

Mariner East 2

PIPELINE PROJECT SAFETY PRACTICES AND DESIGN

At Energy Transfer and Sunoco Pipeline, safety is our top priority. Our goal is to provide safe and reliable transportation of natural gas liquids (NGLs) for our customers. Using advanced technology and a proven safety design, Mariner East 2 has added features that exceed federal requirements and will minimize the impact to the environment and local communities along the route.

Energy Transfer and Sunoco Pipeline are committed to the long-term integrity and safe operation of the Mariner East 2 Pipeline. Once in operation, there are many safety precautions we will employ for the protection of the pipeline and the safety of the communities along the route.

The U.S. Department of Transportation's Pipeline and Hazardous Materials Safety Administration (PHMSA) Office of Pipeline Safety (OPS) is the federal safety authority for ensuring the safe, reliable and environmentally sound operations of our nation's pipeline transportation system. PHMSA's "Transportation of Hazardous Liquids by Pipeline" regulation (49 CFR 195), incorporates by reference 48 industry standards and specifications that have been developed by organizations such as the American Petroleum Institute (API), National Fire Protection Association (NFPA) and ASME International.

Some of these safety measures include, but are not limited to:

- A SCADA (Supervisory Control And Data Acquisition) system will be installed that provides real-time data acquisition, monitoring and control of key operating points such as pressures, temperatures, flows and equipment status, including alarming of any conditions outside established parameters. The system can shut itself down safely without human intervention, but it is monitored by a live operator at all times.
- We also use a subsystem of SCADA, known as the Computational Pipeline Monitoring System ("CPM"), which analyzes deviations in the flow of liquids using computational algorithms, thus improving the operator's ability to identify abnormal operating conditions.
- Sunoco Pipeline will maintain a robust and continuously updated Facility Response Plan for effective and timely response to abnormal operating conditions. The Facility Response Plan is used as a basis for emergency response training and drills with local, regional, state and federal agencies.
- Sunoco Pipeline has teamed with local emergency responders along the route to provide information and training on emergency pipeline response. Strategic contracts will also be executed with private response organizations in the area.
- Sunoco Pipeline provides biennial neighbor stakeholder outreach and implementation of a Public Awareness Program.

ABOVE AND BEYOND EXTRA ATTENTION TO SAFETY

| DOT CFR 195 Requirements | Mariner East 2 Standard | Benefit of Exceeding Requirement |
|---|--|---|
| Pipeline Coverage and Separation Distances for New Construction | | |
| The minimum required coverage in rural areas (excluding certain water bodies, drainage ditches, public roads and railroad crossings) is 30 inches. | Mariner East 2 will have a minimum cover (from the top of the pipe to ground level) of 48 inches for all conventional lays. | The additional coverage enhances protection from potential third-party damage. |
| The minimum required coverage in industrial, commercial and residential areas that are not within 50 feet of any private dwelling, industrial building or places of public assembly areas is 36 inches. | Mariner East 2 will have a minimum cover (from the top of the pipe to ground level) of 48 inches through these industrial, commercial and residential areas. | |
| The minimum required coverage for crossings of inland waterbodies that are less than 100 feet wide is 30 inches and in some cases 36 inches. | Mariner East 2 will have a minimum cover of 60 inches at these inland waterbody crossings. | The additional coverage enhances protection from potential third-party damage and from other outside forces, such as flooding, scouring and washouts. |
| Horizontal Directional Drills (HDDs) underneath waterbody crossings that are wider than 100 feet must be at least 48 inches under the natural bottom of the waterbody. | Sunoco Pipeline starts HDDs at a minimum of 48 inches and drills to a minimum of 60 inches below the natural bottom of these waterbodies. | The additional depth of the HDD will improve the safety and protection of the pipeline and the environment. |

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| DOT CFR 195 Requirements | Mariner East 2 Standard | Benefit of Exceeding Requirement |
|---|---|---|
| Pipeline Strength | | |
| The required design factor for inland pipelines not on a platform in navigable waters is .72 inches. The minimum thickness for this design factor is .316 inches. | The minimum pipe thickness utilized is .38 inches with a .6 design factor. This means that the system will never exceed 60 percent of the pipe's minimum yield strength. Mariner East 2 will employ heavier pipe wall thickness (.456 inches and 0.5 design factor) for horizontal directional drills (HDDs) under certain waterbodies, roads and sensitive areas. | The higher quality of pipe standards increases the resistance to third-party damage, ground movement, shipping damage, and overall pipe body cleanliness and weldability. |
| Line pipe must be fit-for-purpose per the API 5L Specification for Line Pipe. | Mariner East 2 pipe is specified to the API 5L's more stringent PSL-2 standard, which has stricter requirements for metallurgy, testing frequencies, factory inspections and record retention. | The higher quality of pipe standards increases the resistance to third-party damage, ground movement, shipping damage, and overall pipe body cleanliness and weldability. |
| | The longitudinal seam of all pipe has been 100% examined by Nondestructive Testing (NDT). Qualified third-party inspection is required during pipe production to monitor product quality and processing. | By placing qualified third-party NDT inspection personnel full-time at this production station, it provides an added level of verification that the NDT was completed per requirements. |
| Manufacturers are not required by API to be certified by ISO or have Q1 certification. | All pipe mills were inspected for their quality assurance and quality testing programs prior to being allowed to bid as a contractor for the project. We require all manufacturers to be certified to ISO 9001, ISO/TS 29001 or an equivalent such as API Q1, so that they comply with all (not just a few) requirements of API 5L. | Pipe manufacturers are subjected to frequent audits verifying their capabilities and adherence to API 5L requirements. This provides added assurance that pipe produced exceeds quality standards including but not limited to visual, mechanical and dimensional properties. |
| Line pipe inspection is only required at the job site during installation. | For Mariner East 2, inspectors were placed in each pipe mill while the pipe was being produced, and inspection was carried out all the way through installation. | This extra inspection provides an additional measure of compliance with quality control measures and additional safety and serviceability. |
| Pipeline Valves | | |
| Regulation defers to the operator to determine placement of mainline isolation valves, some of which are remotely controlled. | The Mariner East 2 pipeline will have strategically placed automated valves that will enable pipeline segments to be quickly isolated. These valves are programmed to automatically close along with other programming that safely shuts down and isolates the pipeline if certain parameters meet a predefined level. | The automated valves reduce response time allowing a given pipeline segment to be quickly isolated should the need arise. |
| Pipeline Integrity Testing | | |
| Regulation requires that we perform Nondestructive Testing (NDT), by either radiographic or ultrasonic methods, for 10% of the girth welds made by each welder each day. | 100% of all mainline girth welds will be subjected to NDT inspection. | This provides a higher level of the integrity and strength of the welds. |
| Prior to being placed into service, regulation requires that the line must be hydrostatically pressure tested for 4 hours at 125% of the Maximum Operation Pressure (MOP), and an additional 4 hours at 110% or more of MOP. | Mariner East 2 will be hydrostatically pressure tested for at least 8 hours to a pressure equal to 125% MOP. | This additional time at 125% of MOP confirms there are no leaks, deleterious material or construction flaws. |
| The code references ASME B31.4 which states that "testing for buckles, dents and other diameter restrictions shall be performed after installation." The code does not require use of an Internal Line Inspection (ILI) deformation tool run through the entire pipeline prior to start-up. | Mariner East 2 will run an Internal Line Inspection deformation tool through the entire pipeline prior to start-up to identify and address any potential defects. | This will help to validate the pipeline's integrity by identifying any previously unrecognized construction damage and providing a baseline for future inspections. |
| Regulation requires that the pipeline Cathodic Protection System must be activated within 1 year after the pipeline is ready for operation. | Mariner East 2 will tie into an active preexisting Cathodic Protection System once the pipeline is backfilled and completed. The system will be activated in stages along the route as the pipeline is backfilled and completed. | This system helps to prevent corrosion and prevent the pipeline from reacting to other elements in the environment. |
| Operations | | |
| Regulation requires inspection of the right-of-way 26 times per year, not to exceed 3 weeks between inspections. | Mariner East 2 right-of-way will be inspected once every 7 days, not to exceed 10 days, weather permitting. | The increased inspections of the right-of-way provide heightened awareness of activities taking place along the pipeline route. |