information Calendar

For the neighbors of Callaway Energy Center





STAY IN CONTACT



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**STATE EMERGENCY
MANAGEMENT AGENCY**
2302 MILITIA DRIVE
P.O. BOX 116
JEFFERSON CITY, MO 65102
PHONE: (573) 526-9100
FAX: (573) 634-7966



OUR MISSION:
THE STATE EMERGENCY MANAGEMENT AGENCY'S MISSION IS TO HELP OUR FELLOW MISSOURIANS PREPARE FOR, RESPOND TO AND RECOVER FROM ALL EMERGENCIES. EACH STEP WILL BE GUIDED BY OUR CORE VALUES OF RESPECT, INTEGRITY, TRUST, HONESTY AND COMPASSION.



CALLAWAY ENERGY CENTER FACTS AND STATISTICS

OPERATING PERFORMANCE

- The Callaway Energy Center is a highly-efficient, low-cost source of electricity for Ameren Missouri's 1.2 million customers. In 2017, the plant was the second-largest energy producer on the Ameren system — accounting for 19 percent of Ameren Missouri's generation. Its net generation of 8.3 million megawatt-hours of electricity was enough to supply the needs of 800,000 average households.
- In 2017, the Callaway Energy Center generated 8.3 million megawatt-hours of electricity. Through 2017, Callaway achieved the fourth highest lifetime generation among the 99 nuclear power plants operating in the United States, and 12th highest in the world out of 425 nuclear plants operating in 30 countries for which data was available.
- In 2016-17, the Callaway Energy Center operated continuously for 514 days, achieving what is known in the industry as a "breaker-to-breaker" run — which means it operated from one refueling to the next without ever being out of service. This marked Callaway's fourth breaker-to-breaker run since it began operating in 1984, the first coming in 2008 (520 days), second in 2012 (489 days), and third in 2013 (500 days). Callaway is one of only 26 of the nation's 99 nuclear plants to achieve a breaker-to-breaker run.
- Reliable, low-cost electricity from the Callaway Energy Center has been a key factor in keeping the price of electricity low for Ameren Missouri's 1.2 million customers. Ameren Missouri's electric rates are the lowest of any investor owned utility in Missouri.
- Ameren Missouri has sufficient installed spent fuel storage capacity at Callaway Energy Center until 2044.* This capacity includes wet pool storage within the Energy Center, as well as the recently completed dry cask storage system built next to the Energy Center. This level of storage capacity will be sufficient for the licensed life of the Energy Center.

SAFETY PERFORMANCE

- The Callaway Energy Center has established a strong record of safe operation throughout its 30-year operating history.
- In annual performance assessments, the U.S. Nuclear Regulatory Commission (NRC) staff has consistently reported that the plant operated in a manner that preserved public health and safety.
- The Callaway Energy Center also is a very safe place to work. In 2006, the plant received the prestigious Edison Electric Institute (EEI) Safety Achievement Award for outstanding worker safety.
- The Callaway Energy Center received a 2013 Electric Power Research Institute (EPRI) Technology Transfer Award for its plans to implement water jet peening for mitigation of primary water stress corrosion cracking in U.S. Nuclear Power Plants.

BENEFITS TO THE STATE AND LOCAL ECONOMY

- The Callaway Energy Center is a major source of good-paying jobs, with more than 800 Ameren Missouri employees and contractors working there. During refueling outages, which occur every 18 months, hundreds of supplemental workers are typically brought in for several weeks — providing a significant additional boost to the local economy.
- The Callaway Energy Center is a major source of tax revenue to fund education and other critical services. On average, the plant accounts for about \$9.8 million of Ameren Missouri's annual property taxes paid to Callaway County, with about \$6.9 million of that amount going to local schools. In addition, assessed values based on Ameren Missouri's investment in the plant typically result in an additional \$21.5 million in taxes shared by the remaining 66 Missouri counties where the company has facilities.



Photo courtesy of Callaway Co-Worker, Rigel Davis.

SECURITY

- Ameren Missouri has spent more than \$24 million on security enhancements and additional security manpower since the Sept. 11, 2001 terrorist attacks on New York and Washington, D.C. For the U.S. nuclear power industry as a whole, such expenditures have totaled more than \$2 billion.
- Security enhancements at Callaway have included:
 - Extending and fortifying security perimeters around the plant
 - Increasing patrols within security zones
 - Installing new barriers to provide greater protection against vehicle bombs
 - Installing additional high-tech surveillance equipment
 - Strengthening the coordination of security efforts with local, state and federal agencies
- Plant security is routinely tested in drills and exercises every year. In addition, the NRC conducts "force on force" exercises at each plant, using highly-trained paramilitary personnel, at least once every three years.
- The most recent force-on-force exercise was conducted at Callaway in 2017. Although details are confidential, plant security personnel performed at a very high level, resulting in no regulatory findings, violations or unresolved items.

*License extended through 2044 by the Nuclear Regulatory Commissions in March 2015.

IMPORTANT PHONE NUMBERS

Callaway County
Emergency Management Director573.592.2480

Gasconade County
Emergency Management Director573.486.3621

Montgomery County
Emergency Management Director573.564.2283

Osage County
Emergency Management Director573.897.3561

Emergency Preparedness Office 573.676.8111

State Emergency Management Agency573.526.9100

COUNTY AGRICULTURAL EMERGENCY CONTACTS

Callaway County573.592.1400

Gasconade County573.437.3478

Montgomery County573.564.3733

Osage County573.897.2138

COUNTY NUMBERS

Fulton Police573.592.3100

Callaway County Sheriff573.642.7291

Gasconade County Sheriff573.486.3880 or 573.437.7700

Montgomery County Sheriff573.564.8084

Osage County Sheriff573.897.3107

All emergencies911

IF A GENERAL EMERGENCY IS DECLARED

Ameren Missouri Customer Contact Center877.640.5876

STAY IN CONSTANT CONTACT THROUGH SOCIAL MEDIA!

CALLAWAY COUNTY

 /callawayema
 @CallawayEMA

GASCONADE COUNTY

 /gasconadecountyema
 @gascoemd

MONTGOMERY COUNTY

 Search Montgomery
County Emergency

OSAGE COUNTY

 /osagecountymo
 @osagecountyeoc

ABOUT THIS CALENDAR

This calendar provides information to assist you and your family if there is a local nuclear emergency. For further information contact:

Emergency Preparedness Office

Ameren Missouri
8315 County Road 459
Steedman, MO 65077
573.676.8111

State Emergency Management Agency

2302 Militia Drive
Jefferson City, Missouri 65101
573.526.9100

Emergency Management Director

Callaway County/Fulton
Fulton, Missouri 65251
573.592.2480

Emergency Management Director

Gasconade County Courthouse
Hermann, Missouri 65401
573.486.3621

Emergency Management Director

Montgomery County Courthouse
Montgomery City, Missouri 63361
573.564.2283

Emergency Management Director

Osage County Annex
Linn, Missouri 65051
573.897.3561

IMPORTANT: If an emergency should occur that would require you to take special precautions or actions, our local EMERGENCY ALERT SYSTEM (EAS) station is your best source for information. See page 6 for the primary EAS station in your area.

The information in this calendar is important; it tells what to do should a nuclear emergency occur at Ameren Missouri's Callaway Energy Center. We are providing it because your home lies within an area we call the Emergency Planning Zone (EPZ). The EPZ extends about 10 miles in all directions from the plant (see map on page 8).

Since 1958, when the first nuclear power plant in the United States went into operation, the federal government has required detailed emergency plans for areas around all plants, just as emergency plans exist for dealing with tornadoes, floods and other natural emergencies (We've prepared a glossary of terms associated with nuclear emergency response on page 11). Your emergency response plan involves help from local, state and federal agencies, volunteer organizations and Ameren Missouri personnel. Special training, drills and annual emergency exercises ensure all goes well in case of a real emergency. This calendar is part of that plan; it gives you the opportunity to learn about Callaway Energy Center, how it operates and how to respond in case an emergency develops. Please read this calendar and have others in your family read it too. Keep it handy so you'll always know what to do (and what not to do) should an emergency occur.

How nuclear plant emergencies are classified

Emergency action levels established by the Nuclear Regulatory Commission (NRC) come in four classes and are included in all nuclear power plant emergency plans. They range from a minor plant event involving no public danger to a more serious condition which might require

protective action. Each class dictates a different response from county, state and Ameren Missouri personnel. Classes are:

1. **Unusual Event** - An unusual event indicates a potential decrease in the level of safety at the plant. No releases of radioactive material requiring off-site response are expected. Appropriate public officials and agencies are notified. No public action is required (Minor event).
2. **Alert** - An alert is declared if events occur at the plant which could cause a further reduction in plant safety. Public officials and agencies are notified to be on standby. No public action is required.
3. **Site Area Emergency** - A site area emergency is declared if there are actual potential major failures of the plant's safety-related-equipment which could release radioactive materials above normal limits into the environment. The normal limits beyond site boundaries would not be expected to exceed protective action guidelines established by the Environmental Protection Agency (EPA). Local agencies activate their emergency operations centers and the public is kept informed through the news media.
4. **General Emergency** - This is the most severe classification. If a general emergency is declared, it means that safety conditions have deteriorated to where a significant release of radioactive material beyond plant boundaries is occurring or may occur. Appropriate agencies begin the necessary steps for public protection. Public alert systems are activated (see page 6) and the public is told what protective actions are recommended (Major event).

ADDITIONAL NOTIFICATION AND FUNCTIONAL AND ACCESS NEEDS

Would you need additional assistance or need to be notified in an Emergency?

If you have a functional or access need that may cause you to need special help in an emergency, or have an unlisted phone number or want to be notified via cell phone you will need to contact your county Emergency Management Director (EMD) by either e-mail, U.S. postal mail or telephone (see contact information) as soon as possible (this information will be kept confidential by state and local authorities).

PLEASE NOTE: Even if you responded in the past, you must provide your information to your EMD each year.

You should contact your county EMD if:

- You do not have transportation available to leave the area in an emergency
- You need help but can ride in a van
- You are in a wheelchair and need a wheelchair van
- You would need to ride in an ambulance
- You have specialized medical equipment and require special transportation
- You are deaf and use a TTY
- You are sight impaired and require special help
- You have an unlisted telephone number, or want to be notified via cell phone

Contact Information:

Callaway County Emergency Management Director: P.O. Box 817, Fulton, MO 65251, 573.592.2480, michellekidwell@cceoc.org
Gasconade County Emergency Management Director: Gasconade County Courthouse, 119 E. First Street, Hermann, MO 65401, 573.486.3621, kbay@rescueteam.com
Montgomery County Emergency Management Director: 211 East 3rd Street, Suite 103, Montgomery City, MO 63361, 573.564.2283, montemd@mcmo.us
Osage County Emergency Management Director: PO Box 192, Linn, MO 65051, 573.897.3561, director911@midamerica.net

HOW WILL YOU BE NOTIFIED

If protective actions are required, public alert systems will be activated. There are two kinds of alert systems used in the local Emergency Planning Zone: sirens and Emergency Alert Radios. When the sirens are activated you will also be notified via telephone (Automated Calling Service).

Automated Calling Service - Automated Calling Service is a backup to the siren system. The system will call homes and businesses to notify them of an emergency at the Callaway Energy Center. A recorded message will tell you to tune to your local television or radio station for emergency information. If you have an unlisted telephone number or wish to be notified on a cellular telephone, call your County Emergency Management Director at the numbers listed on page 5. Your telephone numbers will remain confidential.

Sirens - Sirens are located in areas of high population. **If you hear a siren, go indoors and tune your radio to the Emergency Alert System (EAS) station (106.9 FM).** Your EAS station will keep you informed. Sirens are tested monthly to ensure operability. Tests are normally on the first Tuesday of the month except for holidays and operational conflicts. Individual sirens are also tested after maintenance or repairs.

Emergency Alert Radios - Emergency Alert Radios have been provided to homes in areas of low population. These radios will come on automatically if there is an emergency. The EAS station will tell you what's happening and what action to take. Emergency Alert Radios are tested on a regular basis. If you reside in the EPZ (see map page 8), and you can not hear a warning siren, call 1.800.880.5953 (during normal working hours) or send an email to aeasley@ameren.com. Your location will be evaluated for an Emergency Alert Radio.

Functional and Access Needs - County officials will provide assistance to those who are disabled, deaf or without transportation. If you or a member of your family needs help, please contact your emergency provider. This will allow the county official to ensure all needs are identified.

Defective Radios - If you have a Emergency Alert Radio that you feel is defective:

- You can contact your county's Emergency Management Director (phone number supplied on page 5);
- You can contact Callaway Energy Center at 1.800.880.5953.

The Primary 24-hour Emergency Alert System (EAS) radio station in the area is: **KTXY 106.9 FM**

WHAT YOU WILL BE ADVISED TO DO

Public officials via the EAS station will advise you about what to do during an emergency. Depending on where you live, this could be "no precautions are necessary" or "shelter in place" or "evacuation."

Shelter in place - This means people should stay indoors. Your home will shield you from a percentage of radioactive material should a release occur. For extra protection, close the windows and doors, turn off cooling and heating systems and move to your basement if you have one. Take a radio or TV with you and stay tuned to your Emergency Alert System (EAS) station for information.



Evacuation - The need to evacuate would be extremely rare. However, this possibility has been taken into consideration. The need to evacuate would be determined by the size of the radioactive release and by the direction the wind is blowing. Special evacuation instructions have been established (see page 7 and 8); be sure to read and understand these procedures.

ABOUT EVACUATION

DO NOT EVACUATE UNLESS YOUR AREA IS SPECIFICALLY TOLD TO DO SO. Only local government officials have the authority to order evacuation. They will have the best information available to make a decision. Your EAS station will keep you informed.

Evacuation area - The map on page 8 of this calendar divides the EPZ into subareas. If evacuation is ordered it will be by subareas. Be sure to identify your subarea.

Evacuation routes - The map also shows major roads in each subarea. The arrows indicate which evacuation routes to use and direction to travel.

Where to go - If you are told to evacuate, you should report to a Reception Center (see page 7), so your whereabouts can be registered in case friends or relatives need to contact you. After you have reported to a Reception Center and if you don't require housing assistance, you may go to the home of a friend or relative outside the EPZ. This is a good time to discuss where you will go so everyone is familiar with your plans.



SOURCES OF EMERGENCY INFORMATION (SEE PG. 10)

Your USDA/FSA/Extension office can provide information on the protection of agricultural products through local radio or television broadcasts, newspaper articles or by telephone. Contact numbers for the counties within the 10-mile EPZ are:

Callaway County 573.592.1400

Gasconade County 573.437.3478

Montgomery County 573.564.3733

Osage County 573.897.2138

WHAT TO DO IF EVACUATION IS NECESSARY

1. Lock all doors and windows.
2. Shut off the same appliances you would if you were taking a short two or three-day trip.
3. Take these items with you: toothbrushes, personal hygiene items, a change of clothes, important papers, medications, valuables and infant needs.
4. Keep car windows closed. Turn off your car's heating and cooling systems until you are outside the evacuation zone.
5. If you are going to a Reception Center, bring sleeping bags or blankets.
6. Do not take pets with you. Leave them at home with plenty of food and water. Reception Centers are not equipped to handle pets.

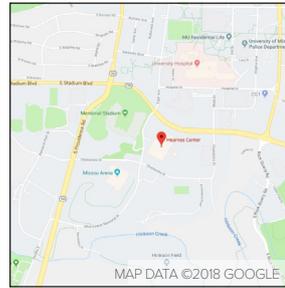
Transportation - Use your own vehicle if you have one. Consider offering transportation to a neighbor. If you need transportation at the time of an emergency, transportation assistance telephone numbers will be provided by the EAS stations. Disabled residents who need special transportation, or have transportation requirements, should refer to the functional and access needs section on page 5.

Children in school - Each school within the EPZ has developed its own evacuation plan. These plans identify actions to take if evacuation is necessary while buses are bringing children to or from school. The plans cover where children will go if their school is in an evacuation area. EAS stations will give information about school actions during an emergency.

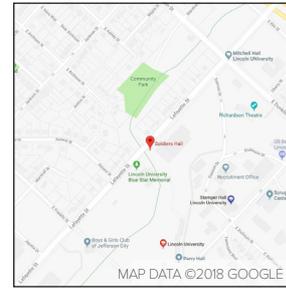
Special care facilities - Hospitals, nursing homes and day care centers within the EPZ are prepared with provisions and transportation for those under their care. State and county emergency plans include assisting special care facilities which might need additional transportation.

Reception Center Locations - If evacuation is necessary, Reception Centers will be opened in communities outside the EPZ. These centers will be operated by the State of Missouri, and assisted by the American Red Cross, providing shelter for residents of evacuated areas. EAS stations will tell you which centers are open and where to go, depending on where you live. When leaving an evacuation area, follow the routes shown on the map on page 8 of this calendar.

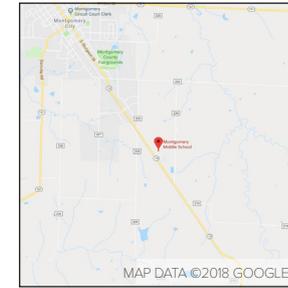
RECEPTION CENTER LOCATIONS



Hearnes Multi-Purpose Building on the University of Missouri campus in Columbia



Jason Gym and Soldier's Hall on the Lincoln University campus in Jefferson City



Montgomery County R-II Middle School, south of Montgomery City on Route 19



Hermann Middle School in Hermann

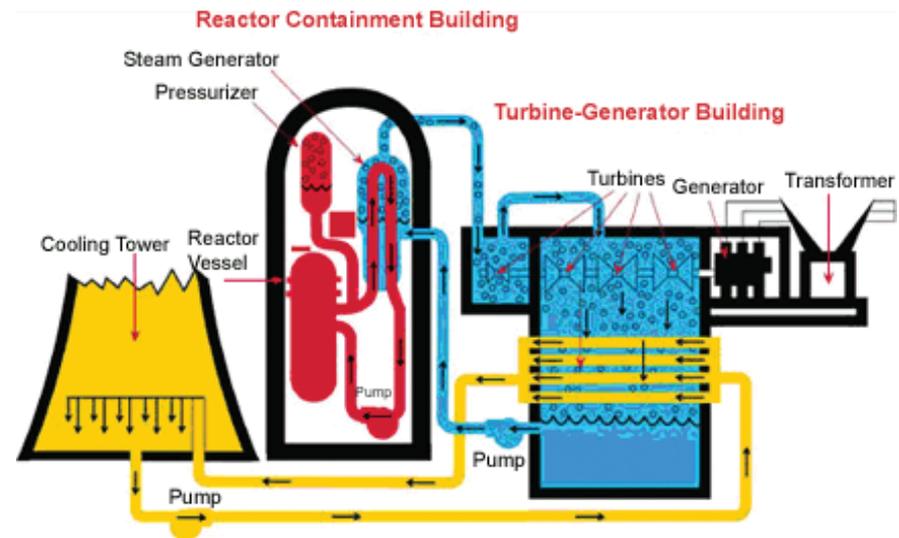
HOW THE CALLAWAY ENERGY CENTER PRODUCES ELECTRICITY

Electricity at the Callaway Energy Center is produced by sending steam through machines called turbines. The turbines drive a generator that connects to electrical lines, producing power. A large amount of heat energy is needed to make steam. At the Callaway Energy Center, this heat is provided by uranium, a natural resource. After uranium is mined and processed, it is concentrated and manufactured into dense pellets. These pellets are sealed in metal tubes called fuel rods which are bundled together and delivered to the plant. The fuel bundles are then placed in the reactor vessel, a 43-foot high steel container.

During operations in the reactor vessel, uranium atoms in the fuel rods are split into smaller atoms, releasing energy in the form of heat. Water is pumped into the reactor vessel, flows around the rods and absorbs the releasing heat. The heated water leaves the reactor, passing through

tubes in another vessel called a steam generator. A second water supply flows around these tubes and is converted to steam – which runs the turbine, generating electricity. Once the steam is used to run the turbines, it condenses back into water. This water is returned to the steam generator to repeat the process.

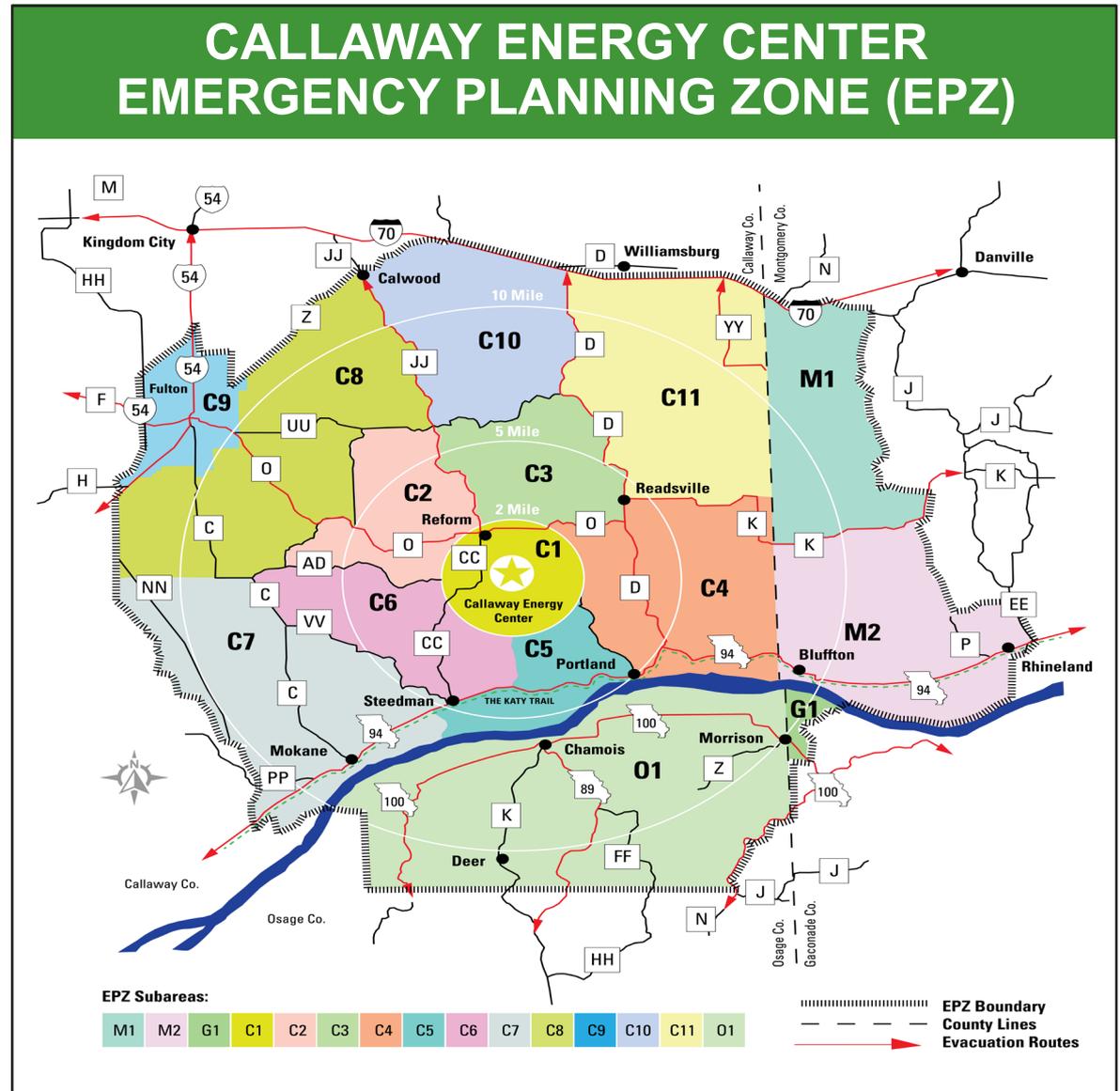
The reactor is controlled by rods that contain a neutron absorbing material. When the rods are fully inserted in to the fuel bundles, the nuclear reaction stops. When withdrawn, the reaction begins again.



WHERE TO GO WHEN TOLD TO EVACUATE

- If an evacuation is recommended, drive to the Reception Center.
- Listen to an EAS radio station for information.
- Obey speed limits and drive safely.

Sub-area	Subarea Description	Evacuation Route
C1	Area within a two-mile radius of the Callaway Energy Center	Route O, Route CC
C2	Area bounded by Route UU on the north Route AD and County Road 428 or the south: County Roads 111 and 419 on the west; and County Road 133 on the east	Route O, Route UU, Route AD, Route JJ
C3	Area bounded by County Roads 132 and 134 on the North; Route O on the South; Route D on the East; and County Road 133 on the West.	Route O, Route D
C4	Area bounded by Routes O and K on the North; Missouri River on the South; Montgomery County line on the East and County Roads 469 and 448 on the West.	Route K, Route D, Highway 94
C5	Area bounded by County Roads 469 and 448 on the East; County Road 459; Highway 94 and Auxvasse Creek on the West; Missouri River on the South and two miles from the Plant on the North.	Highway 94
C6	Area bounded by Route AD and County Road 428 on the North; Highway 94 on the South; County Road 459 on the East; and Routes C, VV and County Road 447 on the West	Route CC, Route AD, Route VV, Route C, Highway 94
C7	Area South of Hams Prairie bounded on the North by Route C from Hams Prairie extending directly West to the Middle River by Routes C, W and County Road 447 on the East; Middle River on the West and Missouri River on the South.	Route C, Route NN, Highway 94
C8	Area Southeast of Fulton bounded by Route JJ, Route UU, County Roads 111 and 419 and Route AD on the East; Route C from Hams Prairie extending directly West to the Middle River on the South; and Route NN; Fulton city limits and Route Z on the West and North. This does not include the City of Fulton.	Route JJ, Route UU, Route O, Route C, Route NN
C9	The City of Fulton. Western boundary is US Highway 54.	Business 54, Highway 54, Route F
C10	Area bounded Route Z and I-70 on the North; County Roads 132 and 134 on the South; Route D on the East; and Route JJ on the West.	Route JJ, Route AB, Route D
C11	Area bounded by I-70 on the North; Route K on the South; Montgomery County line on the East and Route D on the West	Route D, Route K, Route YY
M1	Area South of I-70; North of Route K; East of Callaway County line; and West of County Roads 278 (Graveyard Hill Road) and 283 (Mill Pond Road) and Routes HH and K.	I-70, Route HH, Route K, Route YY
M2	Area South of Route K to Missouri River between Callaway County line and Route P; County Road EE; including Rhineland.	Route K, Highway 94
O1	Area East of St. Aubert; West of Route N and within five miles of Missouri River	Highway 100, Highway 89, Route N
G1	Area South of Missouri River; East of Osage County line; and Northwest of Shawnee Creek and Morrison; including Morrison	Highway 100, Route N



WHEN THE EMERGENCY IS OVER

Don't return home until you have been notified it is safe.
 Authorities will announce through the news media when it is safe to return, along with any special precautions you should take.

EMERGENCY DOS AND DON'TS

The most important thing to remember in the event of a nuclear emergency is to remain calm. Don't panic: you're more likely to be hurt acting in haste than by radiation. Tune to the Emergency Alert System (EAS) station listed on page 6 and wait for instructions.

Do not use your telephone unless absolutely necessary. Telephone lines must be kept open for emergencies.

If you are asked to remain indoors, stay there until official notice is given that it's safe to go out.

If advised to evacuate, use the designated evacuation routes (see page 8 of this calendar). Maintain safe and normal traffic flow, follow instructions given by traffic control officers, and stay in your car. If you have problems with your automobile, park off the roadway, raise the hood to signal officers, then remain in the car. Once you have left the area, don't attempt to go back until authorities announce it is safe to return.

Do not act on rumor. Rely on your EAS station for accurate information. If a Site Area or General Emergency is declared, a telephone line will be activated in Jefferson City. This number, **877.640.5876**, is to be used only for Site Area or General Emergency situations. For all other questions regarding the emergency response plan, call one of the numbers listed on page 5.

EMERGENCY TELEPHONE NUMBER:

If a site area or general emergency is declared, a special telephone line will be activated. This telephone line will be answered by the Ameren Missouri Customer Contact Center. Inquiries and information will be forwarded to SEMA and Callaway Energy Center personnel.

877.640.5876

UNDERSTANDING RADIATION

Radiation is all around us; it has been a part of our environment since time began. Most radiation we are exposed to comes from natural sources

Types of radiation. The term "radiation" is broad and includes light, heat and radio waves. It is most often used to mean "ionizing" radiation, which produces charged particles ("ions") in the materials it strikes. Alpha, beta, gamma, x-rays and neutrons are types of ionizing radiation. Each has different characteristics.

- **Alpha Radiation** consists of positively charged particles. It is the least penetrating and will not pass through the outer layer of skin. A sheet of paper will stop alpha radiation.
- **Beta Radiation** consists of electrons and is more penetrating. A thin sheet of aluminum or plastic can keep it from passing through the outer layers of skin.
- **Gamma Radiation** is a form of electromagnetic waves, similar to light or radio waves. It is highly penetrating. Barriers of concrete or lead shielding are used to provide protection.
- **X-Ray** is the most familiar type of radiation. It is used extensively in medicine and industry. Like gamma rays, x-ray is electromagnetic radiation.
- **Neutron Radiation** occurs inside nuclear reactors. It is very penetrating, but effective shielding can be provided by water.

U.S. AVERAGE ANNUAL RADIATION EXPOSURE

The average American receives about 620 units of radiation each year. Called millirem (mrem), about 310 mrem comes from nature. The average person also gets about 310 mrem from man-made sources, primarily from beneficial medical radiation.

SOURCES OF RADIATION

These figures show the most common radiation sources and how much we receive each year, on average. This amount of exposure falls well below the accepted limits for human beings.

No long-term ill effects in humans have been found at levels of 12,000 mrem per year. This level is well above that to which most of us are exposed.

The Nuclear Regulatory Commission has established public radiation exposure guidelines. They recommend no more than 100 mrem of additional radiation exposure annually. "Additional" means from sources such as industrial or nuclear power plant operations.

The human body has the ability to repair minimal damage inflicted upon it. This is why exposure to low-level radiation over a period of time produces no adverse effects. However, exposure to high radiation levels over short periods of time could result in health problems. Your local emergency response plan was designed to recognize this urgency and provides protection against such conditions.

SAFETY AT THE CALLAWAY ENERGY CENTER

The Callaway Energy Center was constructed and is operated with safety as a top priority. The steel reinforced reactor containment building features concrete walls three to four feet thick. Alternative electricity and water sources are available during emergencies to cool the uranium and assure the plant can be shut down safely. Nuclear power plants do not compare with nuclear weapons. Uranium used for plants is different than that required for bombs. It is physically impossible for a nuclear explosion to occur here.

Nuclear Regulatory Commission licensing requirements of plant operators are demanding. Refresher training is conducted throughout the year to ensure operators remain prepared to cope with any failures or malfunctions.

As an additional safeguard, monitoring of air and water is conducted continuously to verify compliance with environmental regulations.

AVERAGE EXPOSURE**

Man-Made Sources

X-Rays.....	74
Nuclear Medicine.....	223
Consumer products (TV, smoke detectors, etc.)	12
Other (including nuclear power)	1

Natural Sources

Radon.....	229
Our body.....	31
Sun.....	31
Earth.....	19
U.S. Average per year	620 mrem

**Source: Report No. 160, National Council on Radiation Protection & Measurements

INFORMATION FOR FARMERS, FOOD PROCESSORS AND DISTRIBUTORS

Depending on the amount of radioactive material released and prevailing weather conditions, people, animals, crops, land and water near the emergency site could be affected. First concern would be the condition of milk from dairy animals and water from open sources. Sampling for contamination could occur at the site, transfer station or processing plant. If pollution of milk and processed milk products is verified, state officials must determine whether to dispose of these products or hold them until safe for consumption. A potential problem would exist with vegetables, grains, fruits and nuts. Impact would depend on when the emergency took place, the most critical being prior to or during harvest. Crops would be sampled and analyzed to ensure their safety. Contamination of livestock and poultry is another concern. Pasture, feed and water sources, meat and poultry products, would be sampled and analyzed to confirm these products are safe to eat. Contamination of drinking water should not be significant; only surface water is likely to be affected. Water safety would be determined by sampling. If land becomes affected, soil management techniques can be implemented to reduce crop contamination. Recommendation would depend on severity and specific crops to be grown.

EMERGENCY PLANNING ZONES

Two types of Emergency Planning Zones (EPZ) may be utilized. You should know which applies to you.

The Plume Exposure Pathway EPZ

- Area within a 10-mile radius of the Energy Center in which people might be directly exposed to radiation.

The Ingestion Exposure Pathway EPZ

- Area within a 50-mile radius of the Energy Center where people might be indirectly exposed by eating or drinking contaminated food, milk or water.

Safety of the food supply within the 50-mile EPZ would be of special importance to the agricultural community if radioactive material was released into the atmosphere. Should this occur, both water and land could become affected. Eating and drinking contaminated food or liquid could have a harmful, long-term effect on human health. State emergency response teams will quickly notify and advise people of what to do. Recommendation would be based on plant conditions, amount of radioactive material released and health, economic and social impact.

PROTECTIVE ACTIONS

Two types of protective actions can prevent or lessen the possibility of anyone eating or drinking contaminated food or water:

- Preventive protective actions: Wash, scrub, peel or shell fruits and vegetables to remove affected surfaces.
- Emergency protective actions: Restrict or withhold food products from being sold by prohibiting transportation from the affected areas.

PROTECTIVE ACTIONS FOR THE FOOD SUPPLY

Milk - Remove dairy animals from pasture, shelter and provide with protected feed and water. State officials may take samples to analyze and determine if contamination exists. If products are found to be contaminated, a hold on products may be recommended. Since radioactive materials decay over time, it is possible for affected milk products to be judged safe for human consumption after a period in storage. Radioactive decay may be achieved by freezing and storing fresh milk and milk products. Storage for prolonged periods at reduced temperature is also possible if ultrahigh pasteurization techniques are used. Using fluid milk to produce butter, cheese and dry or evaporated milk is also possible; state officials will advise you.

Fruits and vegetables - Wash, scrub, peel or shell fruits and vegetables, including roots and tubers, to remove surface contamination. If this exists, preserve by canning, freezing or dehydrating, then store to allow time for radioactive decay.

Meat and meat products - Place animals on protected feed and water and provide with shelter. If livestock consume contaminated feed or water, some contamination may be absorbed and could enter the human food supply. Even if an animal consumes contaminated grain or water, in time it may eliminate the material or radioactive decay will take place, making the animal fit again for human consumption.

Poultry and poultry products - Poultry raised outdoors, especially those for egg production, should be monitored by taking samples to determine contamination. Officials may advise that poultry and eggs not be eaten until contamination is eliminated or decays to safe levels.

Fish and marine life - Pond raised fish and marine life may continue to be harvested unless officials determine contamination exists. Samples from open water should be analyzed to ensure safety.

Soils - If officials find contaminated soil, proper management procedures will be implemented to return to safe levels. Idling, or non-use of land for a specific period of time may be necessary. In situations involving highly contaminated soil, removal and disposal may be required. Planting alternative crops, such as cotton or flax may be recommended. These crops could be substituted for food because little or no

radioactive material is contributed to the human diet. Deep-plowing soil may move affected substances below root level, prevent plants from absorbing contaminated nutrients and allow radioactivity to decrease over time. State officials will advise you.

Grains - If permitted to grow to maturity, grain contamination will be removed by wind and rain. Milling or polishing removes remaining contamination; sampling will determine safety. When harvested, keep affected grains stored separately.

Water - Open water sources should be protected with covers. Covered wells and underground water sources will probably escape contamination. Contaminants deposited on the ground travel slowly- unless soils are sandy. Filler pipes should be disconnected from containers supplied by runoff from roofs or surface drain fields to keep contaminants from entering storage containers. Close water intake valves to prevent distribution.

Honey - If contamination is detected in your area, honey and beehives will be sampled and analyzed. Handling instructions will be made available.

FOOD PROCESSING AND DISTRIBUTION

Radioactive contamination of milk or food products can occur during processing or transportation. This results from exposure to radioactive materials on the ground, in the air and from contact with contaminated products. Following a nuclear emergency, government officials may restrict movement of food products and withhold from the marketplace. They should not be released until considered safe, or a decision is made to dispose of them. You will be instructed how to handle and dispose of contaminated food products safely.

POST-EMERGENCY ACTION

Re-entry - Necessary only if an area has previously been evacuated. It is the temporary return, under controlled conditions, into a restricted, contaminated area within the 10-mile EPZ of the Energy Center. If you have been evacuated; you will be allowed to return when conditions permit. State officials will advise you through the Emergency Alert System. You will receive specific instructions on routes to use and precautions to take. Temporary re-entry will allow you to perform such vital activities as milking, watering and feeding until permanent, unrestricted return is allowed.

Recovery - The process of reducing radiation to acceptable levels. Following the emergency, officials will identify types and levels of contamination. Samples of air, water, soil, crops and animal products may be taken from farms or businesses. You will be provided with instructions and assistance in decontaminating animals, food and property.

GLOSSARY OF TERMS

Background radiation - Radiation that occurs naturally. In central Missouri, natural background radiation is about 310 mrem per year per resident.

Chain Reaction - The continuous splitting of uranium atoms. This process is controlled in the reactor.

Cladding - The metal (a Zirconium alloy) surrounding the uranium fuel, acting as a barrier between the fuel and water in the reactor coolant systems.

Contamination - Radioactive material where it is not desired.

Control Rods - Metal rods placed between the fuel rods to absorb neutrons and control the fissioning process. When inserted into the core, the reactor quickly shuts down.

Control Room - The center from which the Energy Center is operated, monitored and controlled. NRC licensed operators are on duty at all times.

Core - The central part of a nuclear reactor containing the fuel assemblies.

Decontamination - The removal of radioactive material.

Emergency Core Cooling System - An important back-up safety system for the plant, used to provide cooling water for the reactor if the primary cooling system is not operating.

Emergency Planning Zone (EPZ) - Area around a nuclear power plant for which plans are developed for public protection. The zone covers approximately a 10-mile radius from the Energy Center.

Federal Emergency Management Agency (FEMA) - An agency of the federal government charged with establishing policy for and coordinating all civil emergency planning and assistance functions for federal agencies.

Fission - The splitting of an atom into two or more new atoms. When a uranium atom splits in the reactor, two new atoms, neutrons and heat are produced.

Fuel Rod - A cylindrical rod, 12-feet long, containing uranium fuel pellets.

Ingestion Exposure Pathway EPZ - Area within a 50-mile radius of the Callaway Energy Center in which people may be indirectly exposed to radiation by eating or drinking contaminated food, milk and water.

Millirem (mrem) - Unit used to measure radiation dosage (1/1000 of a REM). REM stands for Roentgen Equivalent Man, a measure of radiation that indicates potential impact on the human body.

Nuclear Regulatory Commission (NRC) - Agency of the federal government responsible for regulations and inspection of nuclear power plants.

Plume Exposure Pathway EPZ - Area within a 10-mile radius of the Callaway Energy Center in which people may be directly exposed to radiation.

Primary Coolant - Water which passes through the reactor vessel, picking up heat from the nuclear fuel.

Radioactivity - Property possessed by some elements which enables them to give off energy in the form of waves or particles.

Reactor - Large steel vessel in a nuclear plant containing fuel assemblies, primary coolant and other equipment. The fissioning process is controlled within the reactor.

Reception Centers - Centers operated by the State of Missouri and assisted by the American Red Cross, providing food and shelter to residents of evacuated areas.

Recovery - Process of reducing environmental radiation to normally acceptable levels following a nuclear emergency.

Re-entry - Temporary return under controlled conditions, into a restricted, contaminated area within 10-mile EPZ of the Callaway Energy Center.

REM - See "Millirem."

Shielding - Comprises the various materials within a nuclear plant preventing radiation from escaping into the environment. Shielding can be steel, lead, concrete or water.

State Emergency Management Agency (SEMA) - Missouri state government agency responsible for development and implementation of procedures to protect the public during natural or emergency conditions.

Subareas - Specific geographic areas within the EPZ. Subareas for the Callaway Energy Center are shown on the map on page 8.

IMPORTANT PHONE NUMBERS

Callaway County

Police 573.592.3100

Sheriff 573.642.7291

All emergencies 911

Gasconade County

Sheriff 573.486.3880

573.437.7700

All emergencies 911

Montgomery County

Sheriff 573.564.8084

All emergencies 911

Osage County

Sheriff 573.897.3107

All emergencies 911

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 **Smart911**

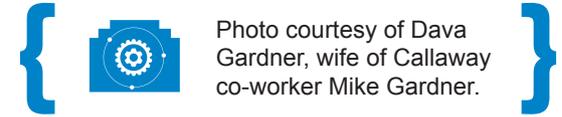
Download the app to provide 9-1-1 and first responders information in an emergency and receive targeted alerts from the National Weather Service, local officials, and the Callaway Energy Center.

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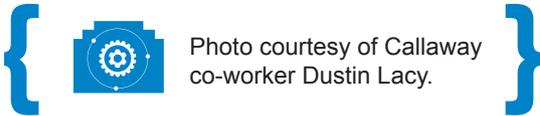
JANUARY 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		New Year's Day	Siren Test			
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
	Martin Luther King Day					
20	21	22	23	24	25	26
27	28	29	30	31		



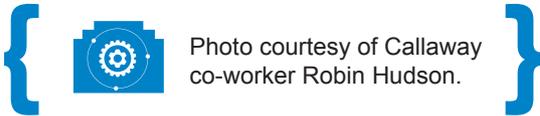
FEBRUARY 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	Groundhog Day 2
3	4	Siren Test 5	6	7	8	9
10	11	12	13	Valentine's Day 14	15	16
17	President's Day 18	19	20	21	22	23
24	25	26	27	28		



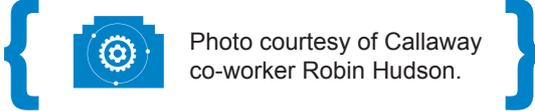
MARCH 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	Siren Test	6	7	8	9
Daylight Saving Time						
10	11	12	13	14	15	16
St. Patrick's Day						
17	18	19	20	21	22	23
24						
31	25	26	27	28	29	30



APRIL 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Siren Test				
	1	2	3	4	5	6
7	8	9	10	11	12	13
					Good Friday	
14	15	16	17	18	19	20
Easter						
21	22	23	24	25	26	27
28	29	30				



MAY 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			1	2	3	4
Cinco de Mayo		Siren Test				
5	6	7	8	9	10	11
Mother's Day						
12	13	14	15	16	17	18
19	20	21	22	23	24	25
	Memorial Day					
26	27	28	29	30	31	



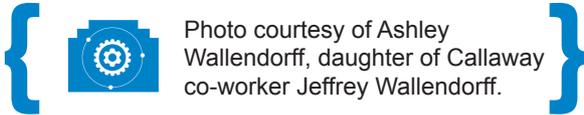
JUNE 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
2	3	Siren Test	5	6	7	8
9	10	11	12	13	Flag Day	15
Father's Day						
16	17	18	19	20	21	22
23						
30	24	25	26	27	28	29



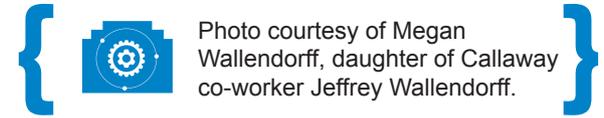
JULY 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Siren Test		Independence Day		
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			



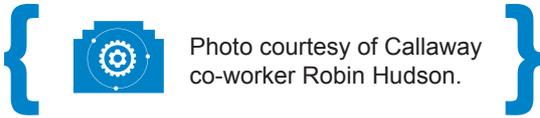
AUGUST 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
4	5	Siren Test	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31



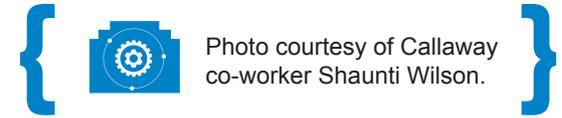
SEPTEMBER 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	Labor Day	Siren Test				
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					



OCTOBER 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		Siren Test 1	2	3	4	5
6	7	8	9	10	11	12
	Columbus Day 14	15	16	17	18	19
13						
20	21	22	23	24	25	26
				Halloween 31		
27	28	29	30			



NOVEMBER 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
Daylight Saving Time		Siren Test				
3	4	5	6	7	8	9
10	Veteran's Day	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	Thanksgiving Day	29	30



DECEMBER 2019



Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	Siren Test 3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	Christmas Eve 24	Christmas Day 25	26	27	28
29	30	New Year's Eve 31				

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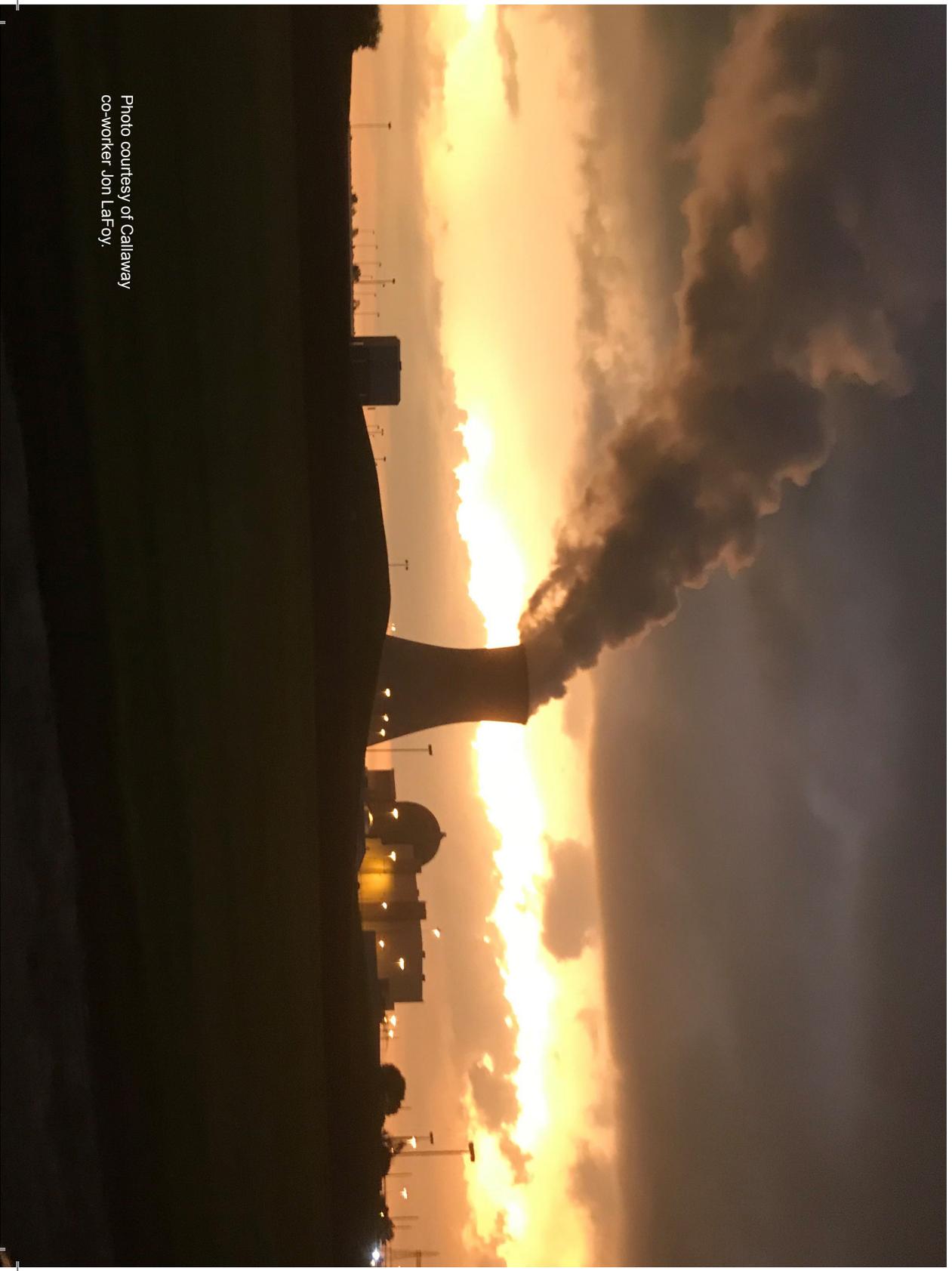


Photo courtesy of Callaway
co-worker Jon LaFoy.