



worker  
beware®

## Working Safely Around Electric and Natural Gas Lines

*Before darkening the room, offer a welcome and overview. Begin by introducing the program and its topic:*

Today's session focuses on working safely around electric power lines and natural gas pipelines. By following the procedures we'll cover here today, you can keep yourself and your crew members safe and on the job. On the other hand, if you cut corners where utility lines are concerned, you put yourself, your crew and the public at risk of serious injury and even death. Please pay careful attention, and ask questions if you don't understand.

*Darken the room and begin the presentation.*

## Respect the Power of Electricity

- **When you arrive at a job site, always identify power lines, poles, guy wires and pad-mounted equipment**, and point them out to your crew.
- **Look for overhead lines** hidden by trees or buildings.
- **Consider *all* overhead lines to be energized and potentially dangerous**, including the service drops that run from utility poles to buildings.
- **Check the site daily** because conditions may change.
- **Review your emergency plan** before work begins so that everyone knows what to do in case of power line contact.



Respect the power of electricity. Follow some simple best practices before starting work.

- When you arrive at a job site, always identify power lines, poles, guy wires and pad-mounted equipment, and point them out to your crew. Review proper safety procedures before beginning work.
- Look for overhead lines hidden by trees or buildings.
- Consider *all* overhead lines to be energized and potentially dangerous, including the service drops that run from utility poles to buildings. These wires may look insulated, but any coating you see may be designed to protect the lines from weather, not to protect you from shock. Contact can still be deadly, so keep your distance.
- Check the site daily because conditions may change. Always survey the site before beginning the day's work.
- Review your emergency plan before work begins so everyone knows what to do in case of power line contact.

## For Tools and Equipment Other than Cranes and Derricks Used in Construction, Observe the 10-Foot Rule

- OSHA requires that you keep yourself and your equipment (other than cranes or derricks used in construction) **at least 10 feet away** from overhead power lines carrying up to 50 kV.
- **Higher-voltage lines require greater clearances.** Contact Delmarva Power for clearance information.
- **If your job requires you to work closer than 10 feet from power lines, call Delmarva Power well in advance to make safety arrangements.**
- **Electrical safety distances given here are minimums.**
- **Always use the maximum possible clearance,** and clearly mark boundaries to keep workers and equipment the required distance away.

For tools and equipment other than cranes and derricks used in construction, always observe the 10-foot rule. (Cranes and derricks on construction sites may require greater clearances, which we will discuss on the next slide.)

- OSHA requires that you keep yourself and your equipment *at least* 10 feet away from overhead power lines carrying up to 50 kV. This applies to all personnel, tools, materials and equipment other than cranes or derricks used in construction. Be aware that wind can move equipment, so build in some extra distance in case of an unexpected shift. A good rule of thumb is to maintain a buffer zone of the minimum required clearance plus 1.5 times the length of your tools or material.
- Higher-voltage lines require greater clearances. Contact Delmarva Power for clearance information. Remember that your best practice is always to stay as far away as possible from power lines.
- If your job requires you to work closer than 10 feet from power lines, call Delmarva Power well in advance to make safety arrangements. Cutting corners and failing to call could have life-threatening and livelihood-threatening consequences.
- Electrical safety distances given here are minimums.
- Always use the maximum possible distance, and clearly mark boundaries with tape, signs or barricades to keep workers and equipment away.

## Cranes and Derricks in Construction

- **Keep the crane boom and load *at least 20 feet away*** from lines up to 350 kV and **50 feet away** from lines greater than 350 kV. Always assume the line is energized, and allow nothing closer unless you have confirmed with the utility owner/operator that the line has been de-energized.
- **As voltage increases, clearance distances also increase.** Contact Delmarva Power and consult the OSHA regulations at [osha.gov](https://www.osha.gov) for specific clearance requirements and encroachment prevention precautions.
  - Once you have established the required clearance, mark a safety boundary with tape, signs or barricades.
- **Whenever cranes or derricks are used on your job site,** contact Delmarva Power well in advance. They will confirm safety clearances and make any necessary facility protection arrangements.

Cranes and derricks used in construction require different clearances than other equipment.

- You must keep the crane boom and load *at least 20 feet away* from lines up to 350 kV and 50 feet away from lines greater than 350 kV. Always assume the line is energized, and allow nothing closer unless you have confirmed with the utility owner/operator that the line has been de-energized.
- As voltage increases, clearance distances also increase. Contact Delmarva Power and consult the OSHA regulations at [osha.gov](https://www.osha.gov) for specific clearance requirements and encroachment prevention precautions.
  - Once you have established the required clearance, mark a safety boundary with tape, signs or barricades.
- Whenever cranes or derricks are used on your job site, contact Delmarva Power well in advance. They will send a representative to your job site to confirm voltages and safety clearances and to make any necessary facility protection arrangements.

## Use a Dedicated Spotter

- **Always use a dedicated, qualified spotter on the ground** to safely judge distances between hoisting equipment and power lines.
- **Crane and derrick operators:** You must maintain continuous contact with a dedicated spotter to comply with line clearance requirements.
- **The spotter's only responsibility should be power line safety.** Don't divide the spotter's attention with other tasks.



Use a dedicated spotter when working with hoisting equipment around overhead lines.

- Always use a dedicated, qualified spotter on the ground to safely judge distances between hoisting equipment and power lines. From the ground, the spotter will have the clearest vantage point and best be able to judge distances correctly.
- Crane and derrick operators must maintain continuous contact with a dedicated spotter to comply with electric line clearance requirements.
- The spotter's only responsibility should be power line safety. Don't divide the spotter's attention with other tasks. To be effective, the spotter must make spotting and clear communication with the equipment operator the top priorities.

## If Your Equipment Contacts a Power Line

- **Both the equipment and the line should be considered energized.**
- **Move the equipment away from the line** if you can do so safely.
- **Remain on the equipment.**
- **Warn others to stay far away.**
- **Have someone call 911 and Delmarva Power immediately.**
- **If fire or other imminent danger forces you off:**
  - Do NOT touch the equipment and the ground at the same time.
  - Jump clear, and land with your feet together.
  - Shuffle away with small steps, keeping both feet close together and on the ground at all times.
  - Do not return to the equipment until utility personnel tell you it is safe.
- **Never touch fallen power lines or anything they may be contacting.**



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If your equipment contacts a power line, it's critical to follow proper safety procedures.

- Both the equipment and the line should be considered energized.
- Move the equipment away from the line if you can do so safely.
- Remain on the equipment until utility workers say it's safe to get off. Anyone on the equipment is safe from shock as long as they stay put.
- Warn others to stay far away. Anyone who touches the equipment or even the ground nearby may be injured or killed.
- Have someone call 911 and Delmarva Power immediately. Their personnel will respond, switch off the power and tell you when it is safe to leave or move the equipment. Wait for their instructions.
- If fire or other imminent danger forces you off the equipment, take these steps:
  - Do NOT touch the equipment and the ground at the same time.
  - Jump clear, and land with your feet together.
  - Shuffle away with small steps, keeping both feet close together and on the ground at all times. Resist the temptation to run or take long steps because this puts you at risk for shock.
  - Do not return to the equipment until utility personnel tell you it is safe.
- Never touch fallen power lines or anything they may be contacting. Stay far away, and call 911 and Delmarva Power to report the emergency.

*Demonstrate the jump-off procedure.*

## Notify 811 Before You Dig. It's the Law!

- **Dial 811 or enter an online locate request well in advance of digging or moving earth in any way.** This free service will arrange to mark underground utility lines so you can dig safely.
- **Before you notify 811, pre-mark your proposed excavation area** with white paint, flags and/or stakes so locators can easily identify and mark affected utilities.
- **If you don't notify 811, you risk hitting an underground line.** You, your crew members or others could be hurt or killed. You may be held liable for any resulting damages, as well as outage and repair costs.

*Always contact your state 811 center before digging and for the most current requirements.*



Underground power lines and natural gas pipelines can pose an unseen but very real danger. By law, and for your safety, you must notify the 811 center before you dig.

- Call the underground utility locator service at 811 or enter an online locate request well in advance of digging or moving earth in any way. This free service will arrange the marking of underground power lines and other buried utilities in your dig area so you can work a safe distance away from them. Be sure to leave adequate time in your job schedule. The service is free, but the costs of not calling can be very high. Building in a few extra days for the job costs less in the long run than spending months or years recovering physically and financially from a power line incident. And remember, it's the law.
- Before you notify 811, pre-mark your proposed excavation area with white paint, flags and/or stakes so locators can easily identify and mark affected utilities.
- If you don't notify 811, you risk hitting an underground utility line. You, your crew members or others could be hurt or killed. You may be held liable for any resulting damages, as well as outage and repair costs.

*Always contact your state 811 center before digging and for the most current requirements.*

## Wait the Required Time

- **In Delaware and Maryland, wait at least two full business days (excluding the date of your request, weekends and legal holidays).**
- Before you dig, confirm with Ticket Check® that all utilities have responded to your locate request.
- **If you wait the required time and the locate is not completed, do not dig.** Notify the 811 service that your locate request has not been fulfilled.

*Always contact your state 811 center before digging and for the most current requirements.*



After you notify 811, wait the required time for buried utility lines to be marked before you dig:

- This wait time varies by state. In Delaware and Maryland, wait at least two full business days (excluding the date of your request, weekends and legal holidays).
- Before you dig, confirm with Ticket Check® that all utilities have responded to your locate request.
- If you wait the required time and the locate is not completed, do not dig! You must notify the 811 service that your locate request has not been fulfilled.
- *Always contact your state 811 center before digging and for the most current requirements.*



## Conduct a Visual Site Survey

- **Do not rely exclusively on the locate marks.** Look for visual indicators of underground facilities that have not been marked, such as meters, valves and pad-mounted transformers.
- **Check with property owners about any private underground lines** that would not have been marked by the locator.
- **Also check for signs of something buried after the locate was completed,** such as a fresh trench.
  - If you find a newly installed or unmarked facility, call 811.

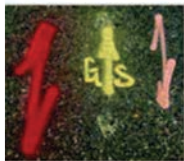










- Conduct a visual site survey before beginning any digging.
- Do not rely exclusively on the locate marks. Look for visual indicators of underground facilities that have not been marked, such as meters, valves and pad-mounted transformers. Use your common sense and industry knowledge.
- Check with property owners about any private underground lines that would not have been marked by the locator because they do not belong to a utility.
- Also check for signs of something buried after the locate was completed, such as a fresh trench.
  - If you find a newly installed or unmarked facility, call 811.

## Respect the Marks, and Dig with Care

- **Not all utilities are 811 members.** You are responsible for notifying non-member utilities about your project. Check with 811 for more information.
- **Respect the locator marks.** Maintain utility indicator marks, and follow them when digging.
- **Dig with care.** Exercise extreme caution when digging near buried utilities, and have a spotter present to observe the excavation whenever heavy equipment is used.
- **Know the underground utility color code:**

### AMERICAN PUBLIC WORKS ASSOCIATION COLOR CODE FOR LOCATOR MARKS



	Electric power lines
	Gas, oil or steam
	Communications lines, cables or conduit
	Potable water
	Reclaimed water, irrigation and slurry lines
	Sewers and drain lines
	Temporary survey markings
	Your proposed excavation

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After you contact 811, the underground utility locator service will arrange for each member utility to send someone out to your dig site to mark the underground lines.

- Not all utilities are 811 members and may not be notified. You are responsible for notifying non-member utilities. Check with 811 for more information.
- Respect the locator marks. Maintain utility indicator marks for the duration of the job, and follow them when digging. If lines become confusing, faded or illegible, notify 811 to refresh them — do NOT use paint to refresh fading marks yourself! Be sure to renew and update your 811 ticket per state regulations.
- Dig with care. Exercise extreme caution when digging near buried utilities, and have a spotter present to observe the excavation whenever heavy equipment is used.
- Know the underground utility color code. Utilities use these colors to mark their lines. Learn the code to stay safe.

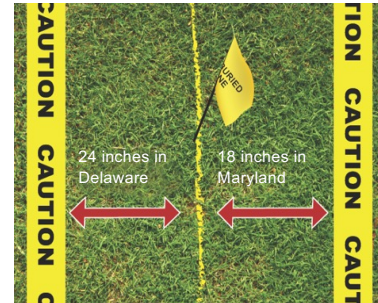
*Point to the chart as you speak.*

- |   |  |
|---|--|
| – Red: electric power lines                       | – Purple: reclaimed water, irrigation and slurry lines |
| – Yellow: gas, oil or steam                       | – Green: sewers and drain lines                        |
| – Orange: communications lines, cables or conduit | – Pink: temporary survey markings                      |
| – Blue: potable water                             | – White: proposed excavation                           |

## Respect the Tolerance Zone

- **Adhere to state laws for digging within the “tolerance zone.”** This safety area spans the width of a marked utility line plus a state-mandated distance from each indicated outside edge of the line: 24 inches in Delaware and 18 inches in Maryland.
- **Hand dig prudently in this zone.**
- **Once visual identification has been achieved,** you may use mechanized digging equipment. Use a spotter to observe the excavation and help prevent damage when heavy equipment is used near power lines.
- **The tolerance zone is a *minimum* safety clearance.** Protect yourself by using the maximum possible distance.

*Always contact your state 811 center before digging and for the most current requirements.*



Respecting the tolerance zone protects buried utility lines from damage and also protects you from injury.

- Adhere to state laws for digging within the tolerance zone, a safety area that spans the width of a marked utility line plus a state-mandated distance from each indicated outside edge of the line.
  - In Delaware, this distance is 24 inches.
  - In Maryland, this distance is 18 inches.
- Hand dig prudently in this zone. Use extreme care and caution. Too many accidental utility contacts have occurred when someone dug with a backhoe or other power-operated equipment instead of a shovel.
- Once visual identification has been achieved, you may use mechanized digging equipment. Use a spotter to observe the excavation and help prevent damage when heavy equipment is used near power lines.
- The tolerance zone is a minimum safety clearance. Locator marks are only the locator’s most reasonable interpretation of the equipment’s signal. So protect yourself by using the maximum possible distance.

## Know When to Stop Digging

- **If there are no locate marks after you have waited the required time, do NOT dig.**
- **If you do not understand the locate marks, do NOT dig.**
- **If you cannot visually verify the location of marked utility lines, STOP digging.**
- **If you find unmarked, mismarked or seemingly abandoned facilities, STOP digging.**
- **If you see signs of something buried after the locate was complete, such as a fresh trench, STOP digging.**
- **If the marks fade or are destroyed, STOP digging and contact 811 to request a new ticket.**



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When you work around buried power lines and natural gas pipelines, knowing when to stop a job could save your life.

- If there are no locate marks after you have waited the required time, do NOT dig. Notify the 811 service that your locate request has not been fulfilled.
- If you do not understand the locate marks, do NOT dig. Ask your supervisor what you must do to work safely.
- If you cannot visually verify the location of marked utility lines by hand digging, STOP digging and notify 811 immediately.
- If you find unmarked, mismarked or seemingly abandoned facilities, STOP digging. Assume all utility lines are in service, and report them to 811.
- If you see signs of something buried after the locate was complete, such as a fresh trench, STOP digging. Notify 811.
- If the marks fade or are destroyed, STOP digging and contact 811 to request a new ticket. Do not resume digging until the area is re-marked.

## Natural Gas Basics

- **Natural gas travels through pressurized underground pipelines of varying diameters.** The size of a gas line is NOT a reliable indicator of the internal pressure.
- **Delmarva Power or your local natural gas utility adds a distinctive, sulfur-like odor to natural gas to assist in the detection of leaks.** However, in certain conditions, you may not be able to smell this odorant.
- **Leaking natural gas can be ignited by a tiny flame or spark—** even from a lit cigarette or a phone.



Understanding natural gas basics will help you prevent accidents around natural gas pipelines.

- Natural gas travels through pressurized underground pipelines of varying diameters. These pipelines range from 1 inch to 4 feet wide. There are three types of pipes used in the system: transmission pipelines, main lines and service lines. It pays to be careful around ALL types of pipelines. Pipeline pressure can vary from  $\frac{1}{4}$  pound to 1,000 pounds per square inch. The pressure is what moves the gas through the pipes. It's also what makes damaging a pipeline so dangerous.
- Delmarva Power or your local natural gas utility adds a distinctive, sulfur-like odor to natural gas to assist in the detection of leaks. However, in certain conditions, this smell may not be apparent. Additionally, weather and soil conditions can strip the odorant from the gas.
- Leaking natural gas can be ignited by a tiny spark or flame — even from a lit cigarette or a phone. To avoid spark hazards, do not turn anything electrical on — or off — in the vicinity of a gas leak.

## Watch Out Around Pipeline Markers

- **Pipeline markers indicate the need for extra care** around natural gas transmission pipelines and some distribution lines.
- **These markers are general indicators only.** For security purposes, they do not show the exact location, path or depth of gas pipelines.
- **The markers should never be used as a substitute for calling 811.**
- **Call the number on the marker if you notice any type of suspicious activity** or construction occurring nearby without gas utility personnel present.



It's critical to be aware of gas transmission pipelines in the vicinity of your job site.

- Pipeline markers indicate the need for extra care around natural gas transmission pipelines and some distribution lines. These markers are usually found at roadways, railroad crossings and other points along the pipeline route.
- These markers are general indicators only. For security purposes, they do not show the exact location, path, depth or number of gas pipelines in the area, and not all pipelines follow a straight course between markers. Maps can also be viewed to identify the approximate locations of major natural gas pipelines (but not gas distribution main lines or service lines). You can access them via the National Pipeline Mapping System website: <https://www.npms.phmsa.dot.gov>.
- The markers should never be used as a substitute for calling 811, nor should you rely on the pipeline maps. 811 is your best resource for natural gas pipeline locates.
- Call the number on the marker if you notice any type of suspicious activity or construction occurring nearby without gas utility personnel present.

## Natural Gas Leak Detection: Look, Listen and Smell

- **Delmarva Power adds a distinctive, sulfur-like odor to natural gas to assist in leak detection.** However, this odor may fade or be difficult to distinguish, and not all gas transmission lines are odorized.
- **Don't rely on your nose alone. Use your senses of sight, hearing and smell to detect a natural gas leak.** Here are the signs:
  - A distinctive odor of natural gas
  - Continuous bubbling in water
  - A hissing, whistling or roaring sound
  - Dead or dying vegetation (in an otherwise moist area) over or near a pipeline
  - Dirt blowing into the air from a hole in the ground
  - Exposed pipeline after an earthquake, fire, flood or other disaster
  - A damaged connection to a gas appliance



When it comes to detecting natural gas leaks, you must use all your senses. Look, listen and smell.

- Delmarva Power adds a distinctive, sulfur-like odor to natural gas to assist in leak detection. However, this odor may fade or be difficult to distinguish. Additionally, gas in some transmission pipelines may not be odorized.
- So don't rely on your nose alone. Use your senses of sight, hearing and smell to detect a natural gas leak. Here are the signs:
  - The distinctive odor of natural gas. This smells like sulfur or rotten eggs.
  - Continuous bubbling in water.
  - A hissing, whistling or roaring sound. The sound will vary with the pressure in the line.
  - Dead or dying vegetation (in an otherwise moist area) over or near a pipeline.
  - Dirt blowing into the air from a hole in the ground. This will vary with pressure as well.
  - Exposed pipeline after an earthquake, fire, flood or other disaster.
  - A damaged connection to a gas appliance.

## Natural Gas Emergencies

- If you contact a natural gas pipeline or suspect a gas leak, **take these steps:**
  - **Warn others and leave the area immediately.**
  - **Do NOT use matches or lighters, start an engine, or operate any electrical device — even a phone.** A spark could ignite leaking gas, causing a fire or explosion.
  - **Do NOT attempt to stop the flow of gas or fix the pipeline.** Leave the excavation open.
  - **When you have reached a safe distance, report the incident:**
    - Call **911** immediately if you suspect a gas leak. Federal code requires this.
    - Call Delmarva Power or the local natural gas utility if you suspect a gas leak or contact a pipeline, even if damage is not apparent.
  - **Stay far away from the area** until safety officials say it is safe to return.
  - **Report the incident to your supervisor.**



A natural gas pipeline may become compromised even when damage is not visible, and the smallest spark can ignite leaking natural gas and cause a fire or explosion.

So if you contact a natural gas pipeline or suspect a gas leak, assume there's a danger and take these steps:

- Warn others and leave the area immediately.
- Do not use matches or a lighter, start an engine, or operate any electrical device — even a phone. A spark could ignite leaking gas.
- Do not attempt to stop the flow of gas or fix the pipeline. Leave the excavation open.
- When you have reached a safe distance, report the incident:
  - Call 911 immediately if you suspect a gas leak. Federal code requires this.
  - Call Delmarva Power or the local natural gas utility if you suspect a gas leak or contact a pipeline, even if damage is not apparent. Remember: A pipeline that is pulled or bumped could break some distance away from the contact point.  
A scrape to a pipeline coating can lead to corrosion that causes a future gas leak. And a cut tracer wire on a plastic pipeline can make the line unlocatable in the future. So report any and all natural gas pipeline contacts to Delmarva Power or the local natural gas utility immediately.
- Stay far away from the area until safety officials say it is safe to return.
- Report the incident to your supervisor.



## Utility Safety Review

- Identify all power lines and electrical equipment upon arrival at a job site. Recheck the site daily, and review your emergency plan.
- Keep yourself and all tools and equipment *at least 10 feet away* from *all* overhead power lines carrying up to 50 kV. Higher voltages require greater clearances, as do cranes and derricks used in construction.
- Always use a dedicated spotter.
- If a power line contact occurs, follow proper safety procedures, and immediately call **911** and Delmarva Power.
- Notify the underground utility locator service by dialing **811** or using the online ticket-entry system before you dig.
- Wait the required amount of time for lines to be marked. In Delaware and Maryland, that's two full business days.
- Respect the marks, and dig with care near buried utilities.
- Watch out around pipeline markers. Report any suspicious activity nearby.
- Know the warning signs of a natural gas leak.
- In a natural gas emergency, warn others and leave the area immediately, avoid spark hazards, and call **911** and Delmarva Power.

*Always contact your state 811 center before digging and for the most current requirements.*

So let's review the key safety points of this presentation.

- Identify all power lines and electrical equipment upon arrival at a job site. Recheck the site daily, and review your emergency plan.
- Keep yourself and all tools and equipment *at least 10 feet away* from all overhead power lines carrying up to 50 kV. Higher voltages require greater clearances, as do cranes and derricks used in construction.
- Always use a dedicated spotter.
- If a power line contact occurs, follow proper safety procedures, and immediately call 911 and Delmarva Power.
- Notify the underground utility locator service by dialing 811 or using the online ticket-entry system before you dig.
- Wait the required amount of time for lines to be marked. In Delaware and Maryland, that's two full business days.
- Respect the marks, and dig with care near buried utilities.
- Watch out around pipeline markers. Report any suspicious activity nearby.
- Know the warning signs of a natural gas leak.
- In a natural gas emergency, warn others and leave the area immediately, avoid spark hazards, and call 911 and Delmarva Power.

## Contact Information

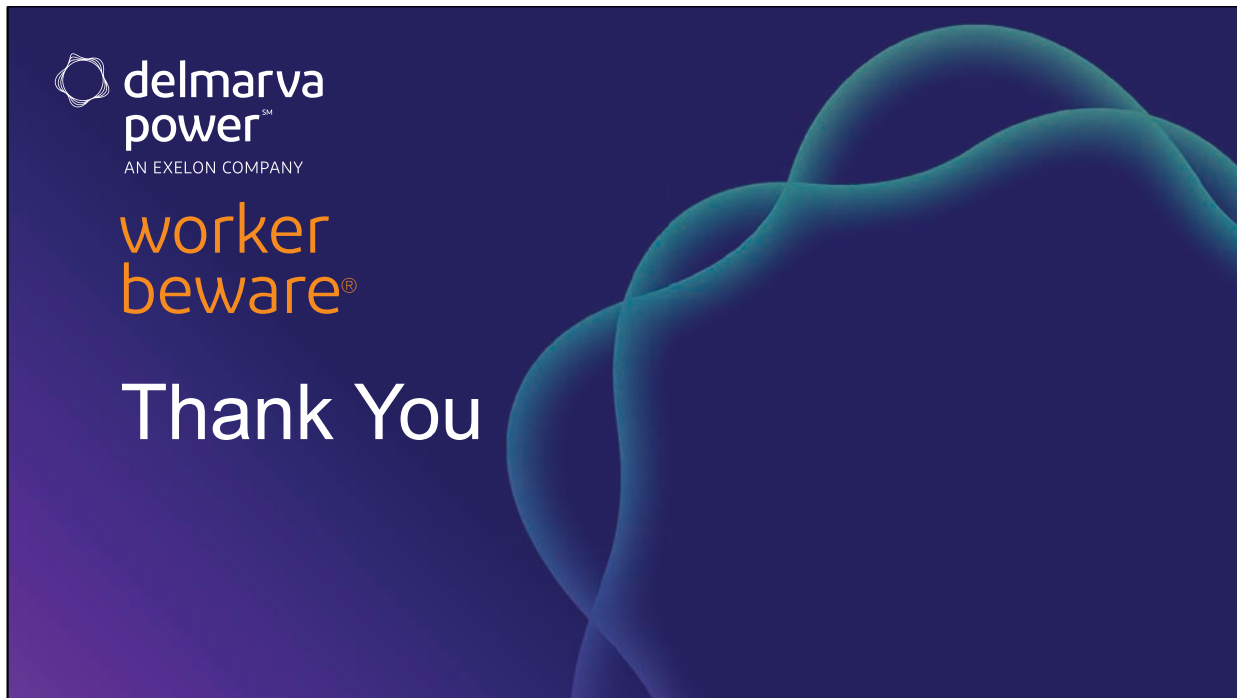
- In case of an electrical or natural gas emergency, call 911 and Delmarva Power immediately.
  - For electrical emergencies, call **800.898.8042**.
  - For natural gas emergencies, call **302.454.0317**. (New Castle County, Delaware, only) or the local natural gas utility in your area.
- For additional information, visit the Delmarva Power website at [delmarva.e-smartworkers.com](http://delmarva.e-smartworkers.com).



**Know what's below.  
Call before you dig.**

Last but not least, here is some important contact information to keep handy:

- In case of an electrical or natural gas emergency, call 911 and Delmarva Power immediately.
  - For electrical emergencies, call 800.898.8042.
  - For natural gas emergencies, call 302.454.0317 (New Castle County, Delaware, only) or the local natural gas utility in your area.
- For additional information, visit the Delmarva Power website at [delmarva.e-smartworkers.com](http://delmarva.e-smartworkers.com).



Thank you for your attention.

*Take questions and begin discussion. If you are using the instructor's guide, in it you will find discussion topics, a utility safety quiz, and more information about the properties of electricity and natural gas and the features of their delivery systems.*

*Discuss how this information conflicts with what your audience believed about electrical and/or natural gas safety, and ask how they may have put themselves or others at risk in the past. Ask what they would have done differently had they had this knowledge before.*

*Delmarva Power thanks you for helping to keep workers safe.*