

WORKING SAFELY NEAR UNDERWATER PIPELINES AND UTILITIES

Recommended Best Practices Guide,
Resources, and Checklist

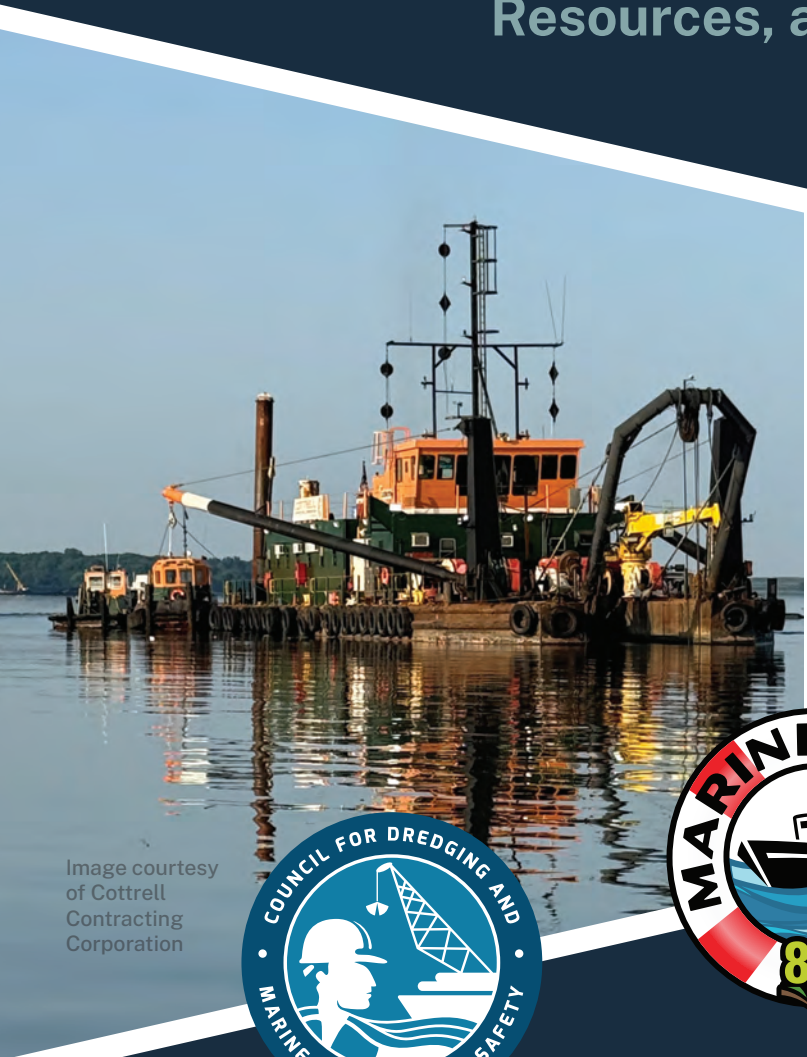
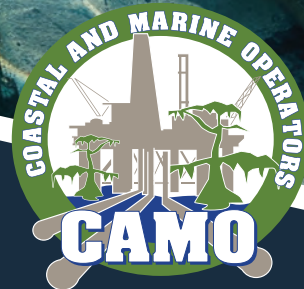


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Disclaimer

This *recommended best practices guide* (“guide”) promotes safe dredging and marine construction operations near underwater pipelines and utilities. It does not replace or override any individual company’s health, safety, and environmental protocols. This guide was developed in consultation with professionals working in marine construction and pipeline industries.

All users of this guide should first consult authorized information sources, including, but not limited to, the following: (i) employer practices, (ii) industry practices, (iii) federal and state statutes and regulations, and (iv) local laws, regulations, and ordinances. This guide is not a substitute for any employer or industry practice nor any local, state, or federal law, regulation, or ordinance.

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PRIMARY CONTRIBUTORS



Marine Safe 811 is a joint industry and stakeholder program driven by its members and partners. The primary focus is to save lives, prevent injuries, and protect the environment and infrastructure.

<https://www.marinesafe811.org/>



The Council for Dredging and Marine Construction Safety (CDMCS) is the leader for raising safety standards in the industry and for promoting a safety-first culture. Its diverse membership supports American maritime infrastructure and the wellbeing of maritime workers coast-to-coast.

<https://cdmcs.org/>



Coastal and Marine Operators Group (CAMO) is an industry initiative engaging marine vessel operators and stakeholders to promote public safety.

<https://www.camogroup.org/>



The Damage Prevention Council of Texas is a non-profit association dedicated to the prevention of damage to underground facilities, public safety, and environmental protection through stakeholder education and communication.

<https://dpcotexas.org/>

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Introduction

Your job involves decisions that may directly or indirectly impact miles of underwater utilities or oil, gas, or chemical pipelines. Within inland waterways such as rivers, bays, lakes, coastal areas and offshore areas, pipelines co-exist with vessel and boat activity of all kinds. With more pipelines and utilities being installed daily, combined with increasing dredging and marine construction activity in the same waters, the chance of a marine vessel contacting an underwater pipeline or utility continues to grow. Accidental interactions and incidents have caused spills, outages, gas releases, injuries, and the loss of human life.

This is a [recommended best practices guide](#) for the marine construction, utility, and pipeline industries. It addresses pipeline safety, damage prevention, and emergency response in the marine environment. All mariners, utility, and pipeline personnel engaged in marine construction, safety, or related activities should consider this guide a resource and keep it readily available.



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Chapter 1: Understanding Underwater Pipelines

This section provides help for planning, identifying, and avoiding underwater pipelines and utilities. It is for marine construction personnel, including (assistant) project engineers, (assistant) project managers, superintendents, captains, and operators. These best practice recommendations are not all-inclusive, and exceptions to a specific activity can always exist.

Communicating concerns and mitigating risk early and often with all parties during project planning and implementation are crucial to project success. Take every opportunity to ask the pipeline company for basic information about each underwater pipeline in your project area. Incorporate the following elements into your project plans, project scope, pipeline avoidance measures, and emergency response plans.



1.1 Company Name and 24/7 Emergency Contact Number

Most pipeline companies have a control center that monitors their pipelines 24 hours a day, 7 days a week, with an 800 toll-free number for emergency calls. This number should always be on hand and called during emergencies, such as if a pipeline leak or strike occurs. In many cases, the control center can shut down the pipeline remotely. If a company does not have an 800 toll-free number, find the name and phone number of the appropriate contact person. In emergencies, contact the Coast Guard, National Response Center (NRC), and 911.

1.2 Company Representative Name and Contact Number

When conducting marine or coastal construction activities, it's critical to communicate with the appropriate pipeline personnel. This includes the "Right-of-Way Technician" or "Pipeline Technician," who is responsible for marking pipelines or providing information on their approximate locations. It's always an industry best practice to communicate with the pipeline technician and the pipeline company to confirm the pipeline's location, as well as reference other third-party documents like maps and surveys.

1.3 Pipeline Right-of-Way

Pipelines can be underground, aboveground, and underwater and are located in rights-of-way (ROWs), which are granted areas where lines traverse. A right-of-way's width can greatly vary but generally ranges from 15 to 30 feet.

1.4 Pipeline Product

An industry best practice is to clearly identify the pipeline's product in any written contingency plan to minimize safety and environmental risks if a release occurs. Products may vary in volatility and have different characteristics when released. Since every pipeline product is different, it's important to assess the potential risks based on its unique characteristics and volatility.

Note: In addition to the pipeline's product, the pipeline's type, location, and pressure need to be identified in your company's contingency plan, too.

1.5 Pipelines vs. Flow or Production Lines

Pipelines can be hazardous, large in diameter, stretch across long distances, and operate under high pressure. In contrast, other pipelines can be smaller, shorter, and operate at lower pressures. Some pipelines can stay within a single oil or gas field and may carry oil, natural gas, water, or other substances. Either pipeline can be regulated by federal, state, or another entity based upon the statutory authority in that location.

1.6 Pipeline Diameter

Pipelines vary in diameter and can range in size from $\frac{3}{4}$ inches to over 48 inches in diameter.

1.7 Pipeline Pressure Range

Understanding the general operating pressure of a pipeline in your project area could help establish the level of risk and needed precautions. Pipeline pressure generally ranges from 300 to 1,500 psi. Even if a pipeline rupture occurs and the pipeline is shut down, it can take several hours for its pressure to bleed to a safe level.

1.8 Pipeline Depth of Cover

Pipeline depths of cover under the water bottom or mud line are generally a minimum of 3 feet when installed and can have more than 25 feet of bottom cover in some areas. Pipeline and utility companies should inspect underwater lines for unintended exposure and inadequate cover. Due to natural forces, an underwater pipeline can become shallower over time and move from its original location. Usually, a pipeline's depth of cover is shallower near the shoreline or riverbank. If a depth of cover range is required for the project, the pipeline company can provide that data.

Note: Ensure a minimum draft clearance of 3 feet when transiting over underwater pipelines. Depth of cover for any underwater pipeline can vary widely. Navigable waterway pipeline inspections should periodically occur to identify exposed lines. Exposed lines should be reported to reduce risks to all parties.



1.9 Pipeline Location

Do not rely solely on maps, permit data, charts, and other third-party sources for information on a pipeline's location. These sources may have inaccurate pipeline location information. Underwater pipelines can shift their locations over time, so always rely on the pipeline company to provide location data. The pipeline company should provide boundaries to work around or inform you that the work area will be “clear” of pipelines.

Location data may be in the form of GPS (or X, Y, Z coordinates), maps, landmarks, or other means. Both the project manager and the pipeline company representative must have direct and detailed discussions on the locations of all underwater pipelines that could be impacted.

Additionally, it is up to marine construction personnel to document the location of any pipelines and verify the pipeline company's 24/7 contact information in the event of an emergency, such as pipeline leaks or damage.

Note: Underwater pipelines that are permitted by the US Army Corps of Engineers (USACE) but never installed by the pipeline company will still appear on the project plans and specifications, unless the pipeline company formally informs USACE that it was never installed. Treat such lines as active, especially if they are listed in the federal and state pipeline databases.

1.10 Land vs. Marine

Pipeline and utility companies should separate their on-land 811 One Call, damage prevention, operations, maintenance, marking, and planning procedures from “marine” specific procedures for damage prevention, awareness, and safety. Land and marine procedures, programs, or plans do not apply to each other.

However, many laws and regulations consistently use words like “underground,” and it's recommended to add “or submerged” to maintain uniformity and ensure “submerged” utilities are equally protected under the law or code. State and federal regulatory language should include words in the law like “submerged” and “marine” versus subaqueous.

1.11 Pipeline Markings and Signs

Marking pipelines in marine areas is very challenging, and proper communication with the pipeline technician is essential. Markers can be accidentally moved or removed by weather events, wave action, boats, vessels, erosion, etc. This makes it difficult to locate and verify information.

Marine utility signs are a great awareness tool for marine safety and damage prevention. Permanent markers should be placed as close as practicable to the entrance and exit points of submerged facilities. This applies to any single line that spans 100 feet or more underwater. These signs typically display “Warning Do Not Anchor or Dredge” or “Warning Petroleum or Gas Pipeline.” Some states may require more detailed information on pipeline signs, such as “Highly Explosive.” Pipeline signs and markers often state the company name, pipeline type, and emergency contact number.



Pipeline markers and signs may vary in location, color, shape, and message.



There are a variety of pipeline markings and signs, and they all differ in color, shape, and message. Pipeline signs are typically located near roads, railroads, fences, rights-of-way, and possibly where the pipeline transitions from land to underwater. If a pipeline accident occurs, look for a pipeline marker or sign nearby and call the emergency number immediately. If you don't see a sign, reference your contingency plan and call 911, the coast guard, or the national response center (NRC: 1-800-424-8802).

1.12 Survey Markings

Surveying and mapping of submerged lines is a challenge. It is recommended that pipeline, utility, and marine construction stakeholders — as well as the project designer or owner of the engineering phase — all seek out and use the best available survey technology or methods.



Every effort should be made to locate the line within 15 feet (on either side of the pipeline) of its actual location. Professional survey data accuracy will depend on specific line characteristics, like diameter, depth of cover, congestion of crossings, soil composition, etc.

A best practice when planning for marine construction is to properly identify the temporary markings or signs for nearby pipelines. Certain considerations, such as visibility and pipeline type, need to be addressed with marine construction personnel and the pipeline company before any work begins. Ask what type of marker will be used so personnel can easily identify them during the project. Acceptable and recommended physical markings include buoys, cane poles, flags, nav-aids, reflective material, PVC pipe, and many others. These markers are not permanent and should be within the normal line of sight.

Additionally, temporary marking colors in the field should follow the American Public Works Association (APWA) color code for the corresponding utility type. For example, yellow should represent oil or gas lines, while pink should represent temporary survey markings. Pink may also be used to indicate surveyed marine buffer zones or marine exclusion zones for dredging or marine construction, whereby no work should occur without documented written permission from all parties.

Weather or other conditions can cause physical pipeline markings to move or disappear. For this reason, a daily inspection of pipeline markings is recommended throughout the project cycle. Pipelines and utilities within the project area should always be reflected on all project drawings or plans and approved by the pipeline or utility company before construction. When physically marking marine lines in the field is not feasible, pipeline companies may provide GPS coordinates (X, Y, Z coordinates or KMZ/KML files) to mark the pipeline electronically.

1.13 Visibility of Signs and Markings

Pipeline signs and markers are generally not illuminated; therefore, visibility at night, in low light during the evening hours, during rain, or in foggy conditions must be considered in reconnaissance, pre-project planning, and execution. Most dredging, marine construction, and marsh creation projects occur 24 hours a day, 7 days a week. Therefore, besides marking the location of pipelines or utilities, it's recommended to place lighted buoys or reflective markers along pipeline or utility routes that fall directly within dredging areas, marsh creation, beach restoration, material disposal sites, discharge pipeline routes, and ingress/ egress routes, etc., to increase their visibility at night. However, when possible, it's recommended to avoid working around pipelines at night.

Additionally, wherever pipelines or utilities emerge from the water (such as platform connection points or other operations), ensure they are appropriately lit and marked in a way that adheres to all Coast Guard standards for mitigating hazards to navigation. In waterways where marine damage could reasonably occur, markers should be placed as close as practicable at the entrance and exit points or along the route of submerged facilities.

1.14 Removed or Abandoned Lines

Partially or fully removed or abandoned lines are among the most challenging risks to projects because they are often undocumented or not captured in the 811 One Call notification system. Partial removal of a line is when only a section is removed, such as the center section in the navigation channel. Other sections of the pipeline may be left behind and intact along the slopes near the shoreline. Always treat such pipelines as active, especially if they are listed in the federal and state pipeline databases. Additionally, list these pipelines on all project specifications unless the pipeline company formally informs you that it was removed.

Likewise, abandoned lines should still appear on project plans and specifications and treated as active. If lines are removed, the proper agencies should be notified of the removal. It is recommended that the contractor perform field surveys, such as the magnetometer type, or employ other methods to scan for unidentified lines prior to construction.

Images courtesy of Broussard Brother, Inc.





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Chapter 2: 811 Reporting of Proposed Dredging and Marine Construction Projects

Dredging and marine construction activities may directly impact the water bottom where underwater pipelines and other utilities exist. Therefore, marking underwater facilities is more difficult. For this reason, consult the state 811 law or 811 One Call Center in which the project is occurring as early as possible to understand how much time is required between notification and when excavation may begin. If the law is silent on the subject of marine excavation, it is recommended to contact the state 811 One Call Center at least 7 business days before starting work to obtain location information directly from the pipeline or utility owners. Remember that because marine or underwater utility marking or surveying is much more difficult than on land, extended time is often requested.

Every state has laws for notifying an 811 One Call Center, so it's important to know the 811 One Call requirements for the state in which you are working. All state 811 One Call Centers should provide locate requests within the territorial boundaries or jurisdiction of their state, including their waterways, rivers, creeks, lakes, bays, bayous, the gulf, and oceans. Reference each state's law as it relates to marine excavation or submerged facilities and know the state boundary lines as they could be within a body of water.

2.1 How 811 Works

811 is a free service funded by companies that own underwater or underground pipelines and utilities (electric, fiber-optic, communication, water, sewer, etc.). Once you submit a notification of work, the One Call Center forwards a ticket to its subscribing companies. If work activities are close to the lines, the companies will contact you with location details and advise you on how to avoid them.

Note: Some lines, such as flow lines or submerged abandoned lines, go undocumented or are not part of the 811 One Call system. It's recommended that submerged, abandoned lines be added to the 811 One Call if not already required by state law, especially in listed navigable waterways. Do your due diligence in identifying all lines in the project area.

2.2 Identify Your Work Area(s)

Dredging and marine construction activities may encompass large areas, some of which may be on land. Identify the entire area of excavation and locations where any water bottom contact may occur. This includes the following locations or areas:

- Material placement
- Heavy equipment and dredge pipeline transit ways
- Equipment/vessel mooring sites
- Staging areas where water bottom contact may occur
- Off-loading equipment and material laydown areas
- Travel corridors or site access (ingress/egress)
- All anchoring and spud down locations
- Any other areas of operational impact, including emergency staging locations for inclement weather

Before contacting 811, dredge and marine construction companies should clearly identify the proposed project boundaries. This can be done by referencing and validating the dredge or construction limits defined in the project scope – which should have corresponding X and Y coordinates encompassing the work area – and then “white-lining” those boundaries in the field using white-colored flags, buoys, or other means. If field marking is not practicable, marking can also be done electronically.

Marking or white-lining the project boundaries just before the 811 One Call notification is submitted helps pipeline or utility operators clearly understand where the dredge or construction activity will occur and where they should mark their lines.



2.3 How to Notify the 811 One Call Center

To notify the 811 One Call Center, either dial 811 or submit an online ticket. When possible, it's strongly recommended to make 811 One Call notifications online or electronically. This will allow you to add helpful information that might not be as easy to communicate over the phone.

To find the online ticket notification process search for the State Name where work is being performed, followed by 811, ex. "Louisiana 811." First-time users may need to register in order to initiate an online ticket. When possible, it's strongly recommended to make 811 One Call notifications online or electronically. This will allow you to add helpful information that might not be as easy to communicate over the phone.

2.4 Information 811 Will Need from You

811 will need your name, company name, phone number, email address, location of work, type of work, and start and end dates. For marine notifications, also provide GPS (X, Y, and Z or decimal coordinates), name of vessel(s), and the name and cell/contact number(s) of the project manager, field coordinator, or captain(s) in the comment section.

Ensure to provide the following information to 811 when submitting a ticket:

- **Time** — Specify project times to help track project and ticket duration information. This is very helpful to the notified pipeline or utility companies.
- **Geographic Area** — Online or electronic 811 notifications allow you to draw a "polygon" that accurately reflects the dredge or marine construction boundary or area(s) within a body of water. When drawing the geographic area, include the entire project footprint, encompassing all areas where water-bottom, beach, wetland, or other contact will be made, as well as proposed dredging or marine construction boundaries with all staging areas, ingress or egress access routes, or anywhere equipment, vessels, spuds or anchors will contact the water-bottom. However, keep in mind that you should only draw or report the geographic area where work will occur within the next 30 to 60 days (depending on state laws). This helps avoid confusion or delays and prevents the need to maintain an area that is too large, which is difficult for all parties. Before beginning construction in a new area that is part of the same project, submit a new 811 ticket at least 7 business days beforehand. Breaking it up will help save time and reduce the number of update tickets, markings to maintain, or notifications to track.
- **GPS Coordinates** — Include GPS coordinates whenever possible in X-Y-Z or decimal degrees formats. This data and other project information should be added to the comments section.
- **Equipment** — List all equipment that will contact the water bottom, including spuds or anchors (as applicable).

- **Material Placement** — Include the location and volume of material transported to placement areas to avoid any negative impact. Remember that equipment excavators are used on land to move dredge pipe and material and may also need to be reported.
- **Access Routes** — Ingress and egress routes or other conditions may cause water-bottom contact where a pipeline or utility may be located and cause a hazardous condition. Prop-wash or a vessel’s “belly” or keel could “plow” into the water-bottom and cause damage. List or map these areas as marking and surveying them should also occur, even if there is no excavation or construction planned. The same holds true for “marsh and wetland” activities.
- **Work Type** — Add or select keywords like “dredging or marine construction” to the title, comments, or activity type. Additionally, include the type of marine work performed. Depending on the state, the notification may have an “excavation type or method” dropdown menu. If so, specifically select or list “Marine Dredging” or “Marine Construction.” This prevents confusion with land activities such as “hydro-excavation,” which is not a marine activity. All marine-related notifications should contain the word “marine” in front of the excavation type or description for easy identification.
- **Information** — Provide any other relevant information, like 24/7 job site contacts, vessel names, and drafts, and indicate if the proposed project boundaries are marked electronically or “white-lined.”

2.5 Design or Engineering Tickets

Some 811 One Call Centers provide a survey, engineering, or design ticket notification service for existing lines. This kind of ticket is sometimes called “SUE” or Subsurface Utility Engineering and allows for a notification to be submitted that does not require the utility owner to mark lines in the field. Instead, it may give you a list of member pipeline or utility owners in your project area, which can help with the project scope and design, pre-project communications, and avoiding and planning for hazards early in the process.

Contact the 811 One Call Center in the state where you are working and ask if they offer this ticket service. Like a normal 811 notification, you must provide details on your proposed project area. Your project team may receive a call from the pipeline or utility owners. However, marking lines in the field or being contacted directly by pipeline or utility owners is not required.

2.6 811 Notification Response and Marking

After a successful 811 notification is submitted, make sure all parties have the notification ticket number and it’s readily available at the job site. The notification will indicate the exact time when you can start the project. Wait the required amount of time before starting the project to give the facility owners time to mark, serve notification, or communicate with you.



Positive Response is offered by many states and lets the contractor know the disposition of the ticket or the answer by the facility operator. It can say things such as no conflict, conflict, or do not proceed.

If an operator does not respond in the allotted time listed in the 811 notification but the excavator sees visible indications of a line (such as a line marker, pole, sign, meter or valve) in the proposed excavation area, many states forbid the excavator from beginning earthmoving operations until an additional notice is made to 811, which allows the operator another opportunity to mark the facility.

If a facility operator does not respond to the 811 notification, make a new notification, contact the 811 One Call Center customer support, report to the state regulator if it involves a pipeline, and document all communications and actions.

2.7 Communication

Communication is the most important action to keep the personnel aboard a vessel safe. Pipelines may need to be surveyed or marked before commencing operations. All parties must communicate timeframes and the type of work to be performed. Understanding and accounting for all risks begins with information exchange, a process facilitated by following state laws and contacting 811 before starting the project.

2.8 811 Process Overview

The following is an overview of the 811 process:

- Notify your local One Call Center by calling 811 or making an online request at least seven business days before work begins. Be sure to check your state to find out how far in advance you need to call.
- Wait the required amount of time for the pipeline or utility companies to respond to your request. Note that the “mark by” time may be extended if all parties agree and it’s documented in writing. A positive notification or communication from the pipeline or utility should occur within the notification timeframe.
- Confirm that all the pipeline and utility companies have responded to your request and marked their underground or underwater pipelines and utilities.
- Respect the marks by clearly communicating with all project site personnel.
- Dig carefully around the marks.
- If needed, renew the notification before time expires. Depending on the state, tickets can expire anywhere from 15 to 30 days. Since marine projects can last several months or even years, it’s important to ensure the 811 One Call ticket remains valid and updated to represent the location of work. When all work is completed in an area, it’s recommended that that area be removed from the notification. No work should occur outside of the 811 notification area.



3

Chapter 3: Avoiding Pipelines

Pipelines need to be respected for their potentially hazardous impacts on human life and the environment when ruptured. To protect pipelines and other utilities from potential damage, pipeline and marine construction companies generally have “no-go” or “marine exclusion” zones, which are areas where work may be unsafe or have special conditions.

Before work begins, all parties should mutually agree on marine exclusion zones. Precautions by all parties need to be understood, agreed to, and in place before the project begins. Avoidance procedures should be followed for marine construction projects of all sizes. Understanding the roles pipeline and marine construction companies play in safety and damage prevention will help create a successful project.



3.1 Land Tolerance Zones

A tolerance zone is a predefined horizontal distance extending from the outer edge or wall of a pipeline or utility. The exact distance is defined by law and varies from state to state but ranges from 18 to 30 inches on each side. Tolerance zones were designed for land applications and are too small for marine activities. However, it should be noted that in some states, tolerance zone laws could also apply in marine areas.

3.2 Marine Exclusion Zones

Dredging, marine construction, and pipeline companies should establish a marine exclusion zone, which is recommended at a minimum 75-foot distance on either side of a submerged pipeline, utility, or facility. This applies to all lines that are laid on or buried under the water-bottom, and companies can have an exclusion zone that exceeds the recommended 75-foot minimum. A marine exclusion zone represents an area where no excavation, equipment water-bottom contact, or construction can take place. Additionally, using spuds and anchors is prohibited within this zone unless all parties agree and have written documented approval.

Pipeline companies could initially request a clearance minimum of up to 500 feet on each side of the pipeline, but depending on the type, magnitude, and scope of work, they may allow closer distances upon request. Although marine exclusion zones vary among companies, 75 feet appears to be the no-go working distance for most.

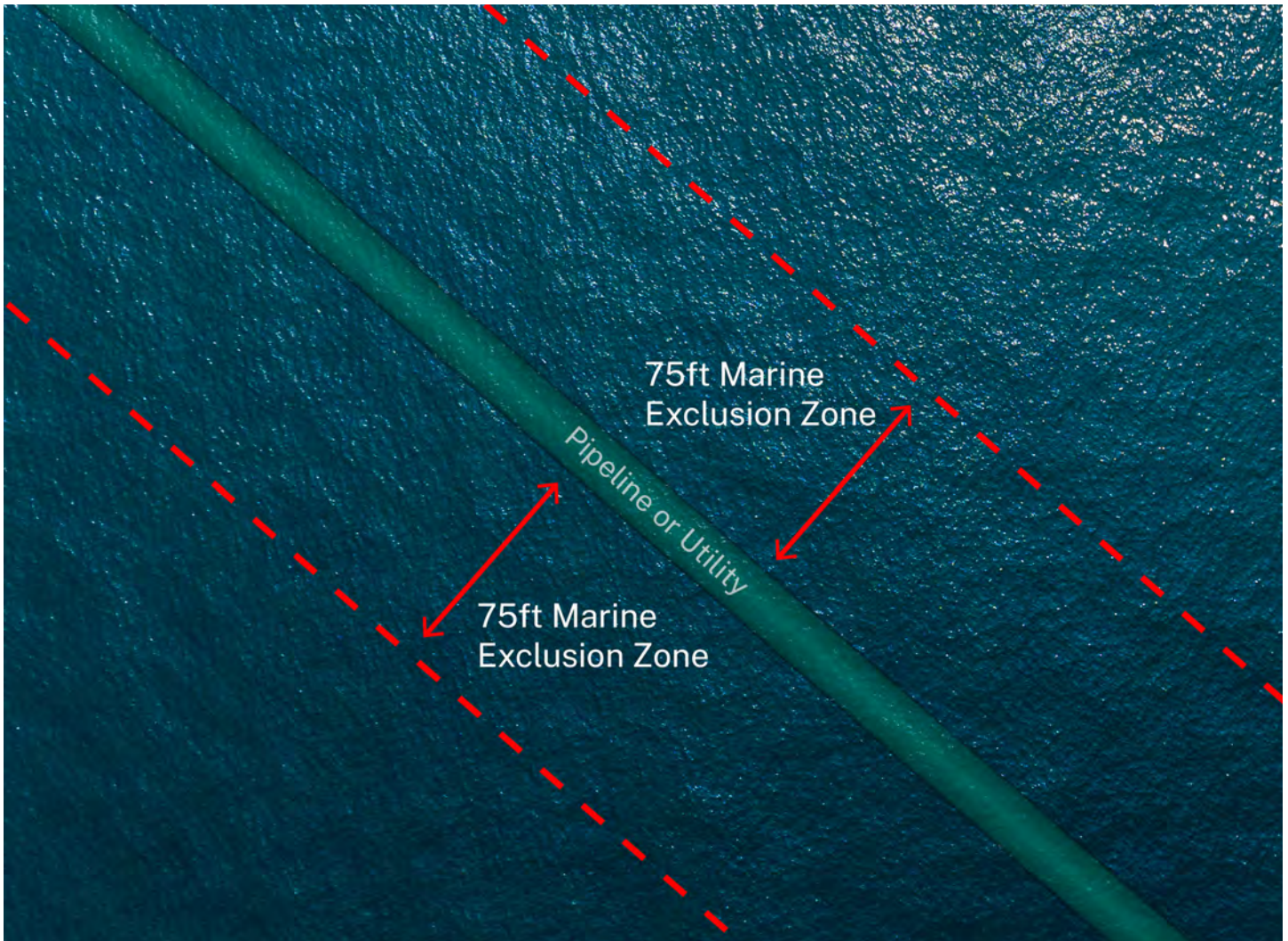
Marking a marine exclusion zone can be done electronically. However, if it is marked in the field, markings should be in pink, which is the recommended APWA color code for marking temporary field survey areas and buffer or marine exclusion zones. The pipeline or utility company owner may also communicate the accuracy of markings to the dredge or construction contractor. Marking accuracy is impacted by many factors, including water depth, weather conditions, and technological errors. The project manager or contractor should ask the pipeline or utility owner for a survey-quality profile of the line to ensure the project is properly planned and the marine exclusion zone is accurately defined.

Additionally, using Automatic Identification System (AIS) technology is a good option for vessel tracking, hazard avoidance, and route mapping. With AIS technology, pipelines and utilities can be geofenced with a needed marine exclusion zone. When a vessel under certain parameters enters the geofenced area, it may generate an alarm and alert the pipeline and utility owners. In some cases, it can alert the vessel that a line is nearby.

Encroachments within the exclusion zone, either near or over lines, may be permitted but only with documented permission that's agreed upon by all parties, such as the pipeline or

utility owner and the contractor. If approved work occurs within the 75-foot exclusion zone, a pipeline or utility company representative should strongly consider being on-site and in direct communication with the dredger or marine contractor. This communication protocol should be outlined as part of the written documented approval.

Note: In federal waters outside of state boundaries, no 811 One Call notification currently exists. If marine water-bottom contact or excavation activity is taking place in federal waters, additional planning and consultation will be needed to determine if pipelines or utilities are in the area and the appropriate marine exclusion zone is agreed upon in writing. For questions outside of state boundaries, contact the Bureau of Safety and Environmental Enforcement (BSEE) or the USACE.





4

Chapter 4: Obtaining and Providing Pre-Project Information

Project planning is a critical aspect of preparing for construction activities. Essential data (pipeline and utility coordinates, ownership, and company contact information) needs to be collected from state regulatory agencies, the 811 One Call notification, pipeline company personnel, and other sources. Other lines, such as electric, water, fiber optic, phone, and sewer, must also be identified in your project area. (The same general precautions listed in this chapter also apply to these types of utilities.)

Sometimes, you may notice conflicting information, so do your due diligence and ask the pipeline or utility company representative the necessary questions. Don't hesitate to ask representatives questions. They are responsible for providing facts. Communicate with them early to obtain facts, legal documentation, letters of no objection, and pipeline profiles. By taking the necessary precautions to identify waterways, wetlands, or marine areas that your project will impact, you will inform and help your company and the pipeline or utility representatives agree upon avoidance measures.

Lastly, take time to familiarize yourself with the pipeline resources available. Each data source has a different layout and provides various information.

4.1 Project Scoping

As a critical part of project scoping, outline your total project footprint in your execution and voyage plan. Identify all waterways, wetlands, and marine areas that will be traversed by project vessels. This includes areas listed in Chapter 2, section 2.2, of this guide. Before a project starts, all parties must agree on project plans, pipeline or utility crossing agreements, clearance areas, and avoidance and safety measures, as well as work together to stay informed throughout the project.

4.2 Customer Data Request

Your first data request should be made to the client. Most states have an agency where data on flow lines and non-regulated lines may be found. For example, if the project is in a jurisdictional body of water, like a port, harbor, or navigable waterway, refer to the information provided in the project plans and specifications and consult with the USACE or other regulatory agency. Often, they will have historic pipeline or utility data to reference.

4.3 National Pipeline Mapping System (NPMS) Public Map Viewer

Operated by the Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA), the National Pipeline Mapping System (NPMS) database collects information on all federally regulated pipelines and should be consulted before every project. NPMS shows general pipeline locations, current owner/operator names, and contact information. Users should be aware that NPMS does not include natural gas distribution pipelines, federally unregulated gathering lines outside of high consequence lines, or abandoned or inactive pipelines.

To access the NPMS database, visit <http://www.npms.phmsa.dot.gov>. Click General Public, then locate and click the Launch the Public Map Viewer link.

Note: There is a helpful video link called "About Public Map Viewer" on the General Public page.

Government agency officials, including emergency responders and tribal representatives, can apply for access to more detailed NPMS information and location data by visiting <https://www.npms.phmsa.dot.gov/ApplyForNPMSAccess.aspx>.

It's important to note that NPMS may not include the following:

- Offshore pipelines in federal waters beyond state boundaries
- Flow lines within state boundaries
- Non-regulated pipelines
- Abandoned lines



4.4 State Data Sources (for Flow or Production Lines)

Flow lines and production lines are a potential hazard and are generally regulated at the state level. These smaller lines are often not captured by the 811 One Call Center or other databases. The agency that manages such pipeline information varies by state. For example, in Louisiana, the agency is the Department of Natural Resources, Office of Conservation. In Texas, it is the Texas Railroad Commission. When planning a project, contact that state's regulatory agency and ask, "Where can production line data be found?"

Refer to the Information Resources section of this guide for more guidance on finding state-level information and other publicly available data sources that may be helpful to your project.

4.5 Whom to Inform

Company engineers, project managers, and/or site managers should inform pipeline companies of the project as early as possible. Each company has different requirements and may ask for a crossing agreement or other legal documents to help protect the line. Invite the pipeline company to give feedback on pipeline avoidance measures. Communication and agreement on the scope of work is essential.

Note: If a project requires an underwater pipeline to be matted or lowered, additional time may be needed. Inform the pipeline company as soon as possible.

4.6 Roles of Pipeline Personnel

The following are various pipeline company personnel responsible for pipelines:

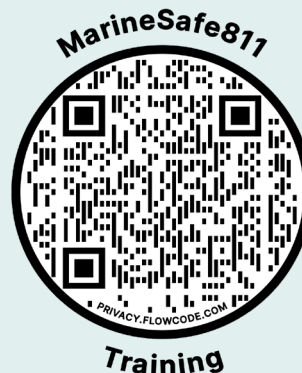
- **Pipeline/Right-of-Way Technician or Damage Prevention Representative** — Responsible for facilitating project commencement and marking pipelines.
- **Land Agent** — Handles legal or crossing agreements.
- **Pipeline Controller** — Remotely monitors pipelines on a 24/7 basis and serves as the emergency contact.
- **Operations Manager/Engineer** — Participates in decision-making.

4.7 Pipeline Support

Once you have notified the pipeline company and obtained its contact information, reach out as soon as questions arise or the project scope changes. If needed, request to have a representative be on-site as work is executed near underwater pipelines in order to assist in proper avoidance measures. As-built drawings or geospatial data such as KMZ/ KML files are recommended to be shared between the pipeline or utility operator and the dredger or marine contractor. These can be overlaid and help formulate avoidance plans. The representative may also provide coordinates and contact information for other pipelines or utilities in the area.

4.8 Other Lines

In addition to oil and natural gas pipelines, there may be other utilities, such as electrical, water/brine, sewer, telecommunication, and fiber optic lines in the project area. You should follow the same general precautions when working around these utilities.



Response and safety checklist, online training in English and Spanish, and support and resources can all be found at www.marinesafe811.org.





5

Chapter 5: Safety, Environment, and Emergency Response

Saving lives, protecting the environment, and effectively responding to emergencies are the focus of this guide. Ask the pipeline company if there are any specific safety, environmental, or emergency concerns and capture them in your safety plan. Review the plan with all project and vessel personnel and re-evaluate it as new hazards emerge. Consider including the recommendations in this chapter in your plans.

5.1 Safety Equipment

Certain equipment or technology should be used to promote safety. For example, visual and audio alarms in the wheelhouse can alert personnel if any equipment — specifically, the cutterhead, spud, or anchor — makes unanticipated contact with the water bottom that is “outside the design template.”

It's also highly recommended that gas detectors on vessels are active during operations. This is because natural gas may be odorless and hard to detect if there is a leak. If you suspect a leak, check or recheck areas for gas using a gas detector.

5.2 Pipeline Leak Signs

The following are the main signs of a pipeline leak:

- A continuous bubbling, blowing, or hissing sound from the water
- A rainbow sheen or unusual colored water, dead or discolored vegetation in an otherwise green area, or a vapor cloud or mist not usually present
- A hydrocarbon smell of rotten eggs or gasoline

5.3 Actions after a Pipeline Leak

Take the following actions in the event of a pipeline leak:

- Shutdown or minimize the use of all possible ignition sources (motors, lights, etc.). Drift out of the area, if possible, before starting the motor
- Evacuate the vessel if needed
- Evaluate the situation and record your exact location and time
- Move upwind at least ¼ mile or away from the affected area. When safe, call 911 and the Coast Guard
- Prevent and warn other vessels from entering the area. If possible, boom-off or secure the area
- Call the emergency number listed on nearby pipeline signs (if applicable)
- Do not attempt to operate any pipeline valves or equipment

5.4 Emergency Response and Notification

Be aware of the following when addressing a pipeline leak:

- Do not extinguish a pipeline fire or attempt to close a pipeline valve
- Immediately contact the pipeline company's 24/7 emergency number in your plan to shut down. Provide any pipeline information and location data that you have, which will help the pipeline company identify the impacted line



- Record the wind and water flow direction and determine the nearest boat launch
- Update or communicate the situation with 911, the Coast Guard, and the National Response Center (1-800-424-8802). Provide the latest location
- Check your state's laws for other entities you must notify. For example, in Louisiana, this would be the Louisiana State Police Hazardous Materials Hotline: 877-925-6595
- If you think a pipeline was struck but no leak occurs, call both emergency and pipeline emergency contacts. (In many states, reporting a strike is required by law)
- If facility damage or an excavation accident occurs, report an emergency 811 damage notification by calling or contacting the 811 One Call Center. Reporting damage is mandated by law in most states

5.5 Safety and Emergency Plans

All project plans should have the following basic pipeline information stored in multiple, readily available locations:

- List of all pipelines in the project scope
- List of the products in each pipeline (to help evaluate the risk and response level in the event of a release)
- Size of the pipeline diameter
- 24/7 emergency contact number
- Local pipeline company representative contact number

5.6 Safety and Emergency Plan Awareness

Emergency plans should be specific to each project and communicated with the crews in the field. Before a project begins, make sure you know the following:

- Potential risks and mitigations
- Evacuation routes and procedures
- When and how to use an emergency shutdown device, if equipped
- How to eliminate all ignition sources

When on-site, construction contractors and subcontractors need to ensure that all project personnel, crew members, and staff are aware of all pipeline hazards, mitigations, and emergency measures. This should be prioritized as an agenda item at all safety and pre-job meetings. Remind crews of those hazards daily.



6

Chapter 6: Understanding Dredging and Marine Construction

Pipeline and utility company personnel should have basic knowledge of marine construction types, equipment, dredging, and underwater excavation. Pipeline right-of-way staff, land agents, engineers, and operations employees need to understand certain information when planning for a dredging or marine construction project in order to prevent pipeline damage and loss of life. Qualified and trained pipeline and utility person(s) should review all dredge and marine construction plans and understand the type of work and hazards specific to marine projects.

In addition to the information below, unique situations may arise that require frequent communication and risk mitigation early and often. Proactively engage with the contractor to improve pre-project scoping and risk mitigation and take every opportunity to ask the contractor for basic information about its operations in your project area.



6.1 What Pipeline and Utility Personnel Need to Know

Marine dredgers or construction excavators can move, impact, or remove submerged earth using various methods in many environments. Marine activities include projects in rivers, bayous, bays, lakes, the gulf, arms of the sea, or oceans. Dredging and marine construction activities are performed for a variety of reasons:

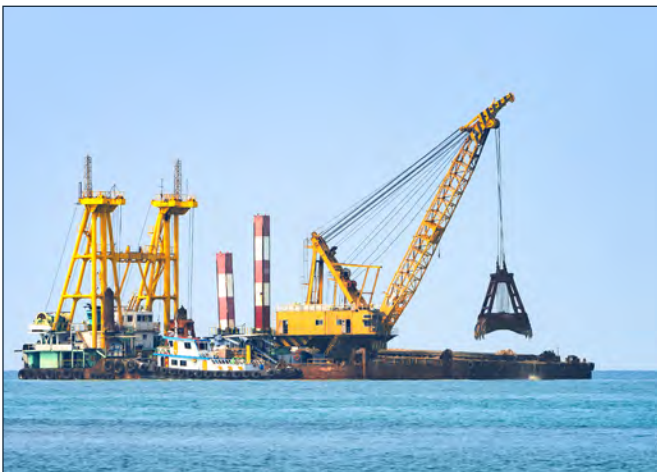
- Environmental restoration, including beach nourishment and coastal protection
- Port, harbor, and river channel deepening and maintenance for navigation
- Pile driving and bulkhead, levee, and camp construction
- Site clearance, drilling, and installation and abandonment of platforms

6.2 Primary Types of Dredges

Understanding how different types of dredges operate is critical for knowing how to protect pipelines and utilities. For example, some dredges and marine equipment move by dropping large anchors or “spuds” at multiple intervals along their path. Their depths and exact location must be known as they may impact underwater lines, making it necessary to create or change an agreement so that work can occur in a marine exclusion zone (especially for larger operations).

The following are types of dredges:

- Clamshell or bucket dredge
- Self-propelled hopper dredge
- Hydraulic cutterhead dredge
- Backhoe dredge



Clamshell or bucket dredge



Self-propelled hopper dredge



Hydraulic cutterhead dredge



Backhoe dredge

6.3 Primary Types of Marine Construction Equipment

Any type of marine equipment that contacts the water bottom during its normal operation is a threat to underwater pipelines. Discuss this type of equipment during the project hand-over meeting. Make special provisions in your project execution plan to protect underwater pipelines and discuss ways to protect all lines during project planning meetings.

The primary types of marine construction equipment include the following:

- Spud barge or spud boat
- Jack-up and lift boats
- Pile driver (crane or excavator)
- Long-reach excavator
- Marsh backhoe or dozer
- Vessels with large anchors
- Other construction equipment, support boats, or vessels

6.4 Accuracy of Pipeline Locations

Dredging and marine construction projects are more complicated than on-land excavation activities. For this reason, pipeline, utility, and marine construction personnel need to ask questions, review the proposed project scope, consolidate pipeline or utility location data



with each other, and agree on the final project scope. All parties must understand the risks posed if they do not agree on the final project scope before starting construction.

Ensure that these essential steps are completed:

- Identify all lines within the project scope
- Attend pre-project scoping and kick-off meetings hosted by the contractor
- Ensure applicable pipeline crossing agreements and other legal documents are addressed early and finalized in the project execution plan

Note that in the event pipelines or utilities are found to exist within a project area with no mitigation measures (inaccurate, missing, and insufficient information or survey data), an allowance by the client should be given to the dredge or marine contractor to suspend activities within 250 feet of the suspected pipeline or utility (unless otherwise agreed to by all parties).

Note: When the marine construction or dredging project ends, stakeholders should be given updated as-builts or surveys containing the most recent pipeline and utility data from the project.

6.5 Questions to Ask Dredging and Marine Construction Companies

Asking the right questions to dredging and marine construction companies will help identify hazards. Record answers to the questions below in your communication plan, project execution plan, and emergency response plan:

- Will spuds or anchors be used? If so, when, where, and how?
- What is the spud or anchor's penetration depth, dimensions, and weight?
- Is the discharge pipe laid out and moved by heavy equipment?
- Is the material placement area near a pipeline?
- Where does dredged material go, and is it moved by heavy equipment?
- What is the potential weight of dredged material, mats, or equipment over the pipeline?
- Are ingress and egress points drawn on plans, field maps, or diagrams?
- What are your 24/7 contact numbers for all project parties? (Document and share this information with all parties)
- What are your hours of operation (day/night, 24/7, or other)? (Clearly communicate this to all parties)

- What are the types, purpose, and staging areas of each support vessel? (These may be barges or other project vessels that may contact the water bottom away from the primary work area.)
- Where are the overnight or project-pause locations for all vessels and heavy equipment?
- Will any spudding or anchoring occur when relocating for repairs, work stoppage, or maintenance that is not in the project location?

6.6 Pipeline Safety and Damage Prevention

Pipeline personnel should consult company requirements for underwater pipeline safety and get additional help from experts in that field. Marine pipeline incidents are far more impactful and difficult to manage than pipeline incidents on land. It is highly recommended that a damage prevention plan be created and customized for each project using this guide's data referenced in Chapter 6, section 6.5.

The following are additional considerations:

- Identify the most hazardous situations.
- Evaluate risk to the pipeline(s) and have an appropriate action or response plan.
- Ask to be on-site when the dredge or other equipment is nearing the pipeline.
- Make sure the contractor knows how your pipeline is marked and that different pipelines may not be marked the same way.
- Tell the contractor if pipelines cannot be marked or accurately surveyed due to water conditions and depths. GPS coordinates may be an option.
- Do not miss planning or pre-project meetings, and document your engagements.

6.7 Safety, Hazard, and Risk Assessments

Dredging and marine construction projects should include conducting a formal and documented safety, hazard, or risk assessment with analysis (such as a risk matrix). Before starting work, and based on the risk assessment mitigations, develop a hazard control plan. Contractors should not assume project initiators, agencies, or clients have identified all pipeline or utility hazards and their associated location information. Abandoned lines may never be identified and should always be considered in construction and safety plans.



Multiple factors, such as the type of dredging, marine construction equipment, and communication, must be addressed before work begins on a project, especially due to the higher risks associated with pipeline damage compared to on-land activities.

6.8 Sources for Learning More about Dredging, Marine Construction, and Safety around Pipelines and Utilities

- Council for Dredging & Marine Construction Safety: www.cdmcs.org
- Marine Safe 811: www.marinesafe811.org





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Chapter 7: Project Planning for Safety Near Underwater Pipelines and Utilities

Ensuring safety in all areas and completing a project on time can be complicated. The planning process should begin months before the project start date. Planning identifies stakeholders and potential on-site problem areas in advance, which can be key to success. To safely perform the project, understand when to implement each step of pipeline or utility identification, notification, and avoidance.

This chapter covers critical steps within the project timeline for planning work near pipelines. These recommendations are not all-inclusive, as special considerations may arise. These recommendations can also apply to other utilities. The listed timeframes are estimates and can be adjusted depending on the project.



7.1 Accurate Data

The recommended practice during project planning for marine construction or dredging activities should require pipeline, utility, and dredge companies to obtain and use accurate line location data approved by the pipeline or utility company. This communication or process should be initiated by the project owner, contractor, or engineering and design personnel. A formal request to the pipeline or utility company should occur as early as possible in the design process and include accurate project boundaries.

For each project, survey data needs to be in a constant format. Data accuracy is paramount for safety when entering information into marine software. It helps to mutually agree on survey data requirements, formats, marking, and project date ranges. The pipeline operator or utility company should be able to provide survey quality data with X and Y coordinates and a plan and profile view of the lines. All project, pipeline, and utility plans should be consolidated and approved by all parties for accuracy.

A quality assurance and quality control process can verify that dredge, cutterhead, spud, and anchor positions are accurately represented in the software, plans, and the 811 One Call notifications. This information should be communicated to all parties before construction begins.

7.2 Stakeholder Identification

Stakeholder identification, risk assessment, and an engagement plan for each project is recommended to ensure effective communications with the right frequency and parties of interest. This may include but is not limited to:

- Pipeline and utility operators
- Contractors
- 811
- Ports
- Marinas
- Landowners
- State or government agencies
- Captains
- Pilots
- The US Coast Guard
- Emergency responders
- Waterway users

As part of pre-design and pre-construction meetings, stakeholders should be informed of the project scope, impacts, and timing. Incorporate solicited stakeholder input on project mitigations, risks, safety concerns, and emergency response measures. Job-site pre-construction stakeholder meetings should occur as part of the communication process.

7.3 Standardized Policies and Procedures

Before the project starts, it's best to develop standardized, written policies and procedures for planning dredging or marine construction operations near pipelines or utilities. This should specifically include:

- Pipeline operator dialog on avoidance measures
- Marine exclusion zones
- Minimum requirements for marking and verifying pipelines
- The uploading of pipeline information into the appropriate navigation or construction software

7.4 Intent to Dredge/Construction Notification Letters

Intent to dredge or construction notification letters, with all associated procedures, mapping, and documentation — hard or digital copies — should be delivered to the pipeline or utility operator as early as possible and well before the 811 One Call notification.

7.5 Safety Plans and Hazard/Risk Assessments

The operator can engage the excavator and develop a safety plan for hazard mitigation. A detailed list of all equipment impacting land and marine areas should be discussed, including equipment dimensions and specifications, spud barge dimensions and weight, vessel name(s) and draft(s), marsh buggy weights, etc. Before project mobilization, provide this information to help stakeholders perform a hazard or risk assessment and associated mitigation plans.



7.6 Two to Three Months or Earlier before Bid or Project Start Date

During this timeframe, aim to complete the following:

- Obtain project bid documents, plans, and specifications.
- Create an 811 survey, engineering, or design notification ticket (if that service is available).
- Collect important research documents like as-built drawings, survey data, and profiles from the pipeline or utility owner or agency.
- Identify all possible pipelines and document their associated details, such as line size, location, and product. Collect primary personnel contact information.
- If there is potential for ANY dredging or construction activity within 500 feet of a pipeline, contact the pipeline company as soon as possible and complete the following:
 - Ask what agreements, documents, or permits are required by the pipeline company to work near their pipeline.
 - Identify and list any avoidance measures and recommendations from the pipeline company.
 - Tentatively agree on a pipeline avoidance plan and document it for later use.
 - Ask the pipeline company for pipeline location data and compare it with other sources.
 - Ask what other pipelines are in the area and who owns them.

Project design and schedule updates should be communicated quarterly during project design and agreed to by all parties as part of pre-project planning. Usually, a 60-day minimum advanced notice of project construction is requested. Additionally, there are other factors to consider during front-end project scoping and planning, such as the length or duration of the project. Projects can span years, and this should factor into front-end project scoping and planning. For example, pipelines and utilities that need to be relocated, deepened, or removed can take a minimum of two years due to permitting, engineering, and normal marine project challenges. Pipeline operators should be asked periodically for the latest line location data and operational and company updates throughout the project.

7.7 One to Two Months before Project Start Date

During this timeframe, aim to complete the following:

- Include pipeline and utility avoidance measures, etc., in project bid documents.
- Conduct any necessary surveys.
- Invite all companies to pre-project planning meetings.
- Have any crossing agreements or letters of no objection signed and documented. (This timeframe can vary from 2 to 8 weeks to complete. Therefore, this should be worked out as soon as possible in the project process so all stakeholders are aware of limitations and avoidance requirements.)

7.8 One Month from Project Start Date

During this timeframe, aim to complete the following:

- Final project design and field verification of the exact project impact areas.
- Meet with impacted pipeline or utility companies to:
 - Provide the project overview and agree on timelines.
 - Discuss roles and responsibilities along with field involvement — who does what and when?
 - Evaluate if a pipeline company representative will need to be on-site when work is executed near a pipeline. If so, schedule tentative dates.
 - Discuss types of pipeline markings and the timing for marking to occur.
 - Ask for GPS coordinates (X, Y, and Z format) of the pipelines.
 - Identify and list special considerations and mitigations from the pipeline companies.
 - Discuss staging sites, discharge pipe, and dredged material placement areas, such as equipment and weight over the pipeline, mats, etc.
 - Discuss and agree on marine exclusion zone distances around pipelines.
 - Discuss and agree on a plan if a pipeline strike occurs — who will do what?

7.9 Three Weeks from Project Start Date

During this timeframe, aim to complete the following:

- Hold a pre-construction meeting with the pipeline companies.



- Discuss specific emergency plans, safety concerns, and possible mitigations with all parties. This could include striking a pipeline or utility that was not identified or how to avoid damage to marine construction equipment.
- Discuss pipeline and utility risks, including spuds, anchors, wheelwashing, jack-up, or heavy equipment that will be near any line. All risks or concerns should be listed with mitigations in the project or safety plans.

7.10 Two Weeks from Project Start Date

During this timeframe, aim to complete the following:

- Make the 811 One Call Notification at least seven business days before the project starts. Add any water bottom contact and dredged material placement areas to the 811 One Call notification so all pipeline and utility companies will be notified. (Pipeline and utility companies will then start marking lines or providing feedback on locations, GPS, maps, etc.)
- Provide contact information for the dredging project manager or superintendent and the name of the dredge used.
- Confirm if a pipeline company representative will be on-site as work is executed and can shut down a pipeline if necessary.

Note: Some pipeline companies have an Automatic Identification System (AIS) around their pipelines that tracks vessel location and notifies the pipeline company when a dredge enters the pipeline buffer zone.

7.11 One Week from Project Start Date

During this timeframe, aim to complete the following:

- Construction companies should verify that ALL pipelines have been marked or have data on exact locations (GPS, maps, etc.). Note: Pipelines may be marked differently by different companies.
- Verify that a copy of all pipeline or utility contacts has been given to the vessel captain or on-site personnel and is kept readily available.
- Verify that all parties have satisfied and agreed to all special requests.
- Communicate the progression schedule and timeframe to the pipeline or utility companies.

- Reconfirm that a pipeline company representative will be on-site as work is executed and can shut down a pipeline if necessary.
- Agree on the activity or dredge route, support vessel(s), and disposal activities.
- Agree on marine exclusion zone distances around pipelines or utilities (where dredging, spudding, or anchoring are not to occur).
- Verify the correct project plans and maps with pipeline locations have been uploaded and are displayed on the vessel guidance systems, construction software, and/or navigation-aiding devices.
- Review emergency response and evacuation procedures.

7.12 Overview of Civil Projects

Civil projects are funded by state and federal governments or agencies. Most civil projects are public-bid, and justification must be made not to award them to the lowest bidder. The USACE, along with some state agencies, has integrated permitting and project design processes, which outline how projects should be implemented. These have some specific pipeline and utility avoidance measures that are incorporated into construction bid package plans and specifications. These should be reviewed pre-bid, and any gaps that could cause a hazardous situation should be communicated. It is recommended that civil projects have well-defined and consistent project scopes to lessen the risk of marine construction or dredge activities impacting a pipeline or other utility. Pre-bid meetings should include pipeline, 811, and/or utility representatives to identify and mitigate hazards and risks properly.

Civil projects have the following focus areas:

- Civil project plans and specifications shall contain consistent, up-to-date, and precise pipeline and utility location data (X, Y, and Z coordinates) with ownership information and guidelines and/or requirements for dredging and marine construction companies to operate around pipelines and utilities.
- The civil client or agency should make funds available in bid documents for marine contractors to accurately verify pipelines or utilities in the project scope.
- Any updated pre- or post-project utility and pipeline survey or location (X, Y, and Z coordinates) and ownership data should be captured by the civil project owner, who should update and purge files for use in future project plans and specifications.
- Training on 811 and marine pipeline safety should be highly recommended by all dredge and marine construction companies and project owners and become part of pre-planning requirements for each new contract. In some states, 811 training is required by law.



- The location and depth of pipelines and utilities should be confirmed, documented, and agreed to by the contractor and pipeline or utility owner before work begins.
- Dredge and marine construction companies should have the most current pipeline or utility line profiles incorporated into marine construction/navigation software or execution procedures.

7.13 Overview of Private Projects

Private projects come from individual companies, corporations, or private owners that are not known as public, governmental, or agency entities. These projects may not be open for public review and may not be publicly bid or awarded under state or federal funding laws. However, private projects should follow all the protocols listed in the civil projects section for marine pipeline and utility safety.

Private projects can vary widely in scope. These can be bid on with no engineering or design, which may have no data that references underwater pipelines or utilities in the project footprint. These projects should require marine pipeline and utility safety plans, guidelines, research, survey, engineering, and avoidance or safety mitigation measures to be performed by the contractor.

7.14 Reminders and Other Recommendations

By understanding and applying the proper planning procedures, you can prevent underwater pipeline damage and protect personnel's health and safety. Plan in advance by obtaining the necessary permits and documentation months before the project begins. Communicate early and often with marine personnel and pipeline company representatives to confirm pipeline location specifications and details and agree on marine exclusion zones, emergency responses, and evacuation procedures. Identify risks and always remember to initiate the 811 One Call notification process. Contact the appropriate emergency response agencies when the situation requires it.

It's recommended that marine safety and emergency procedures and checklists be reviewed at all group meetings. Refer to the end of this guide for a safety checklist or visit www.marinesafe811.org for other resources

Other important actions include identifying the type of work being conducted, the machinery involved, transit routes, staging areas, and nearby pipeline locations. You can save lives by doing your due diligence and promoting safety procedures, attending necessary on-site meetings, and documenting the emergency contact information for all project parties, representatives, agencies, and other personnel.



8

Chapter 8: Learning from Incidents

This chapter covers various marine incidents and the lessons learned from each. It's important to note that these accidents are very serious, and some involve fatalities. It's critical to learn from these accidents to prevent loss of life or injury in the future.

Protecting life is the highest priority, followed by protecting the environment from spills or releases and protecting critical infrastructure like energy pipelines and electrical, fiber-optic, and water supply lines. There are many safety learnings and best practices that apply to all types of underwater lines.

More resources, education, and support can be found at www.marinesafe811.org.



8.1 Lessons Learned from Corpus Christi 2020

On August 21, 2020, a fatal explosion occurred involving a dredging vessel at the Port of Corpus Christi, Texas. The explosion resulted from a dredge's cutterhead striking a submerged propane pipeline. The incident also caused the ship channel to be shutdown, affecting port operations. The fatalities and circumstances prompted an investigation by the National Transportation Safety Board (NTSB), US Coast Guard, and other regulatory bodies. Sadly, five lives were lost, six others were injured, and the vessel and surrounding infrastructure suffered significant damage.

Insufficient planning, pipeline location information, and pipeline protection measures were all factors that contributed to the explosion. The following actions can help avoid an incident like this:

- Establish clear communication protocols between dredging companies, pipeline operators, and all impacted stakeholders to ensure everyone is aware of potential hazards. All parties should agree, document, and signoff on project work plans and scope prior to construction. Any deviations need to be re-submitted for approval.
- Conduct comprehensive risk assessments before the start of any dredging operations. Identify and evaluate potential hazards, including submerged pipelines.
- Ensure that all submerged pipelines are accurately documented and their locations are communicated pre-construction to all relevant parties involved in marine operations.
- Conduct thorough briefings before beginning dredging operations to review potential risks, including the presence of pipelines.
- Implement and enforce strict procedures for verifying the location of submerged pipelines in the field before starting any dredging activities.
- Continuously monitor the dredging site for any conditions that change, which could increase the risk of striking a pipeline. Adjust operations accordingly.
- Ensure that all crew members are trained in emergency response procedures specific to incidents involving pipeline strikes. Eliminate all ignition sources, keep the crew safe, and contact the authorities.

The 2020 Corpus Christi pipeline explosion serves as a sobering reminder of the importance of strict adherence to safety protocols, accurate communication, and thorough risk assessments for marine operations. By learning from this tragic incident, we can work to prevent similar occurrences in the future and help ensure the safety of all personnel involved in dredging and other underwater activities.

8.2 Lessons Learned from Long Beach 2021

On October 2, 2021, an oil spill occurred off the coast of Long Beach, California. The primary cause of the spill was a subsea pipeline being struck and dragged by the anchor of a large ship. The pipeline ruptured, which led to an estimated release of 588 barrels (or 24,696 gallons) of crude oil into the Pacific Ocean. The cleanup process lasted weeks and required long-term environmental monitoring. The oil spill affected coastal ecosystems, beaches, nearby communities, and marine life, including fish, birds, and marine mammals. The spill coated animals in oil, leading to poisoning, hypothermia, and death.

High levels of maritime traffic in the area, combined with adverse weather conditions, increased the likelihood of an anchor drag incident. The coordination and communication between vessels, coast guard, and pipeline operators were insufficient to prevent the oil spill. The following actions can help avoid an incident like this:

- Encourage better collaboration between the pipeline operators, maritime vessels, and the coast guard. Share information on protecting or avoiding underwater infrastructure.
- Improve the marking and mapping of subsea pipelines to ensure that vessel operators and the Coast Guard are aware of their locations, reducing the risk of accidental damage.
- Conduct regular risk assessments of pipelines, especially in areas of high maritime traffic, to detect and address potential vulnerabilities before an incident occurs.
- Implement stricter protocols for anchor handling in areas with critical underwater infrastructure, including designated anchorage zones, to ensure they are clear of pipeline risks.
- Improve awareness, education, planning, and coordination between vessels, the Coast Guard, and pipeline operators, particularly in high-traffic areas near pipelines or utilities.
- Conduct regular drills involving all stakeholders, including pipeline operators, maritime companies, and emergency responders, to ensure operational response and readiness for potential spill scenarios.
- Identify and engage with impacted stakeholders to provide education on pipeline safety, damage prevention, spill response procedures, and preparedness efforts. This helps ensure a coordinated response in the event of an incident.

The 2021 Long Beach oil spill highlights the critical need for improved safety measures, pipeline education, risk evaluation, better communication, and response efforts to protect subsea pipelines from damage and prevent environmental disasters. By learning from this incident, we can work to enhance the safety of maritime operations and protect our oceans and coastal communities from future spills.



8.3 Lessons Learned from Lafitte 2013

On March 12, 2013, a tugboat was pushing an oil barge along Bayou Perot near Lafitte, Louisiana. The tugboat struck a submerged, 16-inch liquefied petroleum gas (LPG) pipeline, causing a massive explosion and fire. The incident resulted in the tragic death of the tugboat's captain and injuries to other crew members.

The NTSB determined that the primary cause of the explosion was the tugboat and barge striking the submerged LPG pipeline. The location of the submerged pipeline was not adequately marked on navigational charts or in the waterway, which contributed to the tugboat's crew operating in a hazardous area. The waterway in Bayou Perot is also narrow, shallow, and prone to shifting sediments, making navigation difficult. These factors also contributed to the tugboat straying off its intended course and into the path of the pipeline.

Additionally, the operator did not perform a comprehensive risk assessment before navigating the barge through the area, which could have identified the potential risk of a pipeline. The incident also occurred with limited visibility and challenging environmental conditions, making it more difficult for the crew to detect hazards or pipeline signage. The following actions can help avoid an incident like this:

- Implement visible and durable markers for submerged pipelines in navigable waterways. Pipelines or markers should be clearly indicated on navigational charts and visible to vessel operators.
- Regularly update navigational charts to reflect the accurate location of submerged pipelines and other hazards. Ensure that these charts are readily available to vessel operators.
- Consider installing aids to navigation, such as buoys or lights, in areas where pipelines coexist with high vessel traffic.
- Conduct pre-operation briefings involving boat operators, pipeline owners, and local authorities to review the location of underwater pipelines and other potential hazards. This is a key component within a vessel's voyage plan.
- Establish clear communication channels between all parties involved in waterway operations to ensure that pipeline locations and other risks are effectively communicated to all involved parties.
- Boat operators should conduct thorough risk assessments before navigating through areas known to contain submerged pipelines. These assessments should consider environmental conditions, potential water bottom contact, pipeline locations, and navigational challenges.
- Continuously monitor and assess the risk of pipeline strikes in waterways, adjusting safety protocols as necessary to prevent accidents.

- Ensure that all crew members are trained in emergency response procedures specific to marine pipeline strikes and explosions. Eliminate all ignition sources, keep the crew safe, and contact the authorities. Conduct regular drills to prepare for such incidents.
- Work closely with local emergency services to develop and implement effective response plans for marine pipeline-related emergencies and communicate those plans at the job site.

The 2013 Lafitte tugboat pipeline explosion highlights the critical need for improved pipeline marking, enhanced communication, and comprehensive risk assessments in shallower waterways. By learning from this incident and implementing the recommended safety measures, we can work to prevent future tragedies and protect both human life and the environment.

8.4 Lessons Learned from Matagorda Bay 2018

On April 17, 2018, a pipeline explosion occurred in Matagorda Bay, Texas, when a spud on a dredging vessel struck a submerged natural gas pipeline. The explosion resulted in several injuries and the complete destruction of the vessel. The incident also led to environmental impacts to the surrounding waters and wildlife.

The NTSB identified the primary cause of the explosion as the vessel's spud being used like an anchor, striking the submerged natural gas pipeline. The exact location of the pipeline was not accurately identified on charts or plans. There was no active 811 One Call notification for the location. Therefore, the vessel operators and pipeline company were unaware they were operating near an active natural gas pipeline. There was also insufficient communication between the dredging company, the pipeline owner, and relevant agencies. This failure to coordinate contributed to the vessel unknowingly operating and spudding in a dangerous area over the pipeline.

- Ensure that all submerged pipelines are accurately mapped and that these maps are regularly updated and shared with companies conducting dredging or other underwater operations.
- Effectively use the 811 notification system and update tickets with new work locations as needed. Do not work outside the active 811 notification area to avoid working where lines are not marked.
- Conduct comprehensive pre-operation surveys to identify all potential hazards, including submerged pipelines. These surveys should be mandatory, reviewed by qualified personnel, and agreed upon by the dredge or marine construction company and the pipeline operator.



- Establish mandatory coordination meetings between dredging companies, pipeline operators, and relevant regulatory authorities before operations start to review potential hazards and safety protocols.
- Implement regular training programs for dredge, marine construction, and pipeline operators on the risks associated with submerged pipelines and the importance of adhering to safety protocols.
- Train crews on emergency response procedures specific to pipeline strikes, including immediate ignition source shutdown protocols and evacuation procedures.

The 2018 Matagorda Bay dredge pipeline explosion underscores the critical importance of accurate pipeline mapping, effective use of the 811 One Call notification system, stakeholder communication, thorough pre-operation surveys, risk evaluations, and crew training in preventing similar incidents. By learning from the NTSB's investigation and recommendations, we can work to prevent future pipeline strikes and protect both human life and the environment.

8.5 Training Topics to Prevent Incidents

There are many marine excavation activities and topics that all parties should be trained on before the project start date. Proper training can help prevent incidents and ensure personnel know how to respond in an emergency. This section covers training recommendations and topics that all parties should know.

Operations and project information, including:

- How to determine what product is in a line
- How to identify the entire project impact area:
 - Vessel anchors and spuds
 - Vessels types and vessel staging
 - Propeller or wheel wash activities
 - Spoil locations
 - Disposal/discharge routes and the equipment used in these areas
 - All work area boundaries where water bottom contact can occur
 - Marine exclusion zone (how to implement and what they mean)
 - Ingress and egress sites/routes by large equipment
 - Hazard and risk assessments with mitigations
 - Accurately communicate pipeline or utility locations during project planning

- How to identify and engage stakeholders and key project personnel, which should be listed during project planning and be available at the construction site
- How to share planning details of the project and specifications of the equipment used: spuds, support vessels, etc.
- How to check cutterhead location in relation to the GPS transmitter to ensure accurate dredge or water bottom impact location

Procedures to use during the project, including:

- How to communicate with all parties throughout the project cycle with updates on project plans, activities, and locations
- Who will be in the direct communication loop during construction (and how important it is to collect good and accurate contact information)
 - Dredge or construction vessel captain
 - Pipeline or utility control center or emergency contact
 - Pipeline or utility locator or field representative
 - Project managers for all parties

The 811 One Call process and pipeline/utility locating, including:

- How to use 811 One Call for pipeline and utility information and not assuming where pipelines or utilities are located:
 - What 811 is and is NOT used for
 - What data elements are required when making an 811/ one call notification
 - How 811 works, its requirements, and ticket duration (which vary from state to state)
 - How to make an emergency excavation 811 notification or report line damage by contacting the 811 One Call Center
 - How to request an “Engineering or Design Ticket” to help plan projects around marine pipelines and utilities
- Training and assigning a qualified individual (subject matter expert) to enter 811 One Call dredging or marine construction tickets (to accurately provide project information, track and receive outputs)
- How to obtain accurate pipeline or utility location information; including abandoned lines
- How to use accurate pipeline information

Vessel safety procedures, including:

- How to ensure there is an emergency plan or pipeline response plan specific to each project, communicate the plan with the crew, and ensure plans are on board the vessel and/or in the office



- How to report hazards or risks to the Coast Guard and other mariners
- How to use gas detectors on vessels and ensure they are active during operations
- The use of visual and audio alarms in the wheelhouse if any equipment contacts the water bottom “outside of the approved project plan or template”
- How to identify or recognize hazards/signs of a leak (smell, bubbles, oil sheen, vapor cloud, or product releases) and react

Emergency response and procedures, including:

- How and when to use Emergency Shutdown Devices (ESD) or shut down ALL ignition sources to prevent ignition if a release occurs
- How to respond if a pipeline strike occurs and how personnel should communicate with each other
- How a pipeline representative shuts down the marine operation
- How construction personnel shuts down the pipeline
- What evacuation routes and procedures that should be used

Training and education, including:

- How to get training, support, and resources
- Tracking, testing, and reviewing training and education
- Taking ongoing training and education (retraining or reviewing annually at a minimum)
- Ensuring all crew and project personnel (locators, dredgers, project team, vessel crew members, One Call Centers, all marine excavators, and pipeline/ utility operators) are trained

Ideally, all state 811 Centers and affected stakeholders should be educated on marine 811, safety, and damage prevention. All stakeholders should have pipeline and utility safety training and hazard avoidance procedures. Additionally, the United States Army Corps of Engineers (USACE) or agency project owners should get trained on pipeline and utility safety. They should assign individual(s) to read, identify, and confirm pipeline and utility project plans and specs prior to the bidding phase.

8.6 Conclusion

The pipeline accidents discussed in this chapter are examples to learn from. Unfortunately, there are many other similar incidents that have occurred, including ones that resulted in

damage to utilities like fiber-optic, electrical, and water lines. These learnings can be applied to many types of underwater utilities.

Remember that pipeline, utility, and mariner safety is a shared responsibility of pipeline and utility companies, marine stakeholders, and applicable agencies.

Visit <http://www.marinesafe811.org> for materials, resources, best practices, training, and support, which are always free and apply to marine stakeholders, agencies, and pipeline and utility companies across the United States.

Image courtesy of Cottrell Contracting Corporation



Information Resources

Emergency Reporting

United States Coast Guard - National Response Center (NRC): <https://nrc.uscg.mil/>

- Phone number: 1-800-424-8802

Emergency First Responders

- Dial 911 in emergencies

State Emergency Reporting Contacts for a Spill or Release

- Use this link to find state-specific contact information and make an Emergency Release Notification: <https://www.epa.gov/epcra/state-contact-information-epcra-section-304-emergency-release-notification>

Federal Agencies

US Army Corps of Engineers (USACE): www.mvn.usace.army.mil

- Regional offices: <https://usace.maps.arcgis.com/apps/webappviewer/index.html?id=7344e62432694199af7790aa47a32fdd>

United States Coast Guard: <https://www.uscg.mil/>

- Region and Sector Information: <https://www.uscg.mil/Responsive/>

National Oceanic and Atmospheric Administration (NOAA), Office of Coast Survey

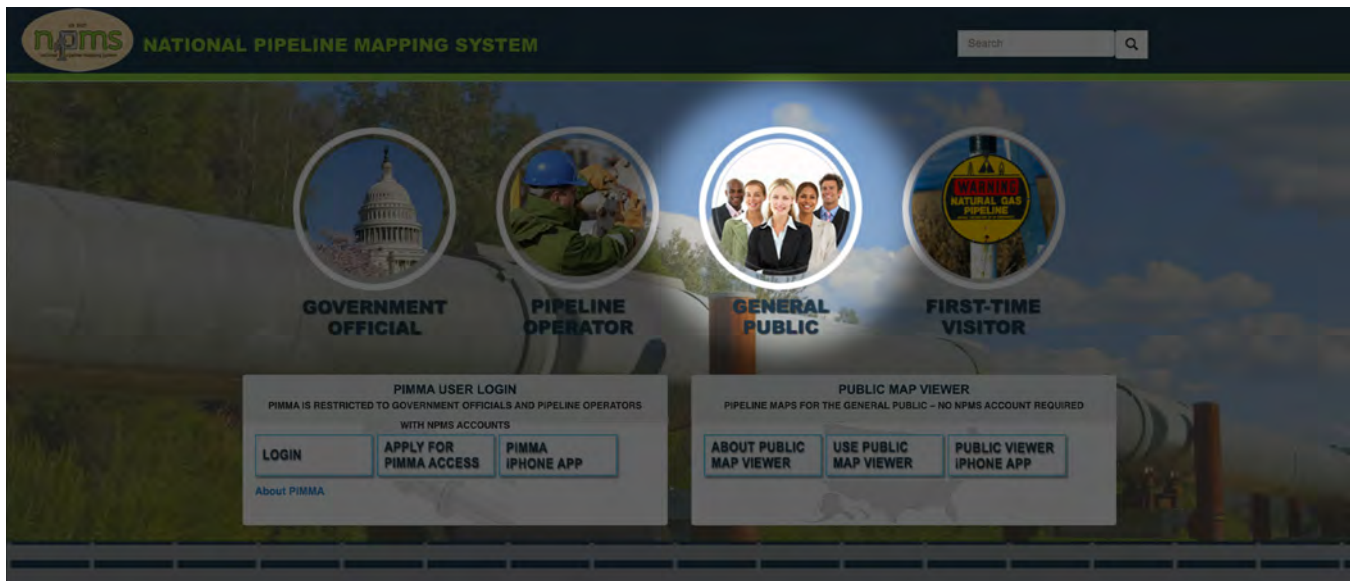
- Navigation Services Division
- NOAA's navigation managers, stationed strategically in port areas along US coasts and Great Lakes, work directly with pilots, mariners, port authorities, and recreational boaters. Regional Navigation Managers: <https://nauticalcharts.noaa.gov/customer-service/regional-managers/index.html>
- Access NOAA's Electronic Navigation Charts (ENCs), which are updated weekly: www.charts.noaa.gov/InteractiveCatalog/nrnc.shtml
 - ENC Tutorial: <https://cdmcs.org/wp-content/uploads/2019/11/Introduction-to-NOAA-ENC-Final.pdf>

National Pipeline Mapping System (NPMS): www.npms.phmsa.dot.gov

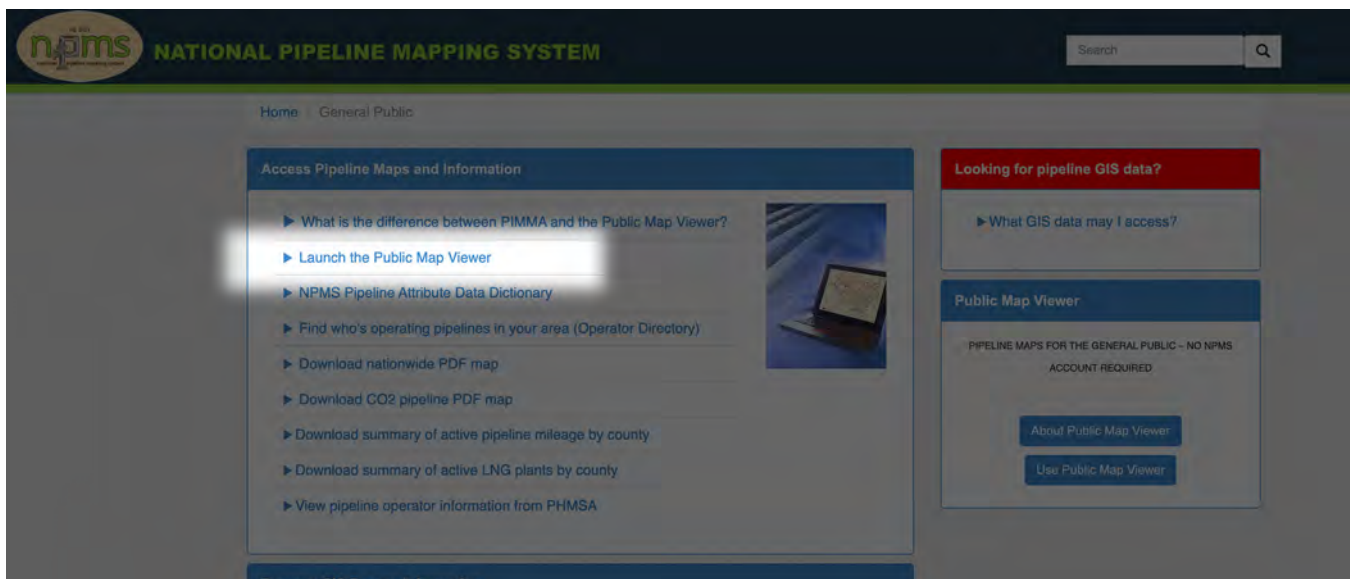
- The NPMS can be used for viewing gas and hazardous liquid transmission lines in every state. When using the public map viewer, note that gas lines are blue and hazardous liquid lines are red.

Note: Abandoned, flow, or production lines may not be listed.

- On the NPMS home page, click General Public.



- Then, click **Launch the Public Map Viewer** to view the map of pipelines. Or, click **“About Public Map Viewer”** get contact information for pipelines in an area



Pipeline and Hazardous Materials Safety Administration (PHMSA) of the US Department of Transportation (DOT): <https://www.phmsa.dot.gov/>

Bureau of Ocean Energy Management (BOEM): www.boem.gov

- GIS data/shapefiles for wells, pipelines and platforms in federal waters can be accessed from this website: www.boem.gov/Maps-and-GIS-Data/

Bureau of Safety and Environmental Enforcement: www.bsee.gov

- BSEE Offshore Data Center for pipelines, platforms, and wells in federal waters: www.data.bsee.gov

Regional Information

Pipeline and Hazardous Materials Safety Administration (PHMSA), US DOT:

- PHMSA Regional Offices: <https://www.phmsa.dot.gov/about-phmsa/offices>
- PHMSA Community Liaison Services: <https://primis.phmsa.dot.gov/comm/cats.htm>

Marine Safe 811: <https://marinesafe811.org/>

- Provides information on 811 and underwater pipelines and utilities, training, support, and resources
- Ed Landgraf: ed@texas811.org or 985-209-4753

Council for Dredging and Marine Constructions Safety (CDMCS): <https://cdmcs.org/>

- Creating an injury-free workplace and safety-first culture for the dredging and marine construction industry.

Coastal and Marine Operators (CAMO): www.camogroup.org

- CAMO is an industry initiative for pipeline and public safety with information for underwater infrastructure.

State Information for 811, Permits, and Oil/Gas Regulators

To find your state's One Call Center, go online and search for "[state name] + 811." Note that there may be more than one state agency that regulates pipelines and oil/gas production lines and equipment. Search online for "[state name] + pipeline regulations" or "[state name] + dredging permits," etc. It varies state-by-state, and it could involve one or more entities such as:

- Oil & gas commission
- Railroad commission
- Environmental quality agency
- Conservation or natural resources department

PHMSA SW Regional Office: <https://www.phmsa.dot.gov/about-phmsa/offices/southwest-region>

- Regulates interstate gas & hazardous pipelines in LA, TX, AR, OK & NM
- Community Liaison Services: 713-272-2859 (main line)

Louisiana Office of Conservation, Department of Natural Resources

- Pipeline Division
 - Regulates intrastate gas/hazardous liquids.
 - Division Director; 225-342-5505 (Main Line)
 - <https://www.dnr.louisiana.gov/page/pd-pipeline-division>
- Engineering Division
 - Regulates well sites, platforms, production lines & production equipment
 - Division Director; 225-342-6986 (Main Line)

Texas Railroad Commission - Oversight and Safety Program

- Ensures compliance with safety regulations while promoting public safety and awareness.
- <https://www.rrc.state.tx.us/pipeline-safety/>

Note: look for similar information available to you in the state for which you are working.



MARINE PIPELINE AND UTILITY HAZARD AVOIDANCE CHECKLIST



Catastrophic damage to an underwater pipeline or utility can be caused by dredging, marine construction, large anchors, spuds, propwash, pads of a jack up or pile driving resulting in major outages or volumes of gas or hazardous liquids being released. Studies have shown that ignition of the gas or liquids could occur within seconds. Before any water-bottom contact is made, follow the Marine Pipeline Hazard Avoidance Checklist below.

For more information, resources, training and help visit marinesafe811.org

PRE-MOBILIZATION PLANNING

- All pipeline and utility locate requests must be initiated by contacting 811. There is no fee for the service, and it is the law.
- Establish, communicate, and agree upon a safe access routes with pipeline and utility operators.
- Ask if the pipeline or utility operator representative should be on your vessel to help ensure safe activity around the pipeline or utility.
- Has the route and/or project location been surveyed, mapped, and/or marked prior to entry?
- Has it been confirmed that all vessels are able to have a minimum of 3' of water clearance under vessels draft for safe passages over pipelines or utilities?
- Is your vessel draft appropriate for the area you plan to navigate where wheel or propwash will not occur?
- Have we reviewed the most recent Coast Pilot or Electronic Navigation Chart information to plan your voyage?
- Have the potential effects of tide and weather been considered in assessing navigable depths?
- Will tides and weather be monitored to determine the effect of work and water bottom contact?
- Is a recent hazard survey available for the location, and are results incorporated in the work or avoidance plans?
- Have all known hazards been identified using GPS markings or surveys, including pipeline or utility crossings, obstructions, and shallow or exposed lines? Should they be communicated and included in the USCG Notice to Mariners Report?
- Do we have the appropriate and updated navigational charts on board the vessel?
- Have pipelines and utility crossings been identified in our voyage plan?
- Have we conducted a safety meeting that covers the hazards of working near pipelines, utilities, and associated facilities?
- Do we have an emergency evacuation plan in place in the event you make contact with an underwater pipeline or utility?
- Will life-saving devices be available at convenient, on-deck locations?
- Will we be able to account for all of our personnel quickly in the event of a pipeline rupture and fire?
- If ANY contact with an underwater pipeline occurs there is a requirement to contact the National Response Center at telephone number 1-800-424-8802.

MARINE PIPELINE HAZARD AVOIDANCE CHECKLIST



MOBILIZATION

- Have designated safe anchor, spud, jack-up, or fleeting areas near pipelines, utilities or facilities been approved by the owners or operators?

- Have ALL barge spuds been secured to prevent accidental lowering while underway?

- Has coordination taken place with pipeline or utility operators to have a representative on board the vessel when near their lines?

- Are tidal conditions adequate for mobilization and safe navigation?

MOORING VESSELS

- Moor all boats, barges, and support vessels at safe mooring locations and when left unattended have a minimum of two mooring points.

- DO NOT moor to signs that indicate a pipeline or utility crossing. These are not safe mooring locations. The sign is a general indicator of where the lines may be located.

EVALUATING CONTACT WITH AN UNDERWATER PIPELINE

- Is there a blowing or hissing sound or blowing water or continuous bubbling?

- Is there a gaseous, hydrocarbon or other unusual odor or an oil/gas smell?

- Are there liquids bubbling to the surface, or a has a rainbow colored spill or sheen appeared?

CONSIDER THE FOLLOWING IF A STRIKE OCCURS

- Immediately minimize potential ignition sources like cell phones, motors, pumps, switches, cigarettes, lighters, etc. (Major sources of ignition are the air intake of engines or the generators)

- Assess the situation:
 - a. Is it getting worse?
 - b. How large does the leak appear to be? Don't make it worse by moving equipment.
 - c. Weather conditions – lightning, rough seas, etc. Where will you be safest?

- If you evacuate the vessel, move personnel at least ¼ of a mile or to a safe location upwind or as far as possible.

- Try to prevent unsuspecting vessels and people from entering the area.

- Do not attempt to extinguish a natural gas fire. When out of the hazard area, call 911, the Coast Guard, and the National Response Center at 800-424-8802.

- If you see a pipeline or utility crossing sign, call the 1-800 number on the sign and provide your general location and coordinates so the Operations Control Center can begin isolating the pipeline.

PIPELINE SAFETY IS EVERYONE'S RESPONSIBILITY:

- Keep Yourself Safe
- Avoid Pipelines and Utilities
- Report Product Releases or Suspicious Activity to Authorities
- Call 811 to Locate Pipelines and Utilities



MarineSafe811.org