Presented by the U.S. Department of Transportation

TSI
Transportation Safety Institute

Transportation Safety Institute

Images Provided by David Bull, Don McCoy, and Google Images

Welcome to

Pipeline Safety Compliance

- Print your name and company name on both sides of the tent card.

- Fill out the class roster with the name you want on your certificate.

Your TSI Training Records

- TSI takes your privacy seriously and does everything possible to protect it. Your TSI records are available to you upon request and will not be released to a third party without your written consent, unless required by law. To request a copy of your TSI training record, please contact us by e-mailing tsi@dot.gov or calling 1-800-858-2107.

Administrative

- Registration
- Building layout/restrooms/break area FIRE/EMS/CPR
- TSI program/catalog
- Introductions: participants and instructors
- Schedule
- Course evaluations
- Class Organization

Class Material

- Participant guide – Flash Drive
- Handouts
- Teaching manuals – Flash Drive

Classroom Conduct

- Be respectful
- No disparaging remarks
- Be in class at all times
- Pagers or cell phones off or in vibrate mode
- Participation is a must

Great Expectations

- What are your expectations for this class?
- Any questions?
- Remember – we're not here today to make or change policy.

49 CFR Part 190, 191, 192, 194, 195 and 199

- DOT/PHMSA Pipeline Safety Regulations
- Overview and Guidelines for Compliance

PIPELINE SAFETY COMPLIANCE

Let’s Take a Test!!!

W AYS

Market

_____

ccccc

PAWALKRK

EILN PU

Definitions for Pipeline Safety

- Hospitalization
- Reporting Time
- Maximum Allowable Operation Pressure (MAOP)
- Excavation
- Privacy

Hospitalization

- Reportable incidents are where hospitalization is required. What is meant by the term “hospitalization”?

- Interpretation 191.5 #8
  - Your interpretation that treatment of superficial burns in the emergency ward of a hospital does not constitute hospitalization is correct. PHMSA interprets "hospitalization" to mean to be admitted into a hospital as a patient. Since the worker was only a patient in the emergency ward of the hospital, this incident is exempt from being reported.

Reporting Time

- Incidents must be reported at the “earliest practicable moment following discovery”. What is the time limit for this reporting requirement?

- Alert Notice ALN-91-01
  - In most cases, this telephonic report can and should be made within 1-2 hours after discovery.

Maximum Allowable Operating Pressure (MAOP) Revision

- What is the time period to confirm or revise MAOP when there is a change in class location?

- Final rule, Amdt. 192-94, eff. 7/14/2004
  - 192.611(d) Confirmation or revision of the maximum allowable operating pressure that is required as a result of a study under §192.609 must be completed within 24 months of the change in class location. Pressure reduction under paragraph (a) (1) or (2) of this section within the 24-month period does not preclude establishing a maximum allowable operating pressure under paragraph (a)(3) of this section at a later date.

Excavation

- Is excavation a covered task?

- From Advisory Bulletin ADB-06-01
  - Only qualified personnel must oversee all marking, trenching, and backfilling operations.
  - Furthermore, PHMSA reminds pipeline operators that although excavation is not explicitly addressed in 49 CFR parts 192 and 195, excavation is considered a covered task under the pipeline operator qualifications regulations (49 CFR 192.801-809 and 195.501-509).

Privacy

- True or False. Operators may refuse access to Office of Pipeline Safety inspectors because of a “right to privacy”.

- § 60117. Administrative
  - (a) General authority. To carry out this chapter [49 USCS § § 60101 et seq.], the Secretary of Transportation may conduct investigations, make reports, issue subpoenas, conduct hearings, require the production of records, take depositions, and conduct research, testing, development, demonstration, and training activities and promotional activities relating to prevention of damage to pipeline facilities.
  - (c) Entry and inspection. An officer, employee, or agent of the Department of Transportation designated by the Secretary, on display of proper credentials to the individual in charge, may enter premises to inspect the records and property of a person…

History of Pipelines

49 CFR 195

Hazardous Liquid Pipelines

History of Pipelines

History of Pipelines

To understand the nature of pipelines, it's necessary to understand the nature, quality and characteristics of the products that flow through them. So we will now look at the properties of pipelines and some of the products that flow through the various types of pipelines.

Products Transported Thru Pipelines

- Crude Oil
- Refined Petroleum Products
- Liquid Carbon Dioxide
- Natural Gas
- Other Hazardous Gases
- Water and Sewer
- Other

Pipeline Materials

- Steel
- Thermoplastic (PE, PVC, PA, etc.)
- Thermosetting (Fiberglass)
- Newer composites (Fiberspar, Flexsteel, Flexpipe, Smartpipe, etc.)
- Cast and Ductile Iron
- Ceramic materials
- Other

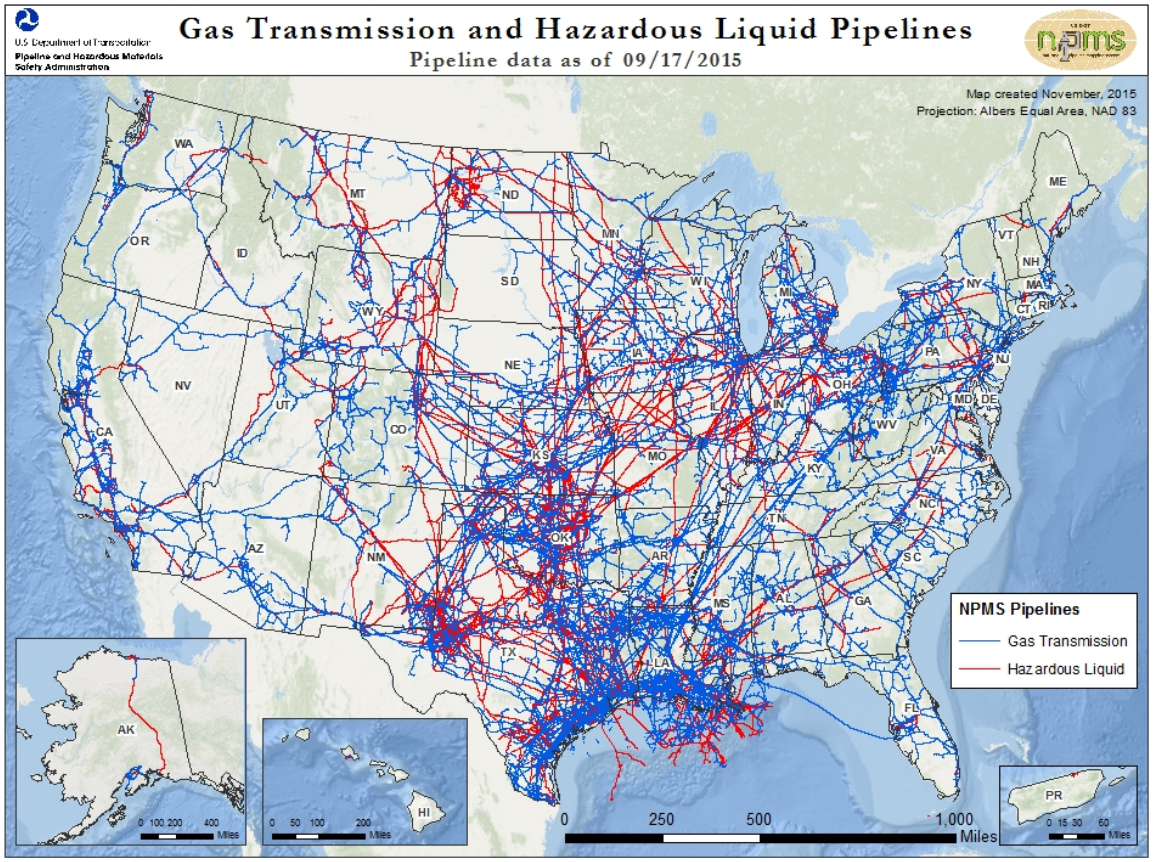
History of Pipelines – It all started from this . . . .

Original crude oil pipelines made from trees!

Pipeline Variables

- Pressure
- Product Characteristics
- Temperature
- Terrain
- Environmental Conditions
- ROW's (Right of Way's)
- Operational Concerns (Corrosion, etc.)
- Elevation Changes
- Soil Conditions

Gas Transmission & Hazardous Liquid Pipelines



U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

History of Pipelines

- Crude Oil Pipelines

What is Crude Oil?

- Crude oil, also known as “black gold”, is a thick dark brown or greenish flammable liquid, which is found in the upper strata of some regions of the earth’s crust.

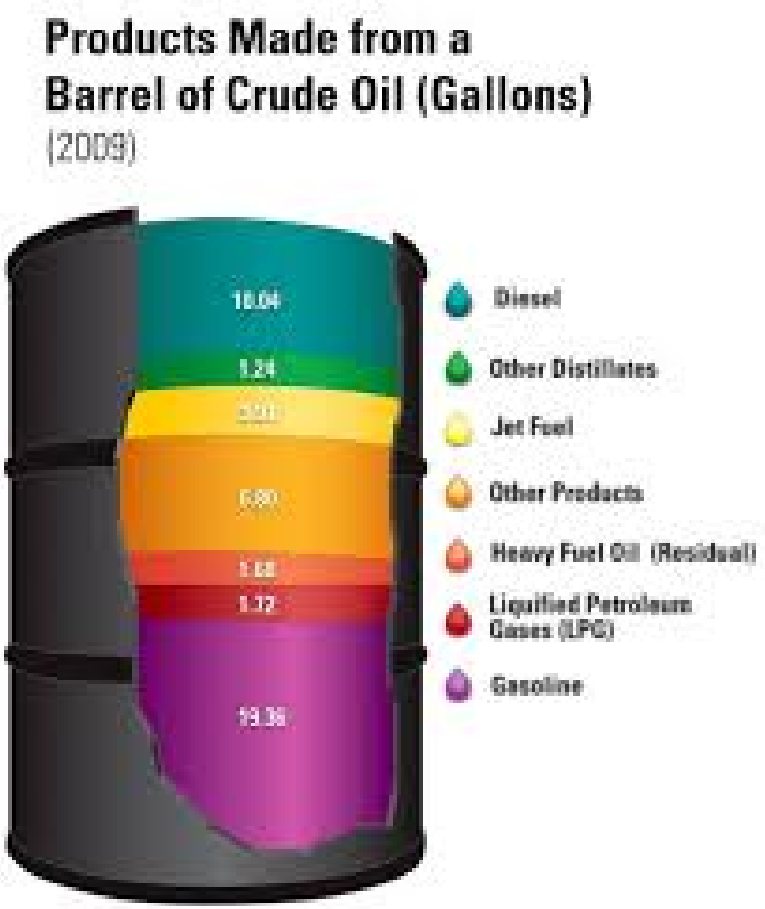
- It is a complex mixture of various hydrocarbons, mainly alkanes), along with traces of other chemicals and compounds.

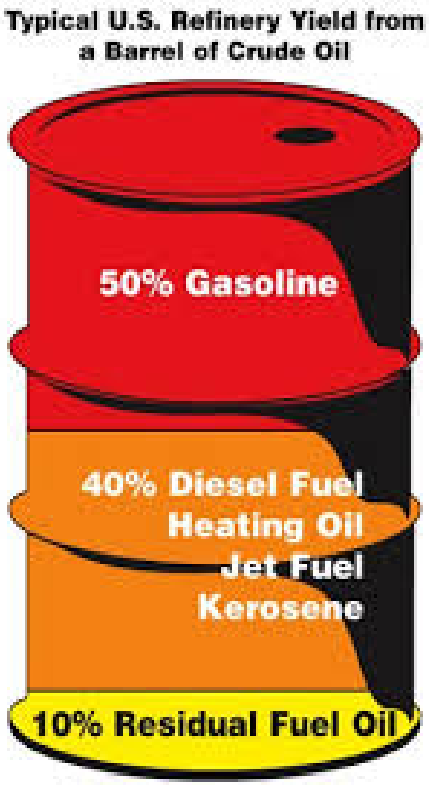
What is Crude Oil?

Crude Oil can be categorized as either “sweet crude” (sulfur content less than 0.5%) or “sour crude”, (sulfur content is at least 2.5%)

Crude Oil

Crude Oil Products





Crude Oil Pricing

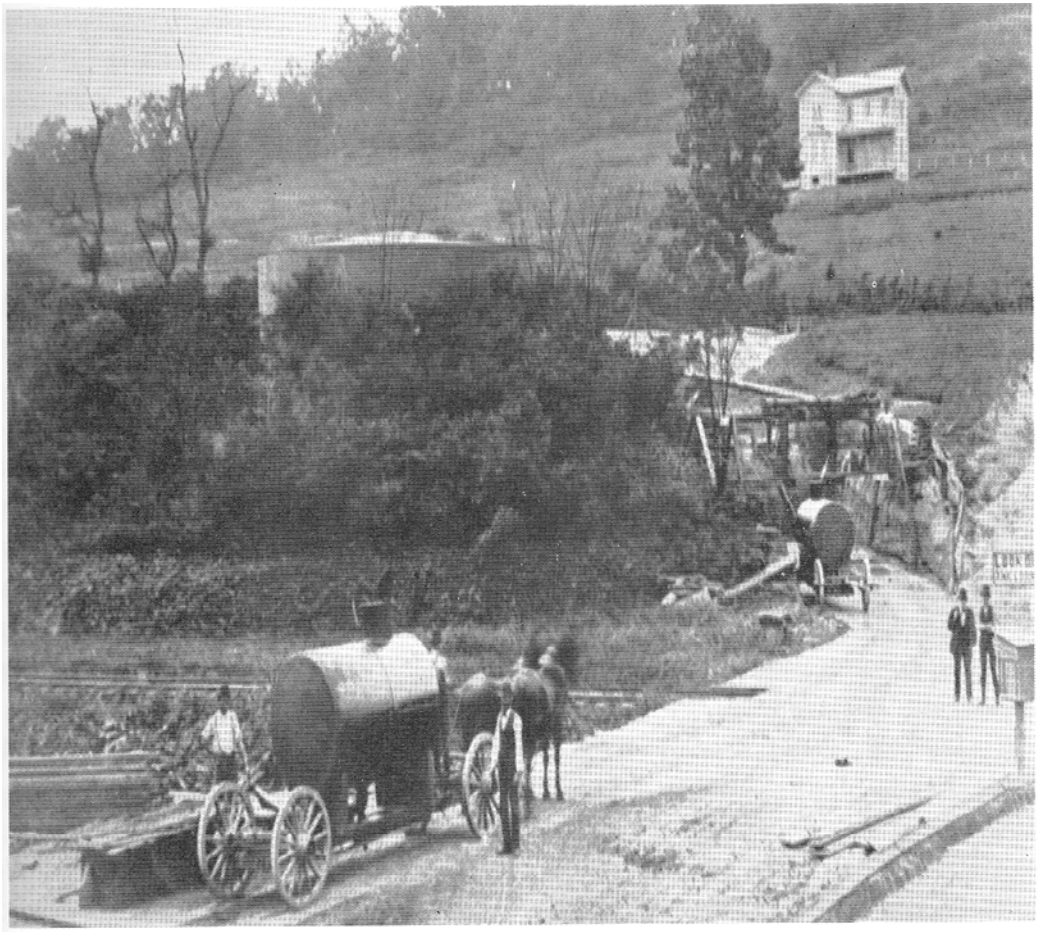
Fundamental factors affecting crude oil prices

- ✓Weather conditions
- ✓Government policy
- ✓Political Conditions
- ✓World oil demand
- ✓World oil supply
- ✓Futures Market
- ✓GDP

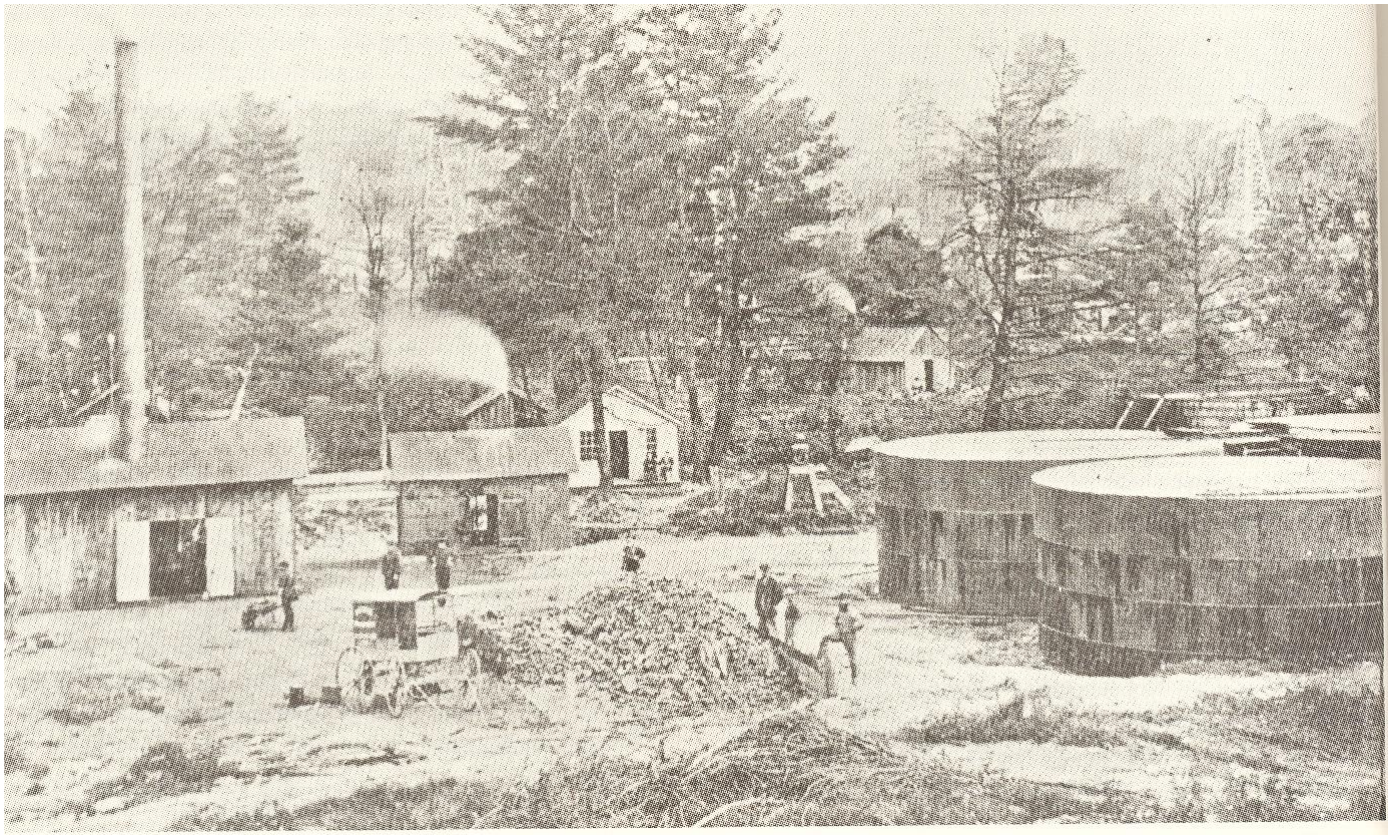
Crude Oil Pipelines 1890's

Historical Perspectives. The word "Crude" had many meanings back in the early days of oil production…

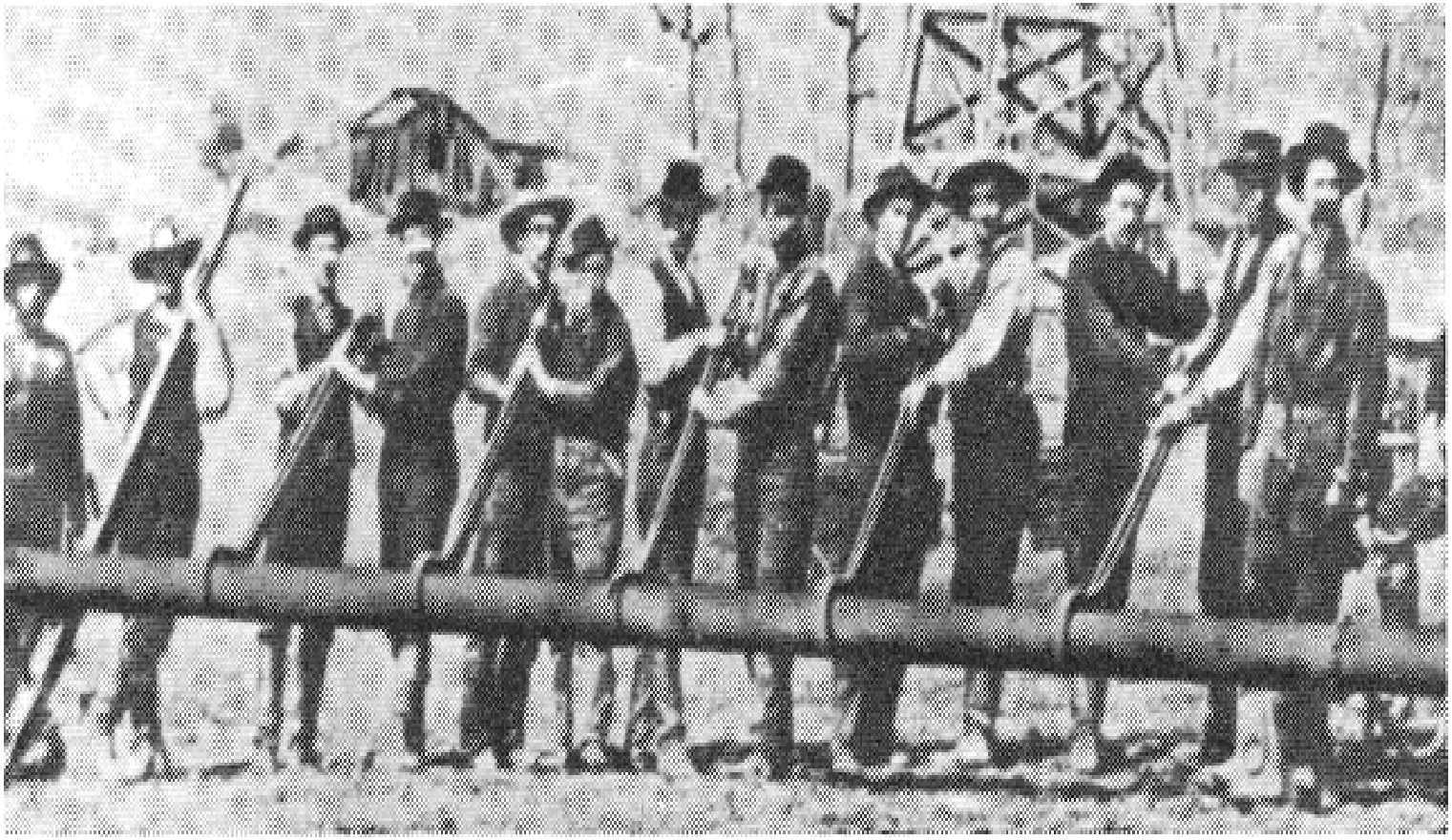
Compared to the standards of production today, the process was crude indeed!



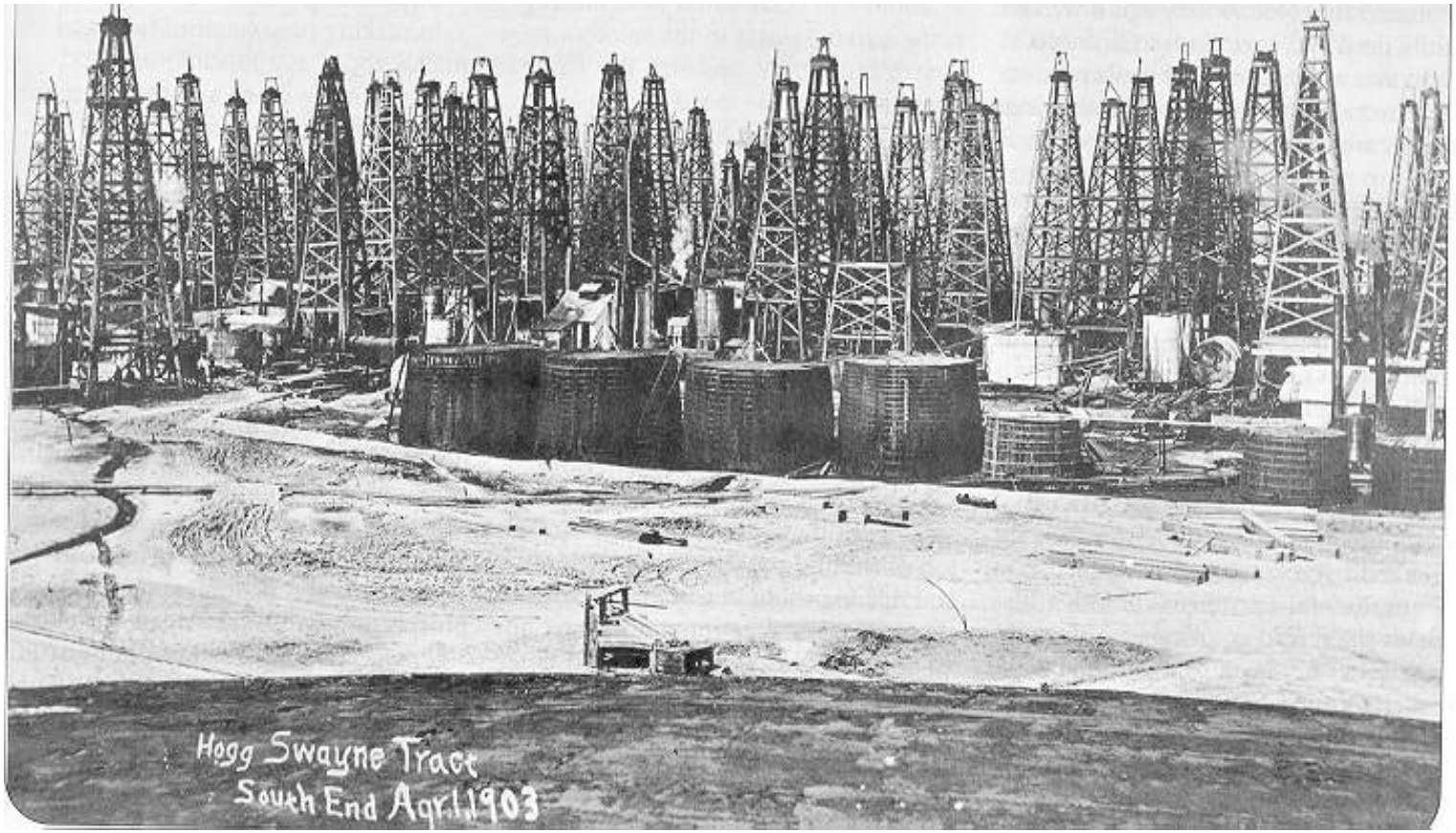
Historical Perspectives 1890's



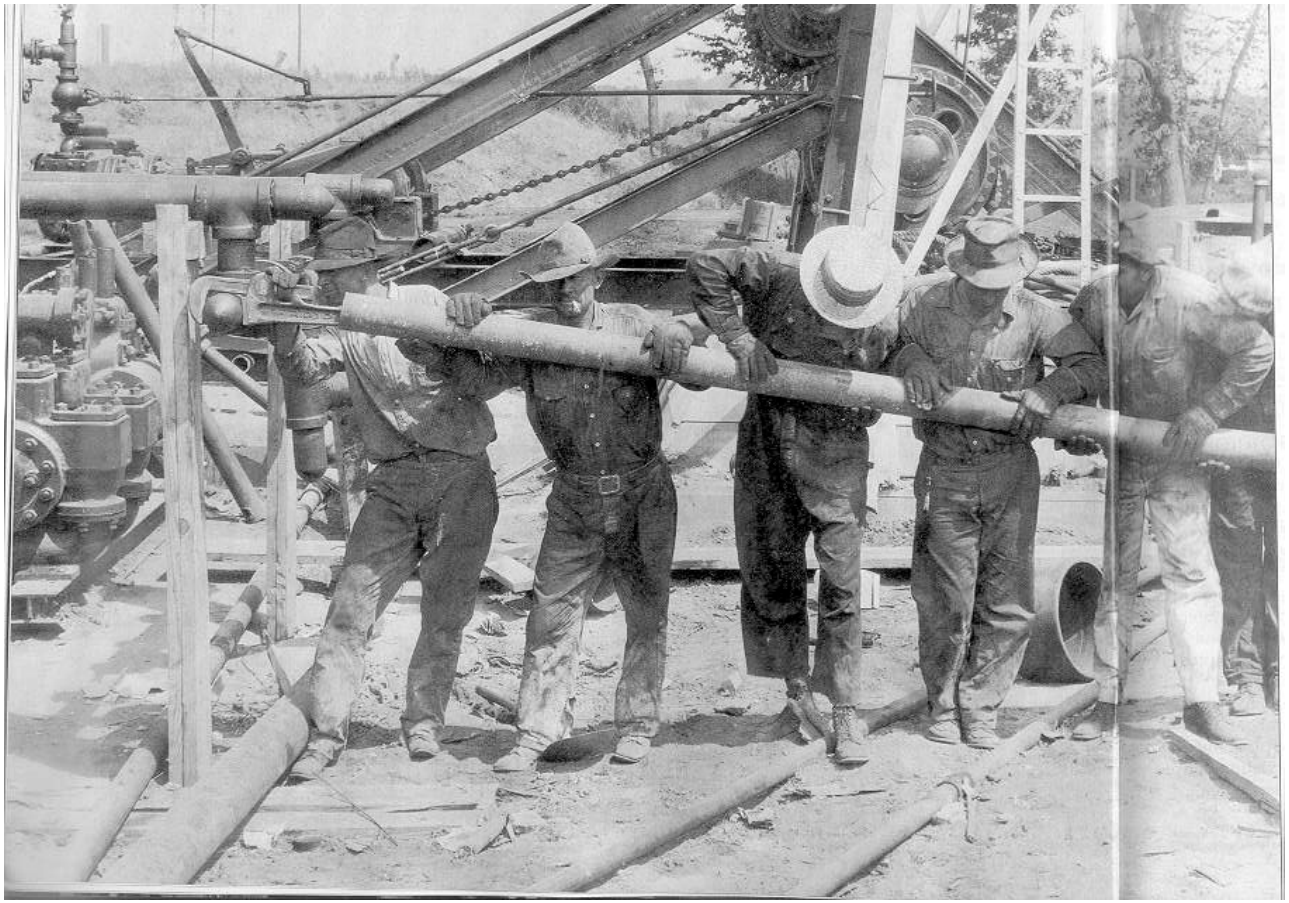
Historical Perspectives 1890's



Historical Perspectives 1903



Historical Perspectives 1903 – Pipeline Gang on a pipe “cheater”



Historical Perspectives 1916 – Where the true term “Manpower” came from!

Historical Perspectives 1925 – Line coating crew

Historical Perspectives 1926 – Welding

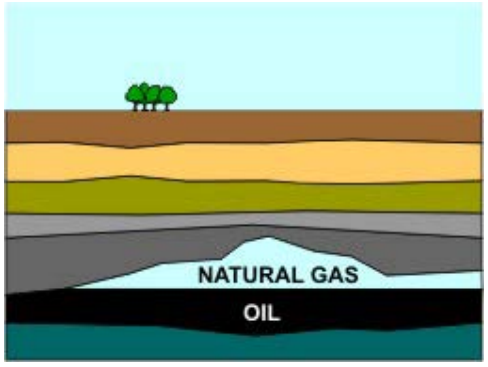
Natural Gas Pipelines

Natural Gas Sources

- Natural gas is found in reservoirs beneath the surface of the earth. Large layers of rock trap the natural gas as it tries to float to the surface. Although the areas where the gas is trapped are referred to as pools, the natural gas molecules are actually held in small holes and cracks throughout the rock formation.
- Like oil, natural gas can be produced via conventional vertical wells or by horizontal directional drilling ("frac-ing").

Natural Gas

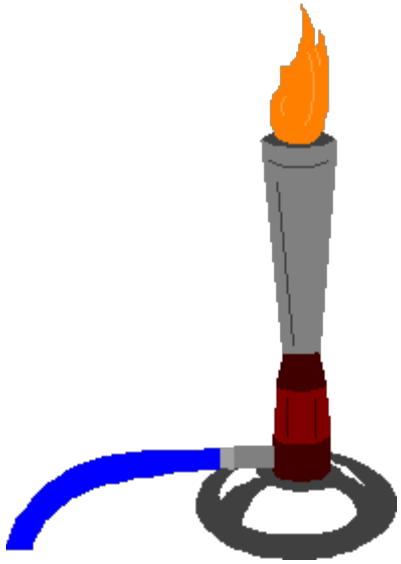
Natural gas can be found by itself or in association with oil. Pure natural gas is both colorless and odorless, but raw natural gas is a mixture of hydrocarbons. Water, oil, sulfur, carbon dioxide, nitrogen, and other impurities may be mixed with the gas when it comes out of the ground. These impurities are removed before the natural gas is delivered to homes and businesses.



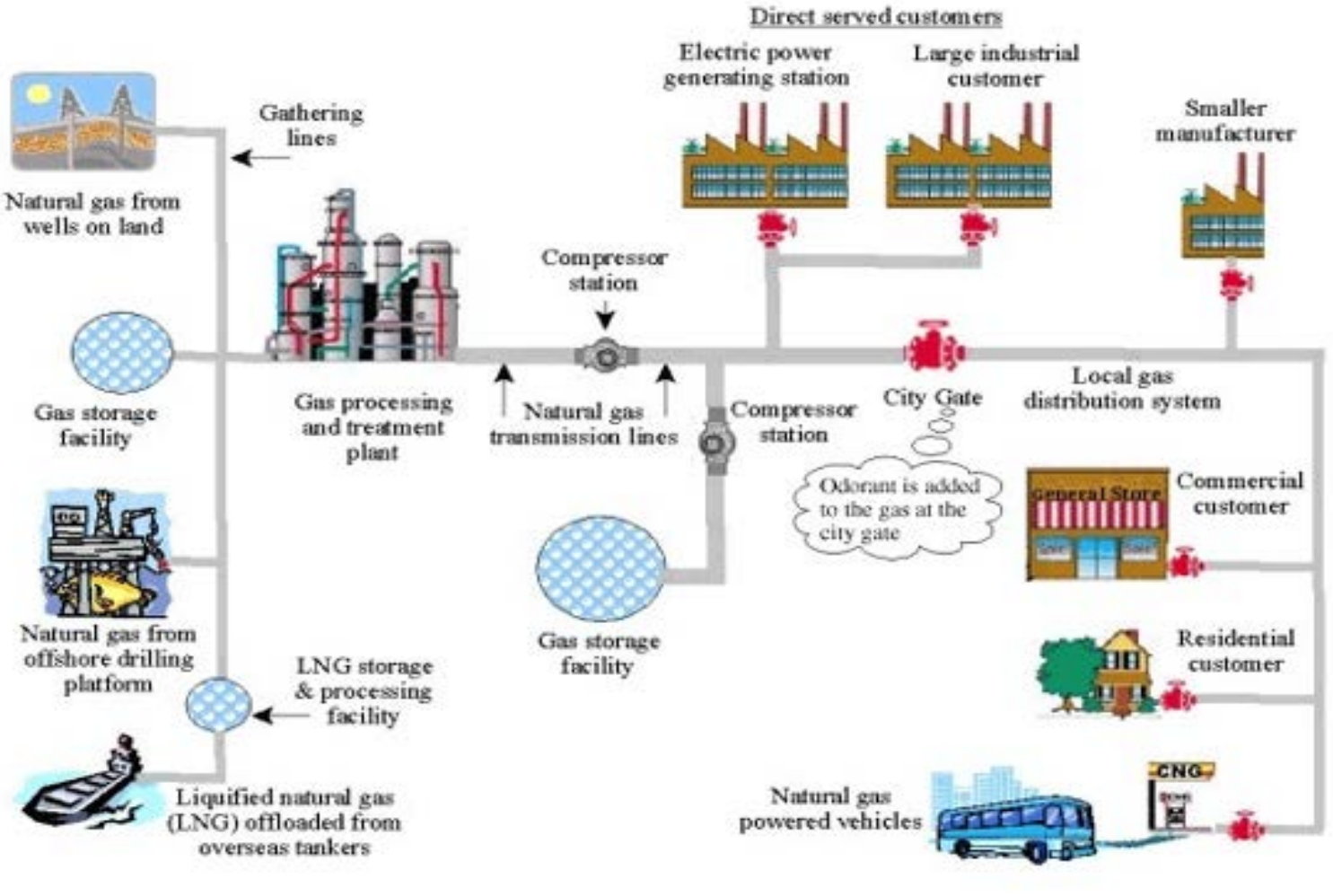
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

What is Produced Natural Gas?

- Naturally Occurring Blend Of Various Hydrocarbons and Gases
  - **Methane (CH_4)**
  - Ethane (C_2H_6)
  - Propane (C_3H_8)
  - Butane (C_4H_{10})
  - Nitrogen (N_2)
  - Other

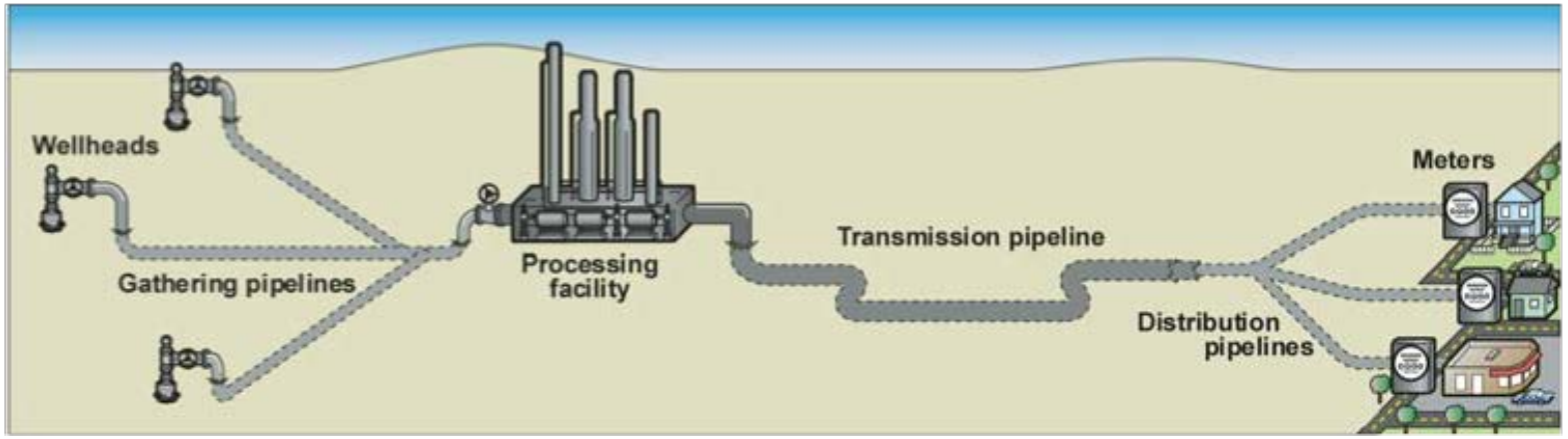


Natural Gas Pipelines: From Wellhead to Consumer



Gathering lines

- **Gathering lines**. [Production Facilities]. The pipes used to transport **oil** and gas from a production **field** to a processing or treatment plant, or a transmission pipeline in the area.



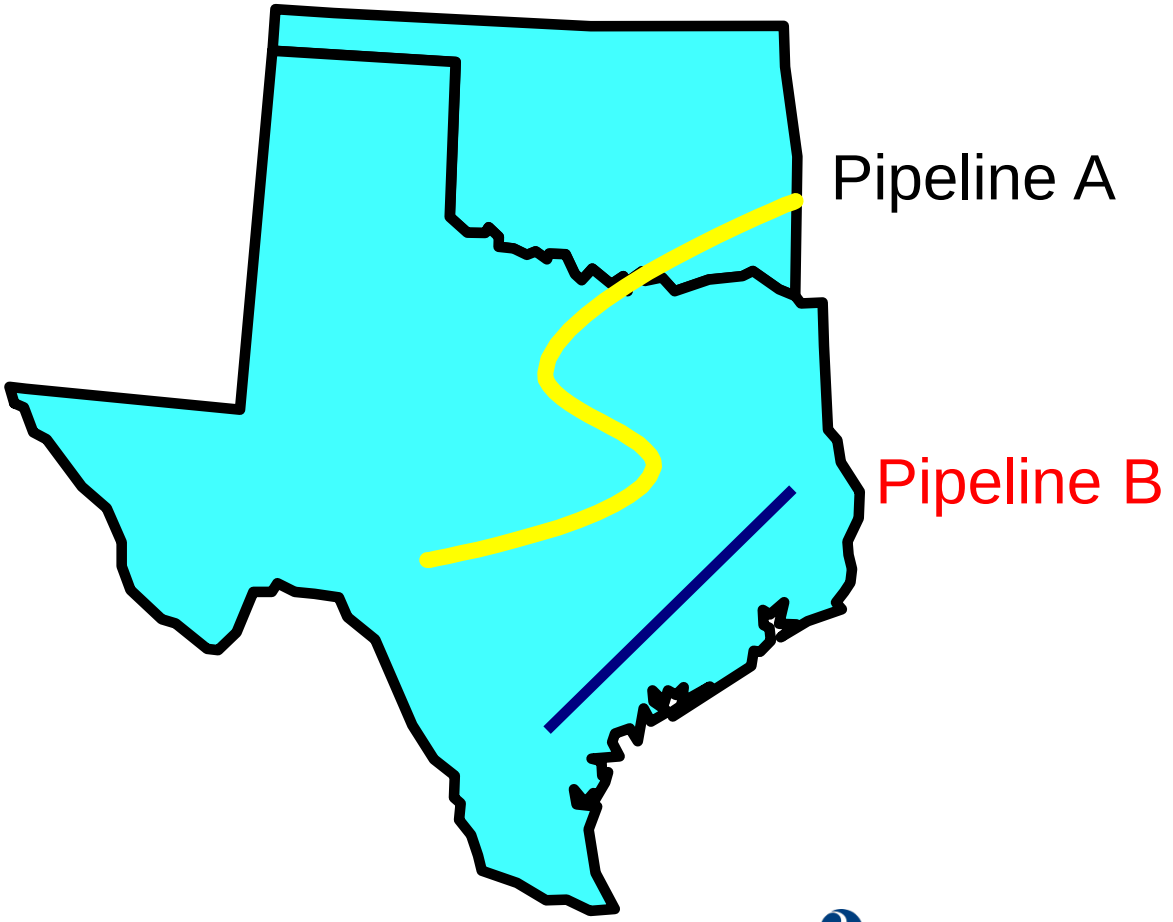
Gathering lines

Transmission Lines

- **Transmission lines**. [Production Facilities]. The large-diameter, high-pressure steel pipelines that transport gas long distances to distribution systems and industrial users. May be interstate or intrastate.

Interstate v. Intrastate Pipelines

- A=Interstate
- B=Intrastate



Distribution Lines

- Distribution pipelines are smaller diameter mains and service pipelines that deliver gas to the ultimate residential or commercial customer.

Natural Gas Processing

Once removed from an underground reservoir, the natural gas is usually transported to a gas processing or treatment plant to remove impurities and by-products. Some of these by-products, including ethane, propane, butane, and sulfur, are extracted for other uses. After being processed, the clean natural gas (almost pure methane) is transported through a network of pipelines and delivered to its point of use, including our homes.

Natural Gas Processing Plant

Flammability Ranges

Liquid/Gas	LEL	UEL	Ignition Temp.
Natural Gas	4.5%	14.5%	1200 ° F
Propane	2.2%	9.5%	1000 ° F
Gasoline	1.4%	7.5%	630 ° F

How is Gas Measured?

- Gas is usually measured in 1000 cubic feet:

  1,000 cu. ft. = 1 Mcf

  1,000,000 cu. ft. = 1 MMcf

  1,000,000,000 cu. ft.= 1 Bcf

  1,000,000,000,000 cu. ft. = 1 Tcf

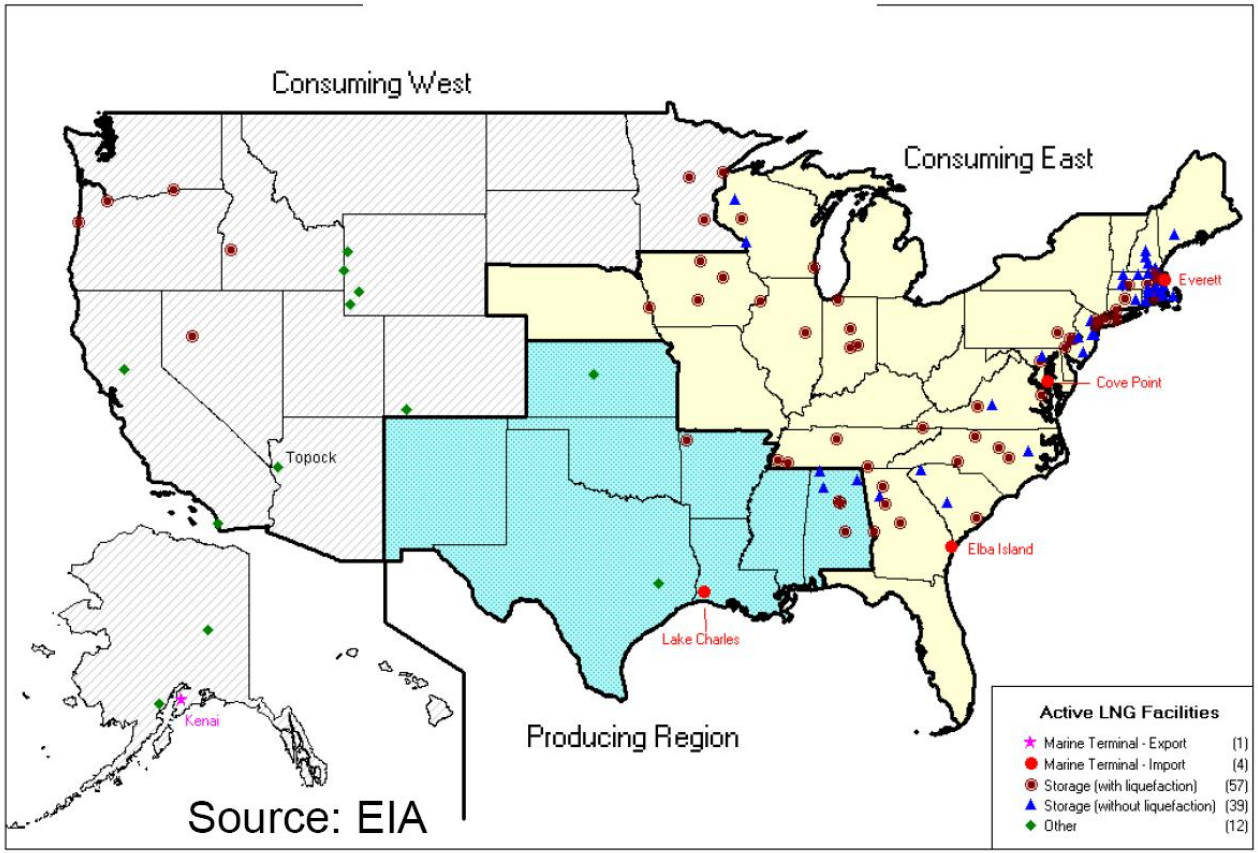
What is LNG?

- Liquefied natural gas (LNG) is natural gas that has been cooled to a liquid state, at about negative 260°Fahrenheit, for shipping and storage. The volume of natural gas in its liquid state is about 600 times smaller than its volume in its gaseous state. This process, which was developed in the 19th century, makes it possible to transport natural gas to places pipelines do not reach.

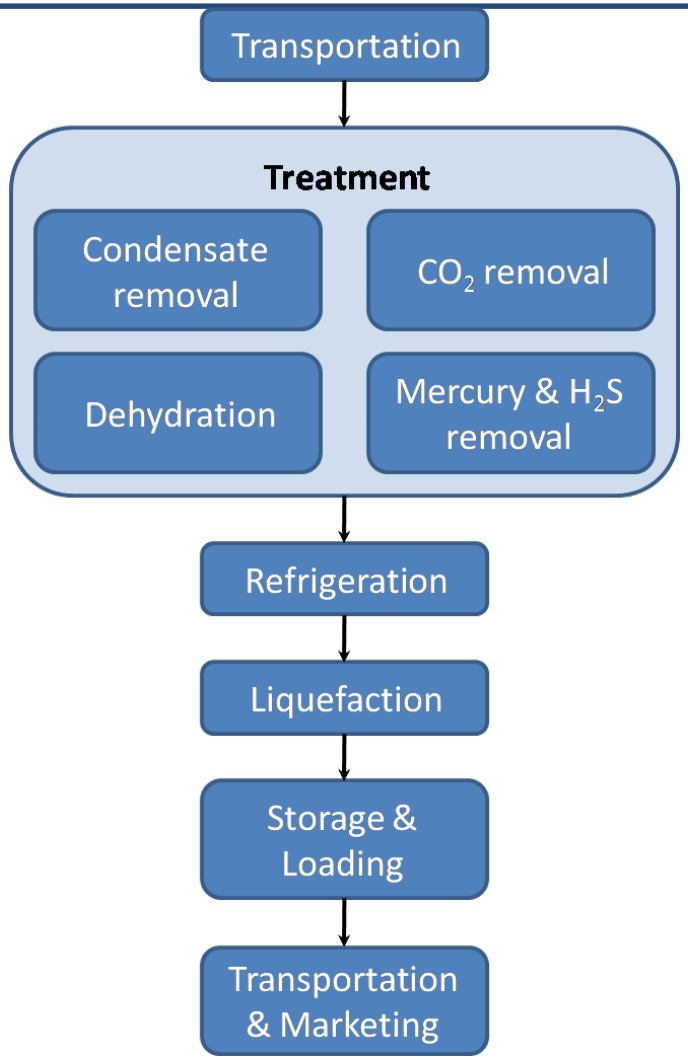
LNG Facilities – Peak Shaving & Terminals

LNG Facilities

U.S. Liquefied Natural Gas Facilities



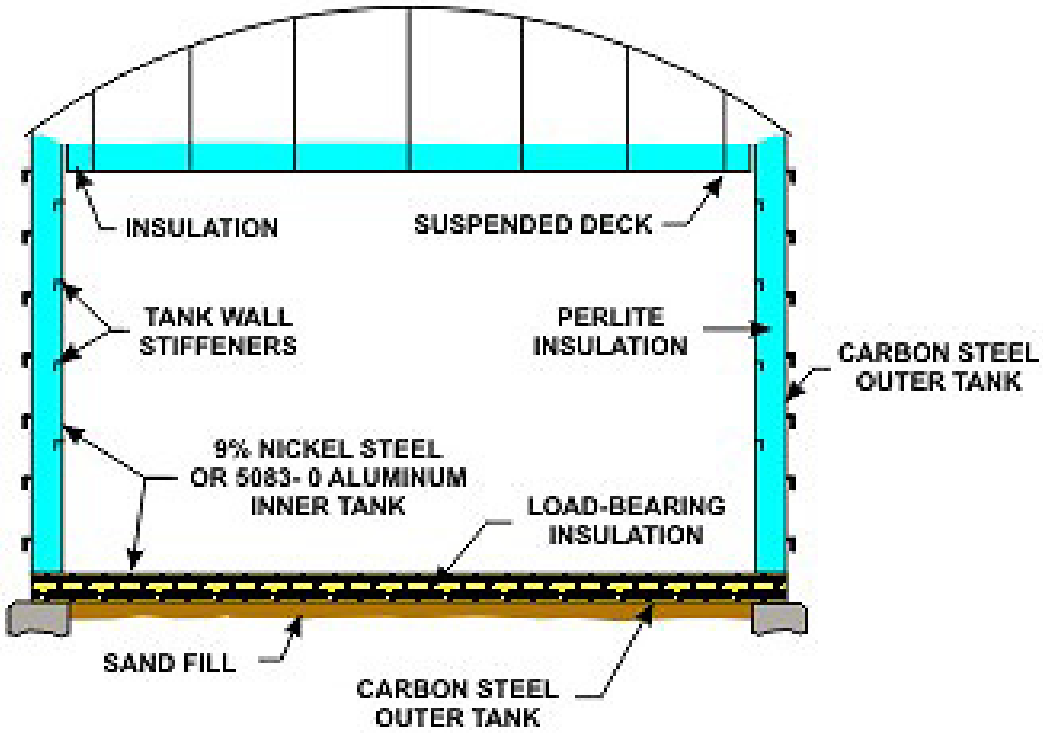
LNG


Transportation
Treatment
Condensate removal
CO_2 removal
Dehydration
Mercury & H_2S removal
Refrigeration
Liquefaction
Storage & Loading
Transportation & Marketing

Typical LNG Peak-Shaving Facility

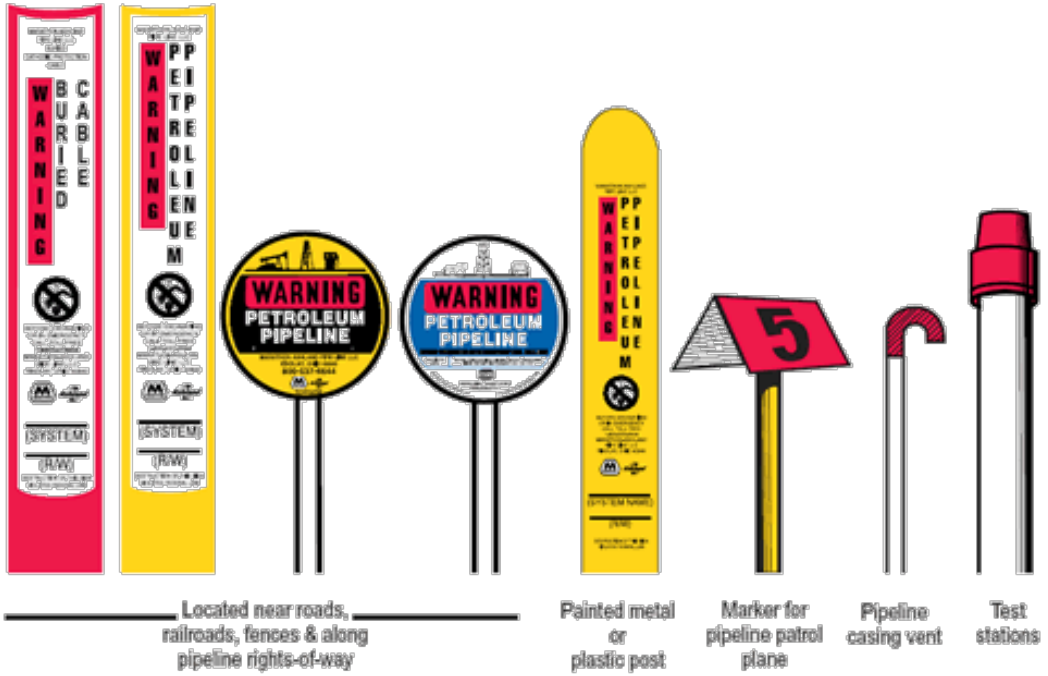
The LNG storage tank is the focal point of an LNG Facility

Cutaway diagram of an LNG storage tank



How to identify pipeline locations?

- Signs or markers located near road and railroad crossings and along pipeline right-of-ways
- Signs identify company, product, and 24/7 emergency phone number
- Signs do not mark exact location or depth of pipeline



U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Product	Appearance	Characteristics	Fire Hazard	Health Hazard	Response
Natural Gas	In pure form is colorless and odorless. Gathering may have a hydrocarbon smell. **<u>Distribution lines</u>** are injected with a chemical "mercaptan" which gives a distinctive odor.	**Form** Remains a gas whether it is transported in a pipeline or found in the air. **Vapor** Vapors Lighter than air.	Natural gas is flammable. Gas vapors can travel toward an ignition source and flashback.	Exposure can cause asphyxiation. Natural gas can also contain H2S.	Secure area Let primary fire burn Eliminate secondary fire
Natural Gas Condensate	Colorless to straw-yellow, water-like. Has a petroleum smell.	**Form** Liquid and vapor. **Vapor** Vapors are heavier than air.	Handle as a flammable liquid. Vapors may be ignited rapidly when exposed to heat, spark, flame etc. Self-generation static electricity	Moderate irritation to eyes. If ingested, aspiration can occur. Severe lung damage, respiratory failure even death can occur.	Secure area Let primary fire burn Eliminate secondary fire

Product	Appearance	Characteristics	Fire Hazard	Health Hazard	Response
Natural Gas with Hydrogen Sulfide (H2S)	Colorless. Rotten egg smell.	**Form** Remains a gas whether it is transported in a pipeline or found in the air. **Vapor** Vapors Lighter than air.	Extremely flammable. Explosive in confined spaces. Re-ignition can occur.	Respiratory tract irritation, fatigue, headache, dizziness, paralysis of the respiratory center and sudden **death**.	Secure area Let primary fire burn Eliminate secondary fire
Hydrogen Sulfide (H2S)	Toxic, colorless gas. Pungent rotten egg odor.	**Form** Remains a gas whether it is transported in a pipeline or found in the air. **Vapor** Vapors Lighter than air.	Extremely flammable and explosive. Can flow along surfaces long distances then reach an ignition source and flash back.	Dizziness, drowsiness, tremors, death at high concentrations (>1,000ppm). DO NOT rely on sense of smell!	Secure area Let primary fire burn Eliminate secondary fire

Product	Appearance	Characteristics	Fire Hazard	Health Hazard	Response
Petroleum Crude Oil	Color ranges from amber to brown to greenish black. Petroleum/asphalt type smell.	**Form** Liquid. **Vapor** Vapors are heavier than air.	Flammable liquid - HIGH FIRE HAZARD Vapors may be ignited rapidly when exposed to ignition sources.	Moderate irritation, headaches, dizziness. Can also contain H2S.	Do not extinguish with water Isolate the area Eliminate secondary fire
Petroleum Crude Oil with Hydrogen Sulfide (H2S): Sour Crude Oil	Color ranges from amber to brown to greenish black. May possess a rotten egg or sulfur odor.	**Form** Liquid. **Vapor** Vapors are heavier than air. Runoff to sewer may cause fire or explosion hazard.	Flammable liquid - HIGH FIRE HAZARD Vapors may be ignited rapidly when exposed to ignition sources.	Can contain toxic levels of H2S. Exposure to high levels of H2S (>1,000ppm) will cause immediate unconsciousness and death. DO NOT rely on sense of	Do not extinguish with water Isolate the area Eliminate secondary fire

History of Pipelines

How Do Pipelines Work?

How Do Pipelines Work?

- We are going to cover one type of energy pipeline – **liquid petroleum pipelines.** We will also reference natural gas pipelines where appropriate.
- Within the liquid petroleum pipeline network there are crude oil lines, refined product lines, highly volatile liquids (HVL) lines, and carbon dioxide lines (CO_2). Crude oil is also subdivided into “gathering lines” and “main(or some times called “trunk”) lines”.
- For natural gas pipelines there are gathering, transmission, and distribution lines.

How Do Pipelines Work?

- First, gathering lines are small pipelines usually from 2 to 8 inches in diameter in the areas of the country where crude oil or natural gas is found deep within the earth.

- These gathering lines exist all over the country but the bulk of them are located primarily in Texas, North Dakota, California, Oklahoma, New Mexico, Louisiana, and Wyoming with small systems in a number of other producing states.

How Do Pipelines Work?

How Do Pipelines Work?

The larger cross-country crude oil transmission pipelines or trunk lines bring crude oil from producing areas to refineries. These lines typically range in size from 8 to 24 inches in diameter in the United States that connect regional markets. There are also a few VERY large trunk lines. One of the largest in the U.S. is the Trans-Alaska Pipeline System, which is 48 inches in diameter.

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

How Do Pipelines Work?

- The next group of liquid petroleum pipelines is one that carries refined petroleum products – gasoline, jet fuel, home heating oil and diesel fuel. These refined product pipelines vary in size from relatively small, 8 to 12 inch diameter lines, to much larger ones that go up to 42 inches in diameter.

How Do Pipelines Work?

- Pipelines carrying refined products are found in almost every state in the U.S. These pipelines deliver petroleum products to large fuel terminals with storage tanks that are then loaded into tanker trucks. Trucks cover the last few miles to make local deliveries to gas stations and homes. Major industries, airports and electrical power generation plants are supplied directly by pipeline.

How Do Pipelines Work?

- Highly volatile liquid (HVL) lines and carbon dioxide (CO_2) lines are also a part of the liquid petroleum pipeline network. These liquids turn to gas once exposed to the atmosphere. They include ethane, butane and propane. Carbon dioxide pipelines allow carbon dioxide to enhance oil recovery, as CO_2 has long done in North America.

How Do Pipelines Work?

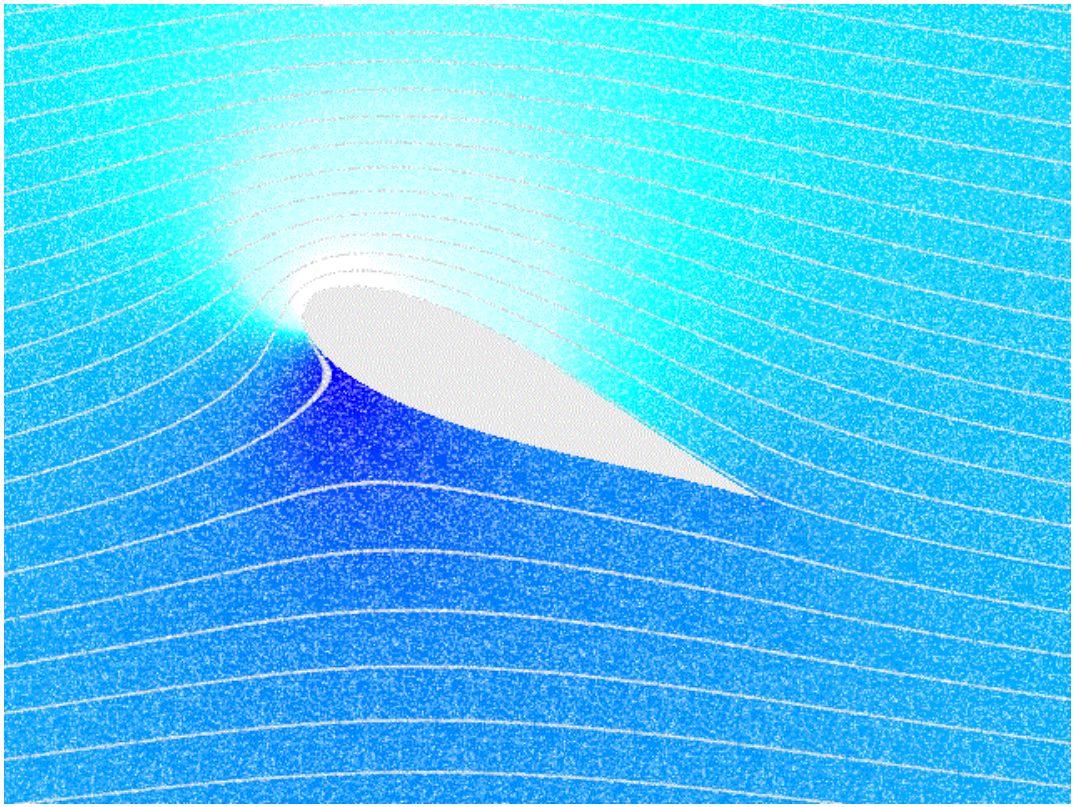
The total pipeline mileage regulated by PHMSA in 2015 was:

- Liquid Petroleum
  - Crude oil 72,563 miles
  - Refined products 62,595 miles
  - HVL 65,576 miles

- Natural Gas Transmission (& gathering) 318,968 miles
- Natural Gas Distribution (mains) 1,276,900 miles
- Natural Gas Distribution (services) 913,773 miles

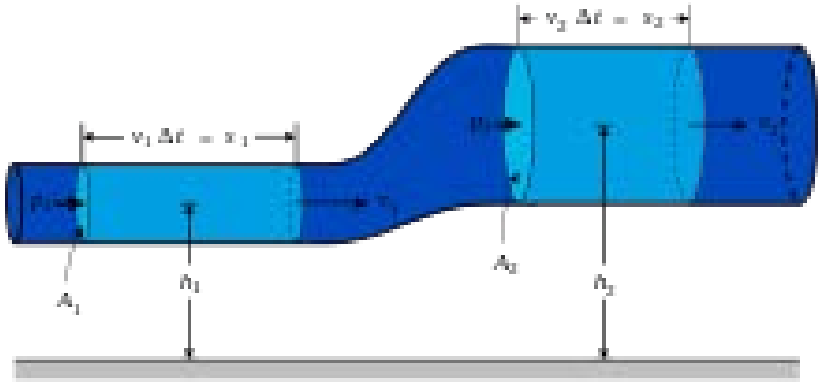
Total mileage +/- 2,718,622 miles

Physics of fluid flow



Physics of fluid flow

Flow dynamics based on temperature, viscosity, laminar friction, surface tension, capillary action, pressure, cavitation, turbulence etc.



Physics of fluid flow

- In fluid dynamics, **Bernoulli's principle** states that an increase in the speed of a fluid occurs simultaneously with a decrease in pressure or a decrease in the fluid's potential energy. The principle is named after Daniel Bernoulli who published it in his book *Hydrodynamica* in 1738

Physics of fluid flow equation factors

- Laminar vs. turbulent flow
- Compressible vs. incompressible flow
- Inviscid vs. Newtonian and non-Newtonian fluids
- Steady vs. unsteady flow
- Unsteady potential flow
- Compressible flow in fluid dynamics
- Subsonic vs. transonic, supersonic and hypersonic flows

Friction losses

- In fluid flow, **friction loss** (or skin friction) is the loss of pressure or "head" that occurs in pipe or duct flow due to the effect of the fluid's viscosity near the surface of the pipe or duct. In mechanical systems such as internal combustion engines, the term refers to the power lost in overcoming the friction between two moving surfaces, a different phenomenon.

Hydraulic Definitions

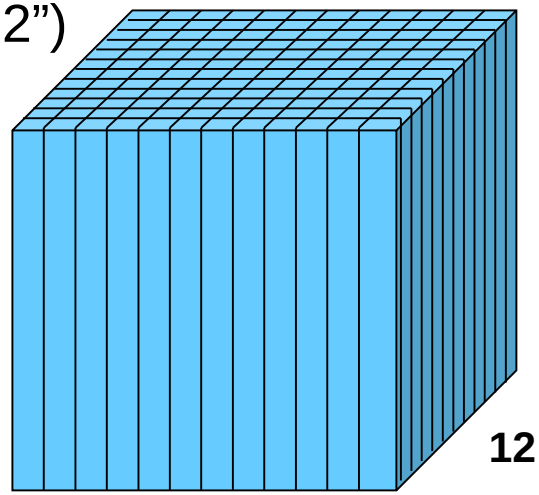
- Viscosity – the property that offers resistance to flow due to the existence of internal friction within the fluid. (water vs. oil vs. syrup)

- Specific gravity – the density of a liquid relative to that of water.
- Head – Height of a fluid times its weight.

Hydraulic Definitions - Measurements

psi – pounds per square inch

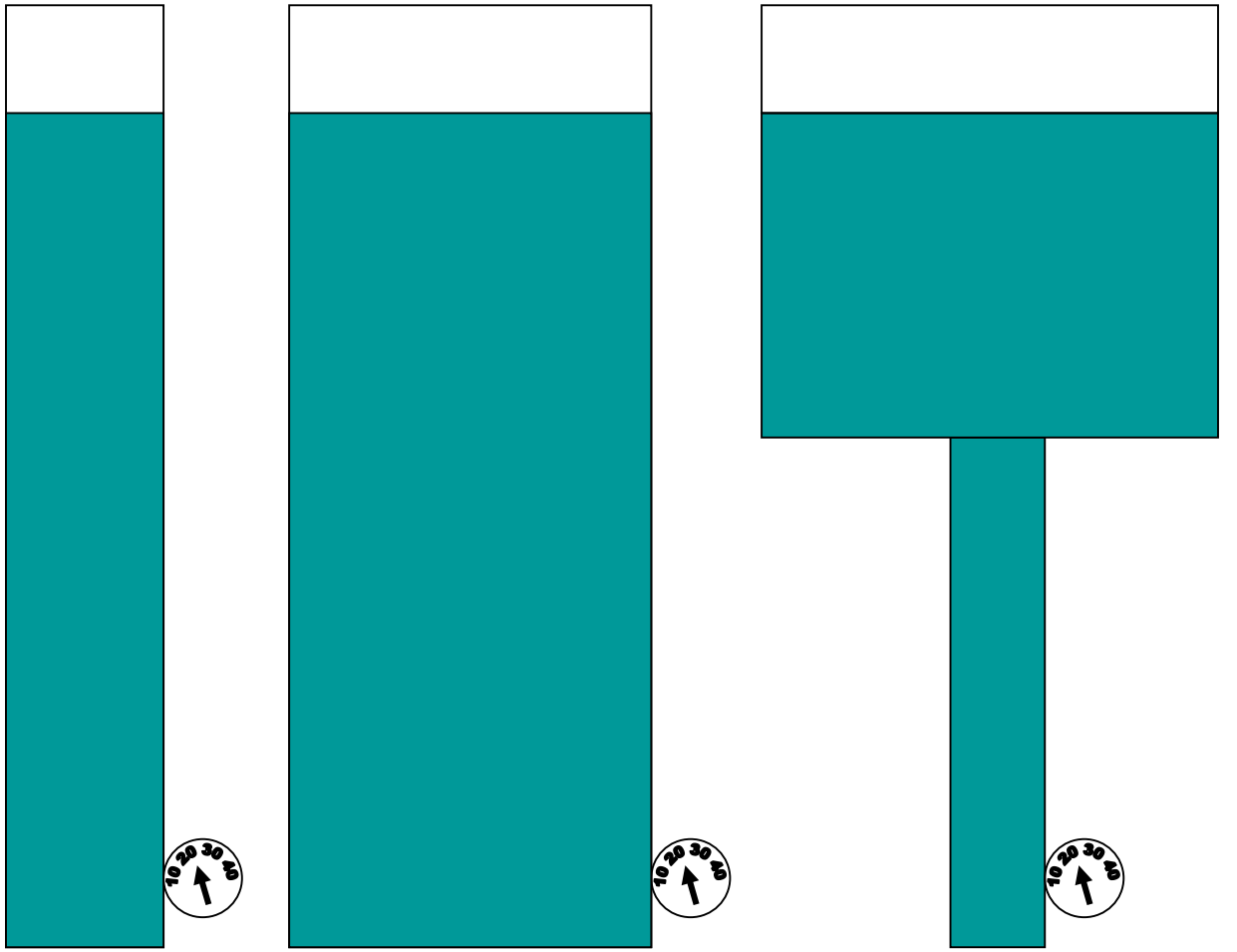
- 1 cubic foot of water weights 62.4 pounds.
- 1 cubic foot consists of 144 columns (1” x 1” x 12”)



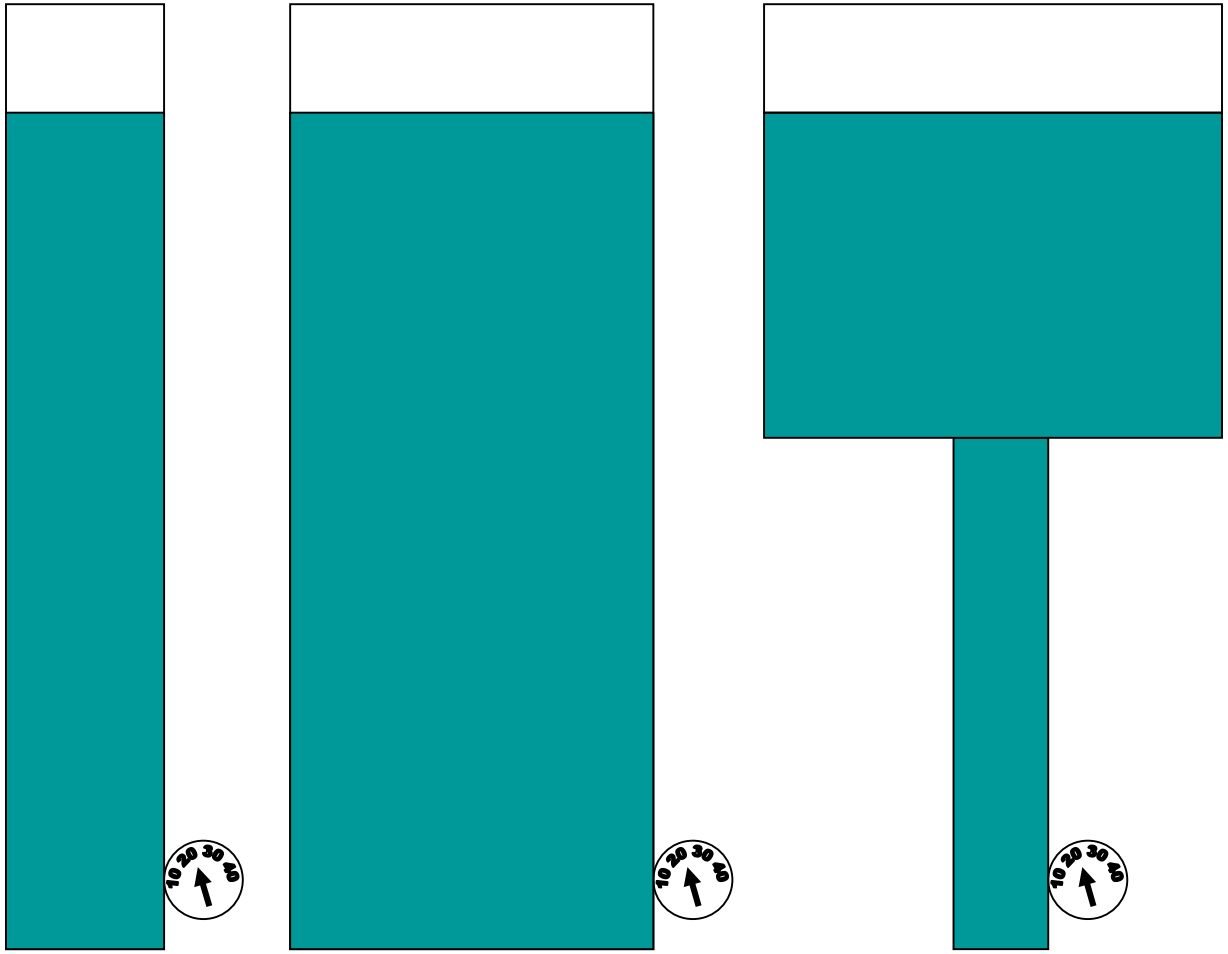
- Therefore each column would weight
  62.4 lbs./144 = 0.433 lbs.

1 foot of water = 0.433 psi or 1 psi = 2.31 feet of head

Hydraulic Definitions - PSI



Hydraulic Definitions - PSI



60 psi 60 psi 60 psi

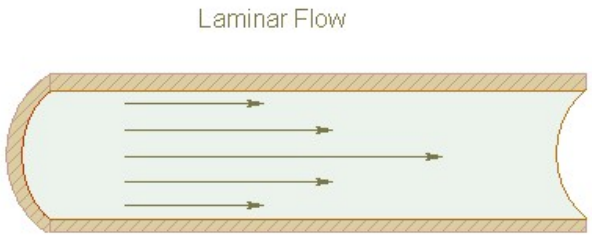
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Fluid Flow Friction Dynamics

- There are in general three types of fluid flow in pipes
  - laminar
  - turbulent
  - transient

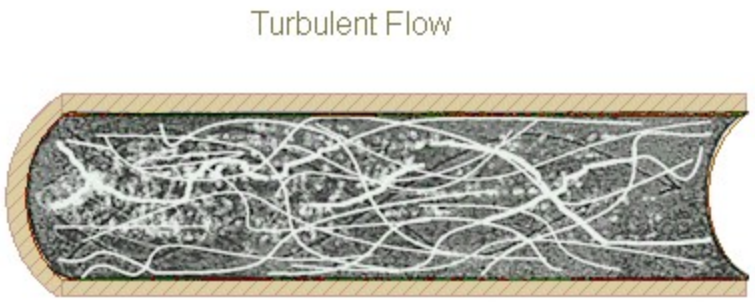
Laminar flow

- Laminar flow generally happens when dealing with small pipes and low flow velocities. Laminar flow can be regarded as a series of liquid cylinders in the pipe, where the innermost parts flow the fastest, and the cylinder touching the pipe isn't moving at all.



Turbulent flow

- In turbulent flow vortices, eddies and wakes make the flow unpredictable. Turbulent flow happens in general at high flow rates and with larger pipes. Bends and transitions will add to the turbulence.



Transitional flow

- Transitional flow is a mixture of laminar and turbulent flow, with turbulence in the center of the pipe, and laminar flow near the edges. Each of these flows behave in different manners in terms of their frictional energy loss while flowing and have different equations that predict their behavior.

Pipe lengths

- Pumping stations are critical to the distance and friction loss calculations as is the pressure calculations required to move the liquid based on it's viscosity. The length of the pipe, the viscosity and distance/pressure from station to station is critical in calculations.

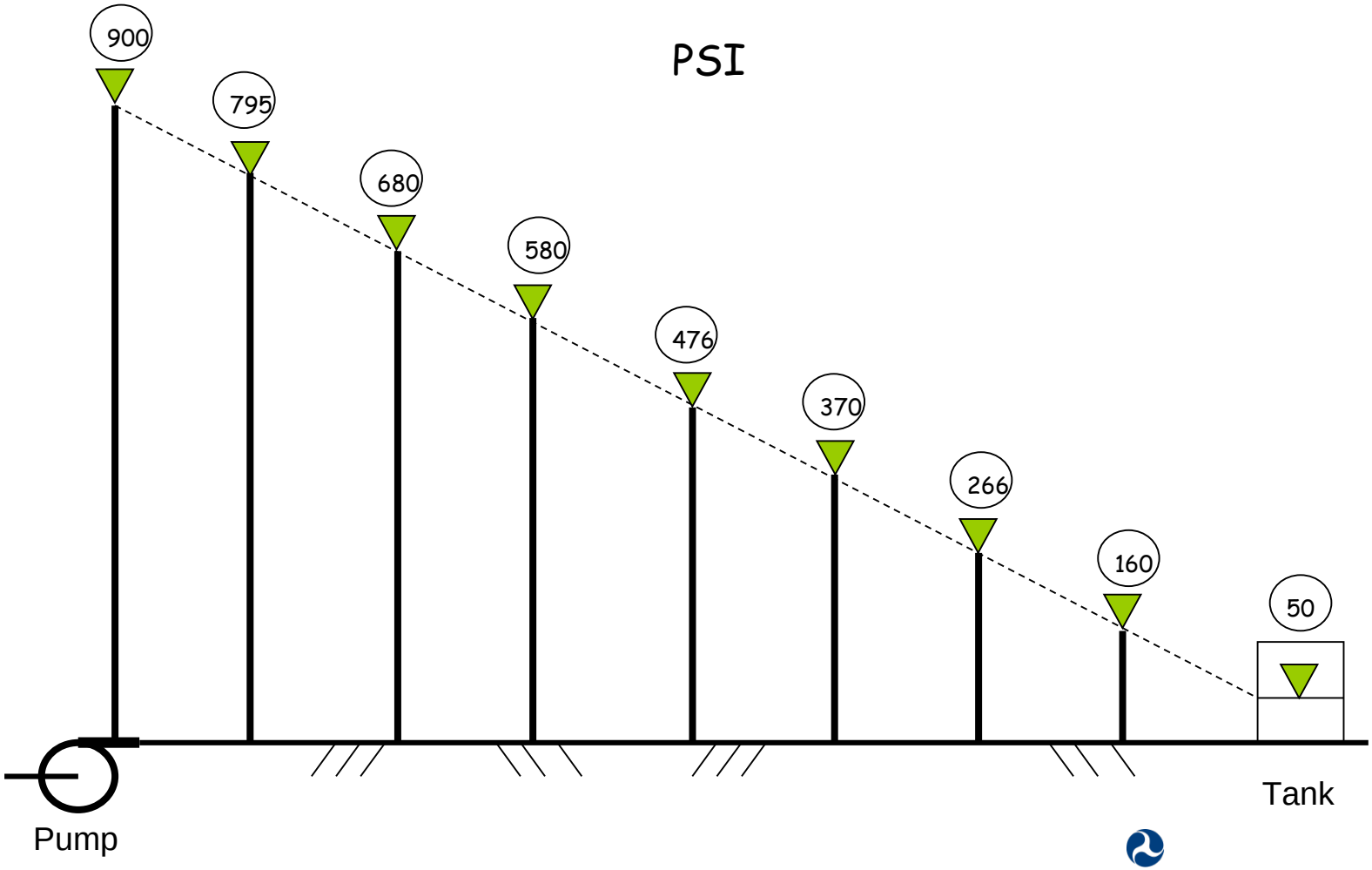
Elevation gain/losses

- Location, location, location is a common vernacular in real estate and the same is true for pipeline locations. The rise and fall of steep pitches in terrain and elevation can significantly affect the flow rates of petroleum products causing a loss of pressure if the pump sizing is done incorrectly.

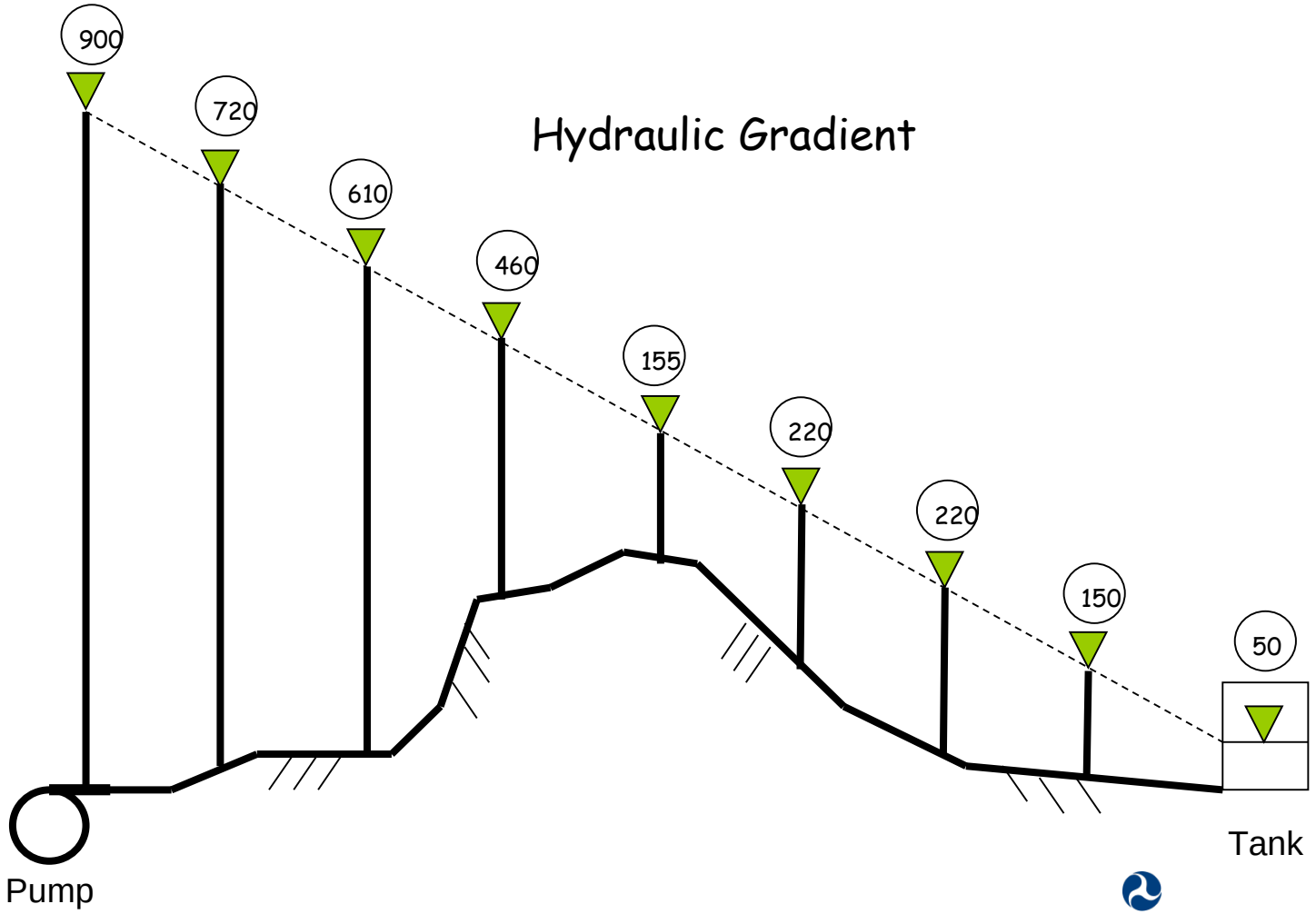
Flow in pipelines

- Velocity and gravity can have a serious affect on flow rates and pump performance. A pipe that is too small will not carry enough liquid or gas based on the supply and delivery needs. A pipe that is too large will possibly have issues with cavitation if air gets into the system at some point.

Pipeline Hydraulics



Pipeline Hydraulics

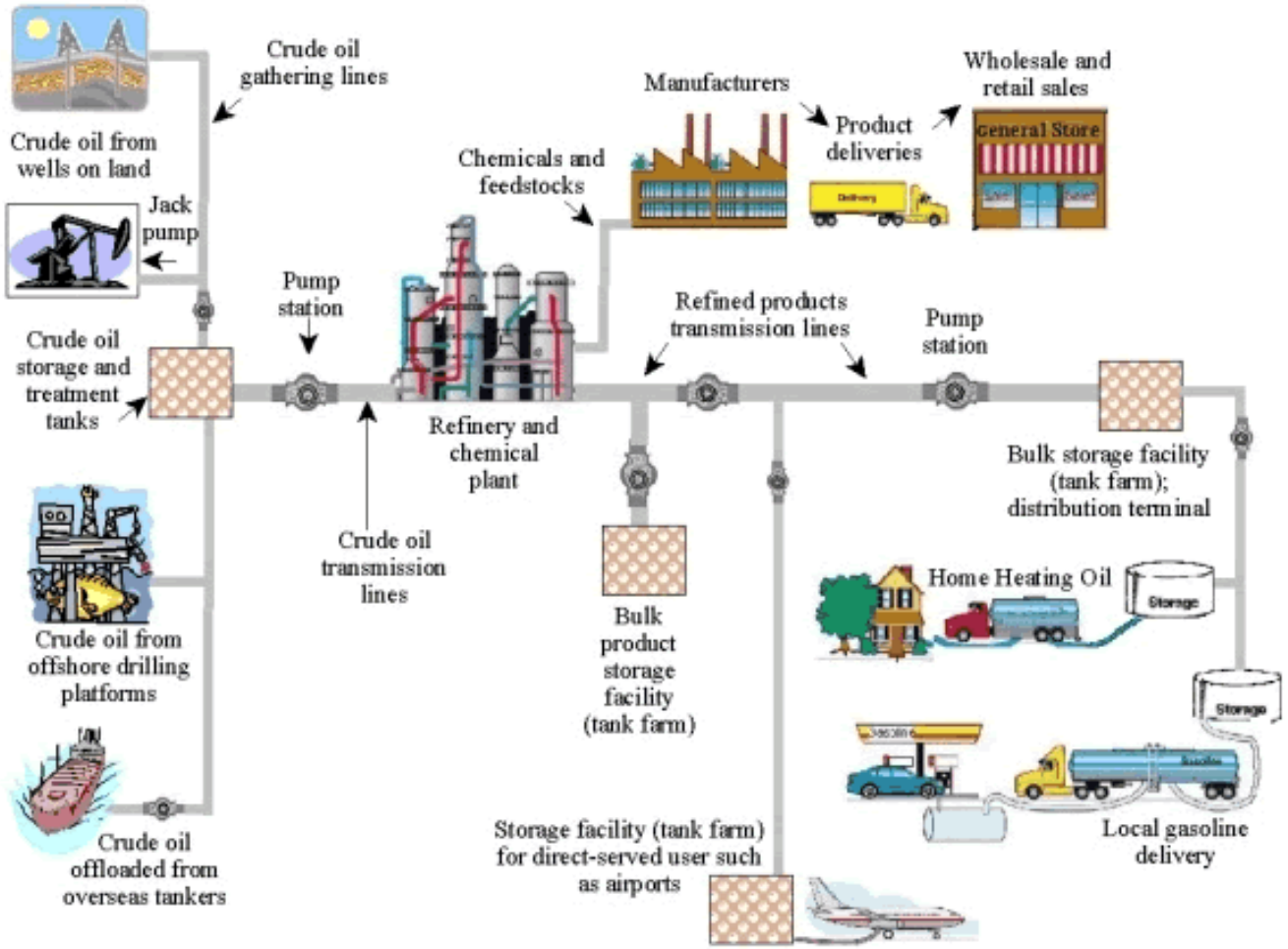


How Do Pipelines Work?

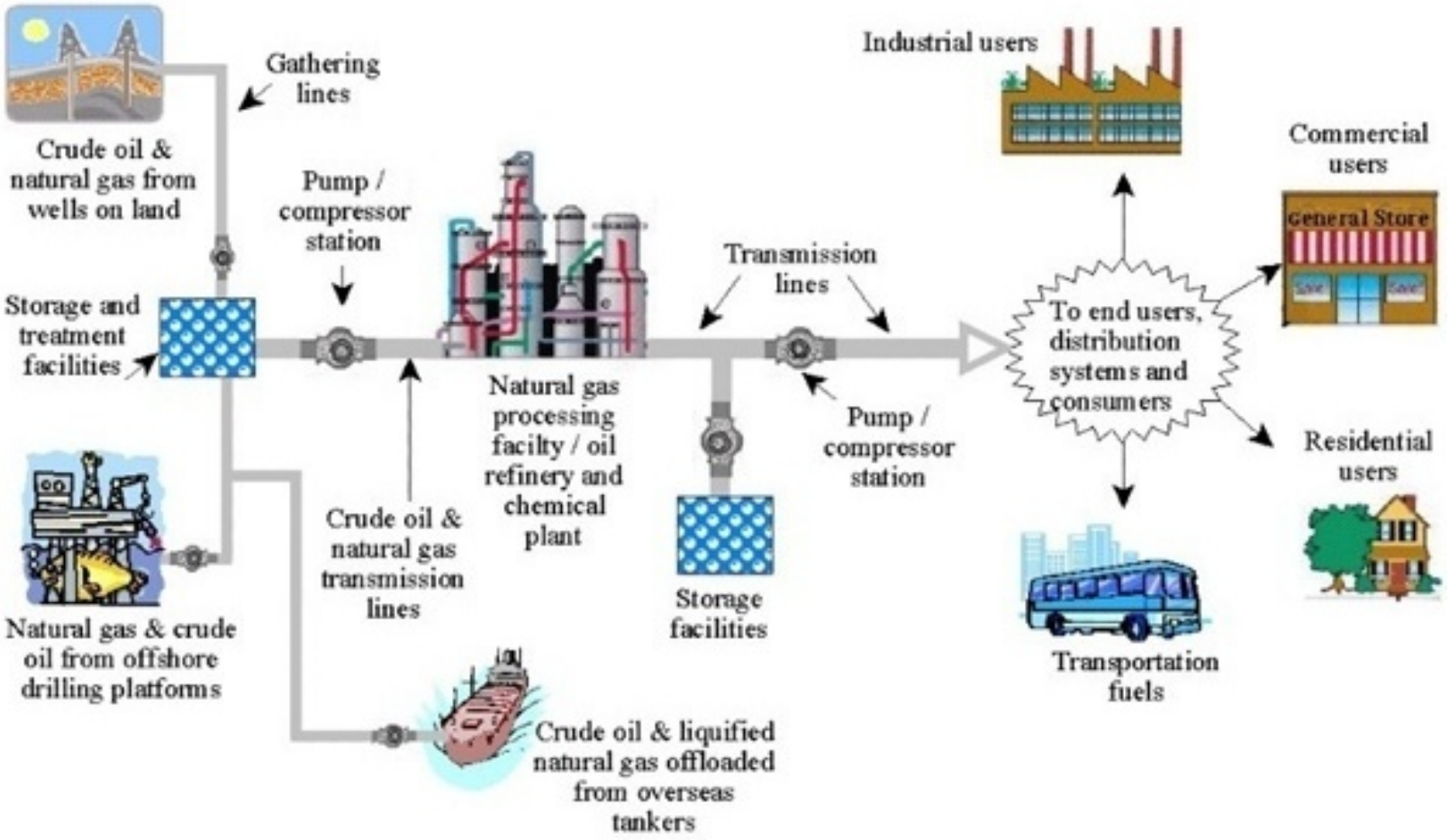
Pipeline Equipment and Facilities

Pipeline Equipment and Facilities

Petroleum Pipeline Systems



Natural Gas Pipeline Systems



Pipeline Equipment and Facilities

In this module we are going to describe some of the typical pipeline equipment (components) and facilities that are necessary for a pipeline system to function.

By far the most common item on a pipeline is **pipe**. We then have to add items that allow us to assemble the pipeline system and that will include things such as valves, fittings, pumps, meters, regulators, relief devices, breakout/storage tanks, etc. And the list goes on and on.

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Pipeline Equipment and Facilities

Within petroleum pipelines and natural gas pipelines we can also generate a large list of pipeline facilities that are necessary to move the commodity from point A to point B.

Pipeline Equipment and Facilities

Pipeline Equipment and Facilities

Pipe being unloaded

Pipeline Equipment and Facilities

Mainline valve

Pipeline Equipment and Facilities

Pipeline valves (could be oil or gas lines)

Pipeline Equipment and Facilities

Mainline valves (could be oil or gas lines)

Pipeline Equipment and Facilities

Pipeline valves (could be oil or gas lines)

Pipeline Equipment and Facilities

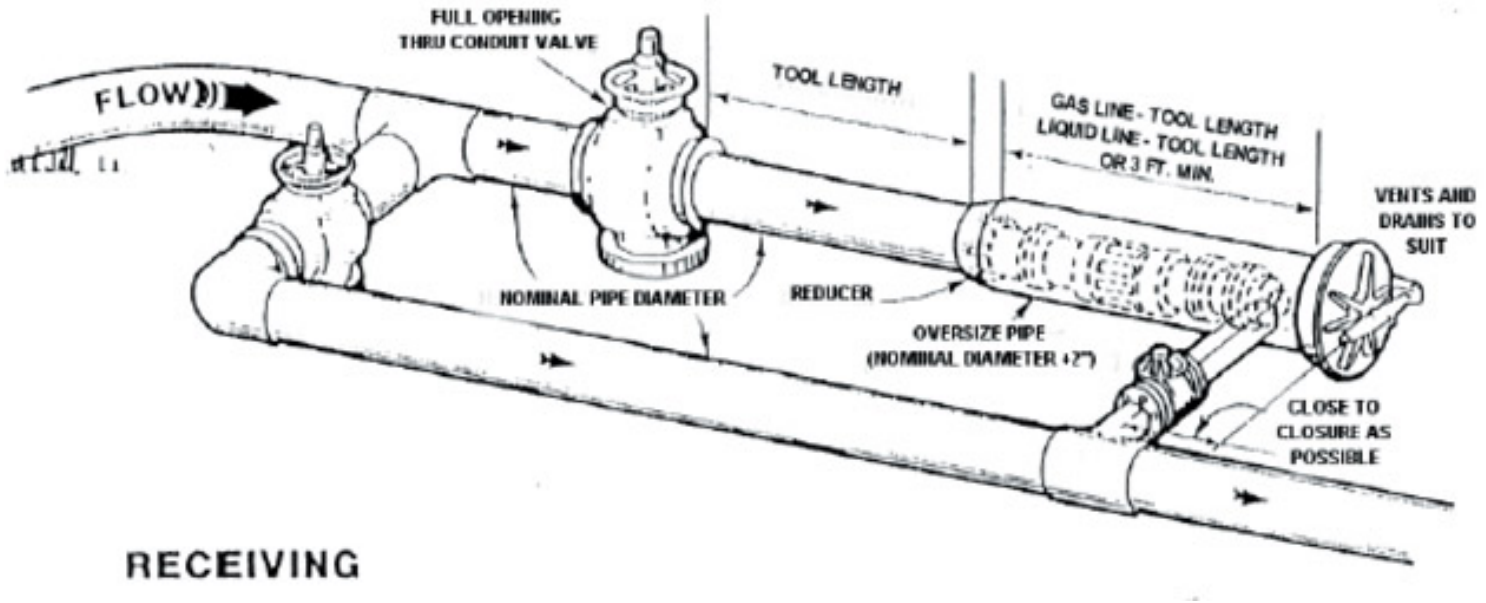
Pig launchers (smart pigs or maintenance pigs)

Pipeline Equipment and Facilities

Pig launchers/receivers *aka* “Pig Traps”

Pipeline Equipment and Facilities

Pig receiver *aka* "Pig Trap"



Pipeline Equipment and Facilities

“Pig Trap”

Pipeline Equipment and Facilities

Pipeline Equipment and Facilities

Pump stations (centrifugal pumps)

Pipeline Equipment and Facilities

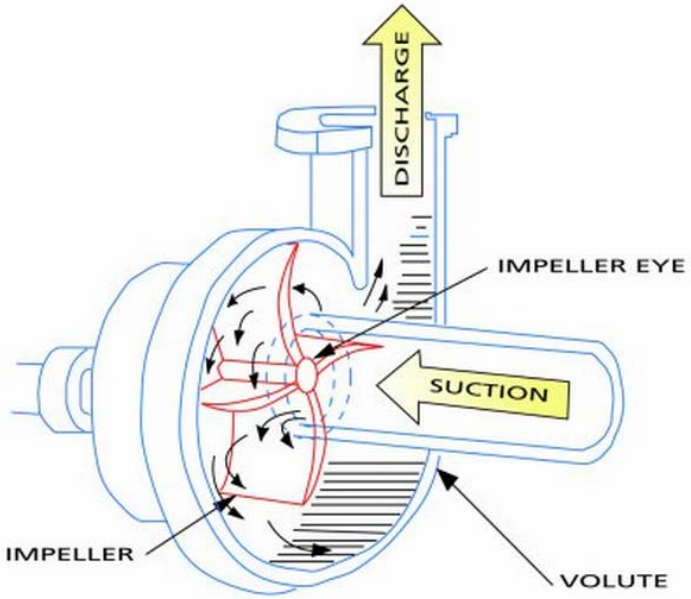
Pump stations (centrifugal pumps)

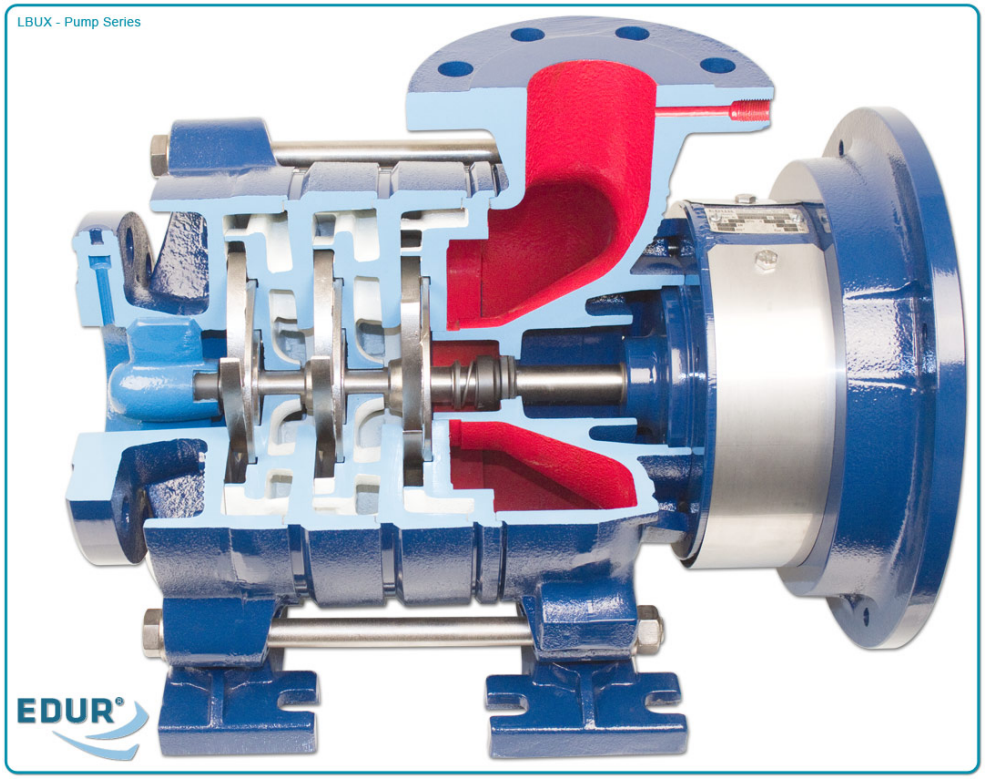
Pipeline Equipment and Facilities

Pump stations (centrifugal pumps)

Pipeline Equipment and Facilities

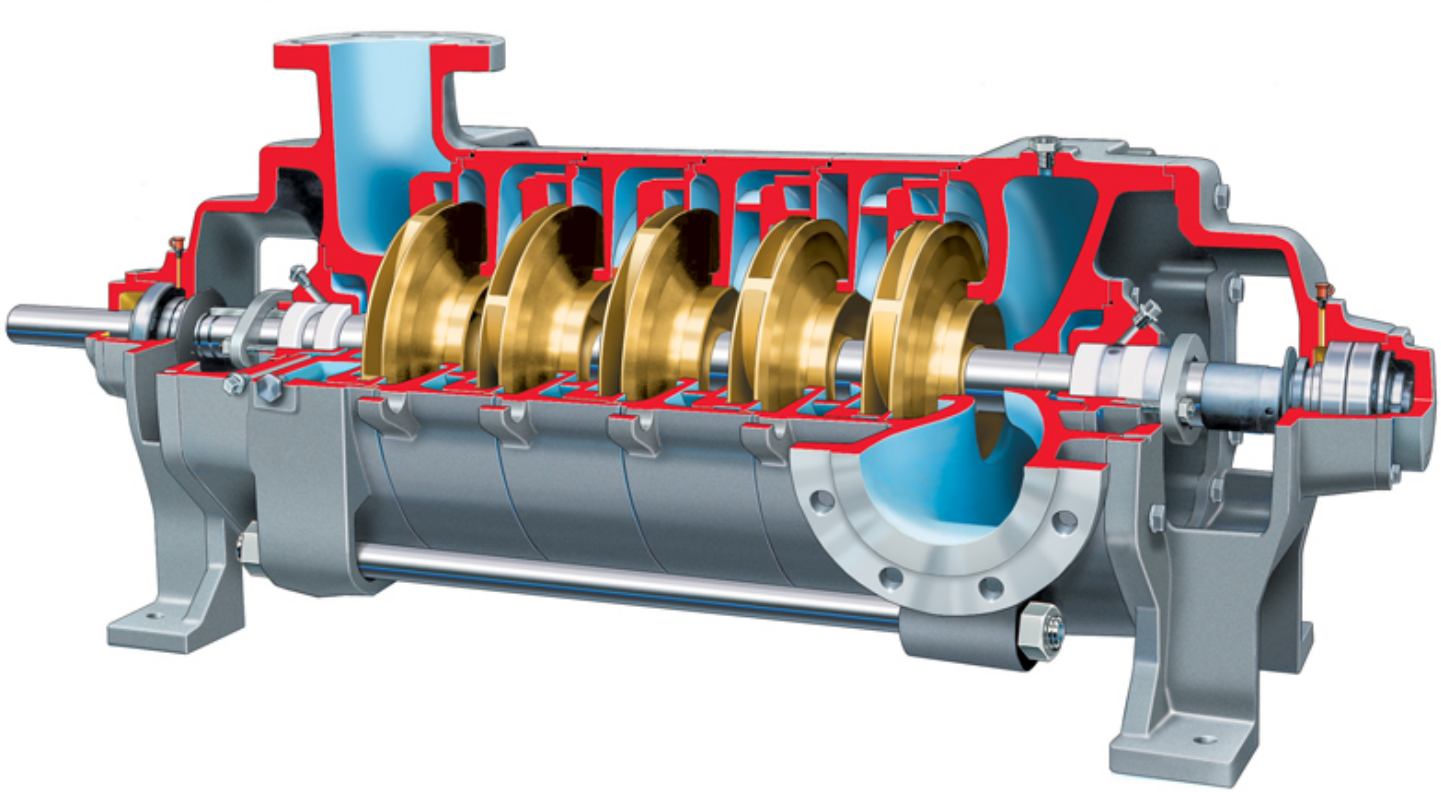
Centrifugal pumps





Pipeline Equipment and Facilities

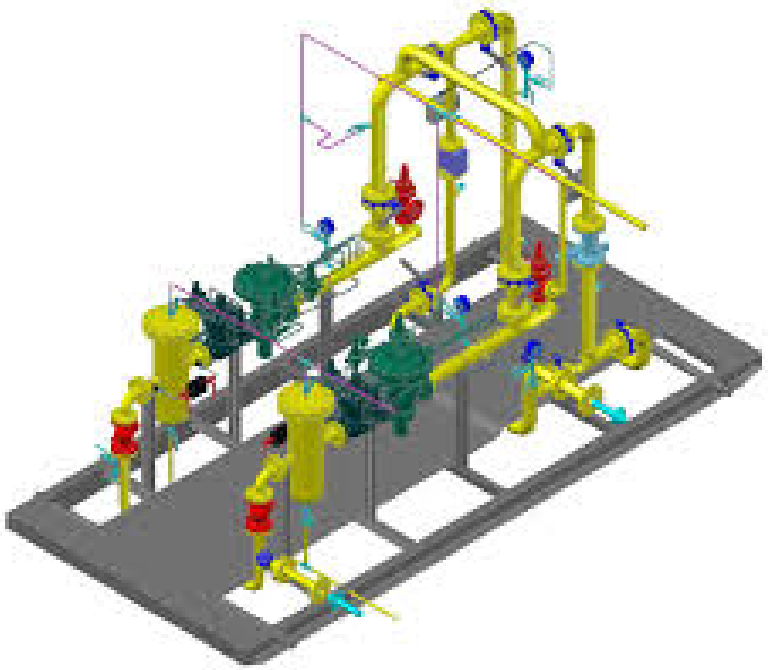
Centrifugal pumps – multistage



Pipeline Equipment and Facilities

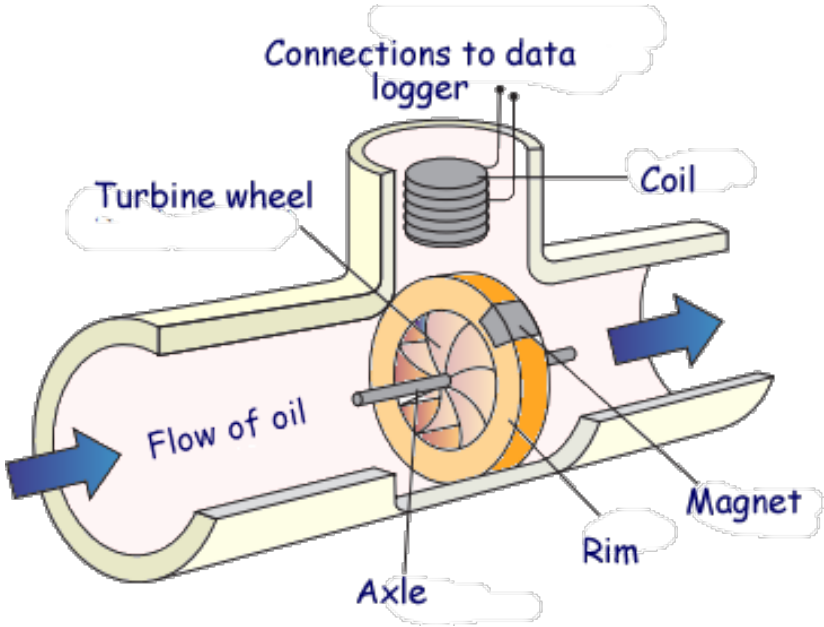
Metering stations

- Pipeline gas metering stations are designed for simultaneous, continuous analysis of the quality and quantity of natural gas being transferred in a pipeline.



Pipeline Equipment and Facilities

Metering stations



Pipeline Equipment and Facilities

Metering stations

- A system may consists of a multi-path ultrasonic flow meter, process gas chromatograph and computer workstation installed, pre-wired and pre-piped in a special air-conditioned shelter with all auxiliary equipment and utilities.

Pipeline Equipment and Facilities

Control Valve

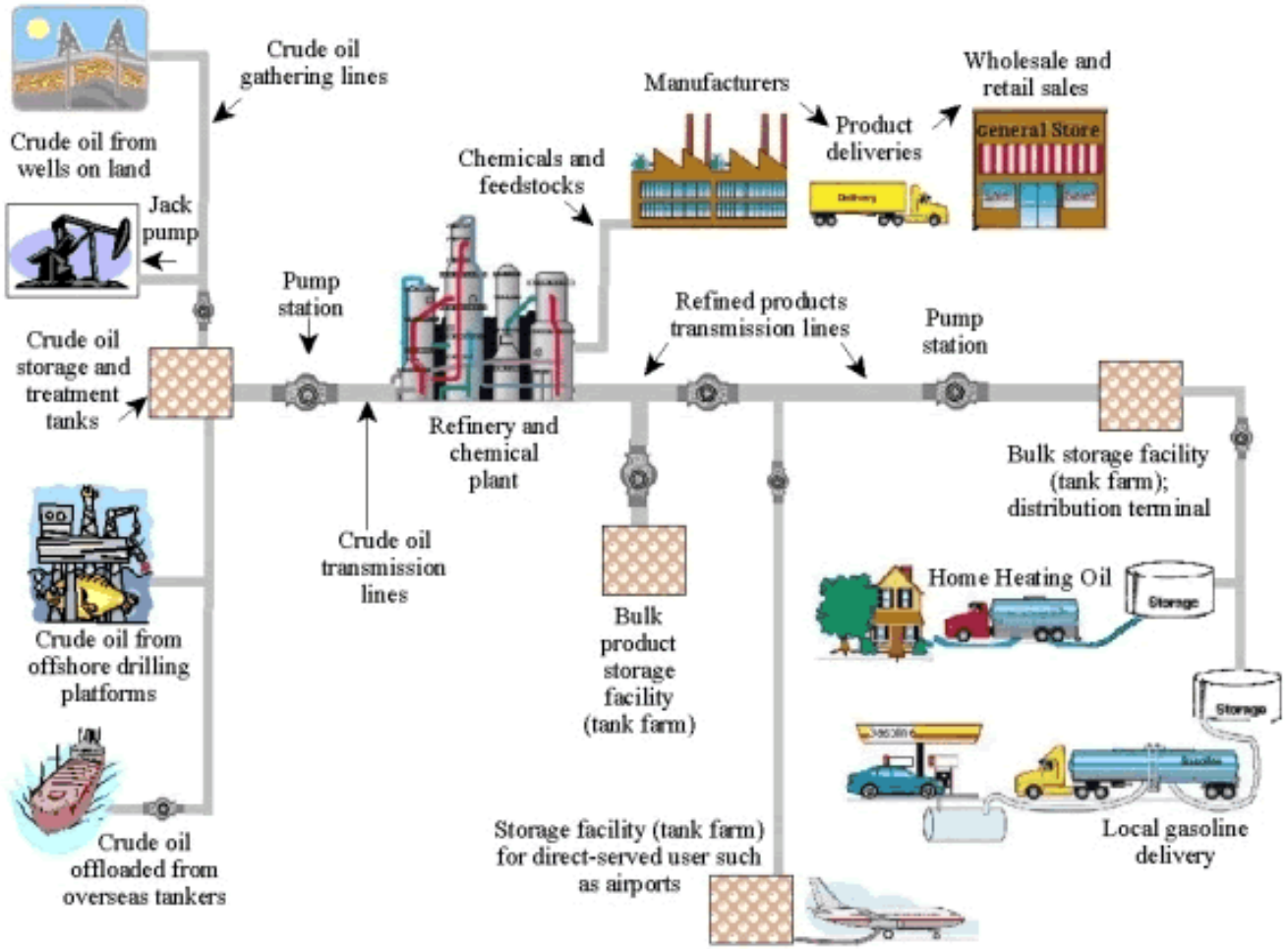
Pipeline Equipment and Facilities

Pump Station

How Do Pipelines Work?

Introduction to SCADA

Control of a Petroleum Pipeline System



Introduction to SCADA

Supervisory control and data acquisition is a system for remote monitoring and controlling a geographically dispersed process from a central location and which operates with coded signals over communication channels

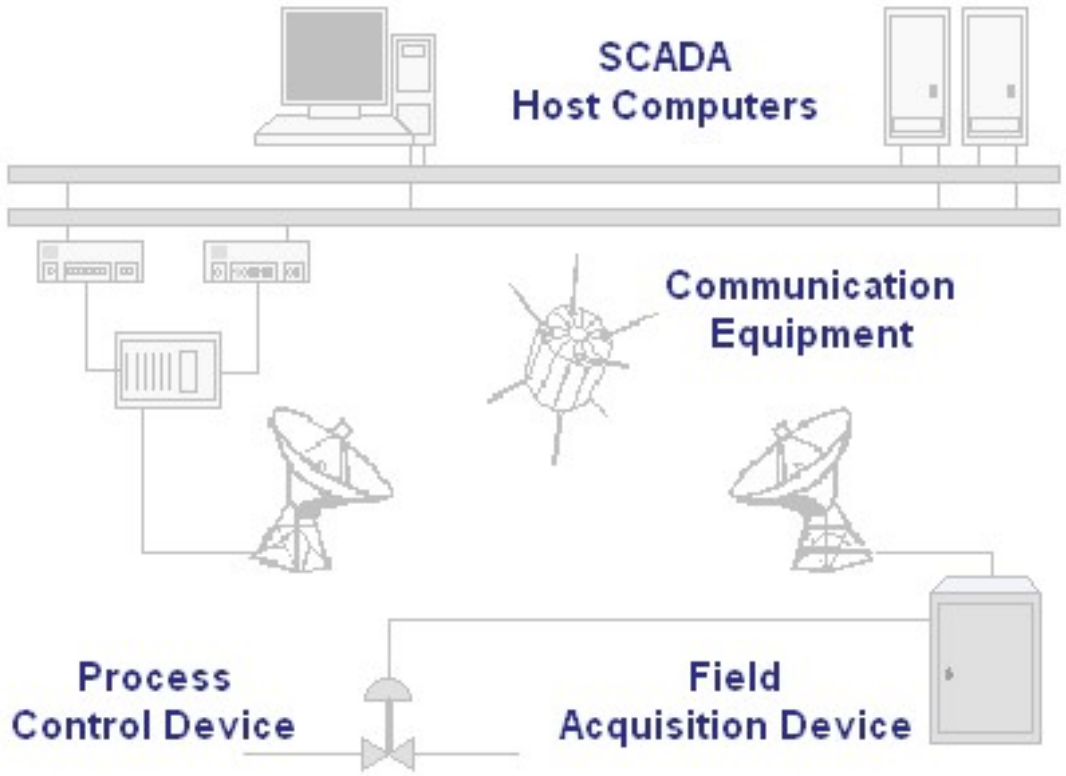
During normal operation, the computer-based SCADA system collects and processes feedback and control signals from pressure and temperature sensors, flow meters, and other types of mechanical and electrical devices located at various points along the pipeline.

Introduction to SCADA

These real-time signals are used by the SCADA system and the control room operators to maintain continuous operations while accommodating routine maintenance and in-service testing, equipment repairs and replacements, and product supply and demand fluctuations.

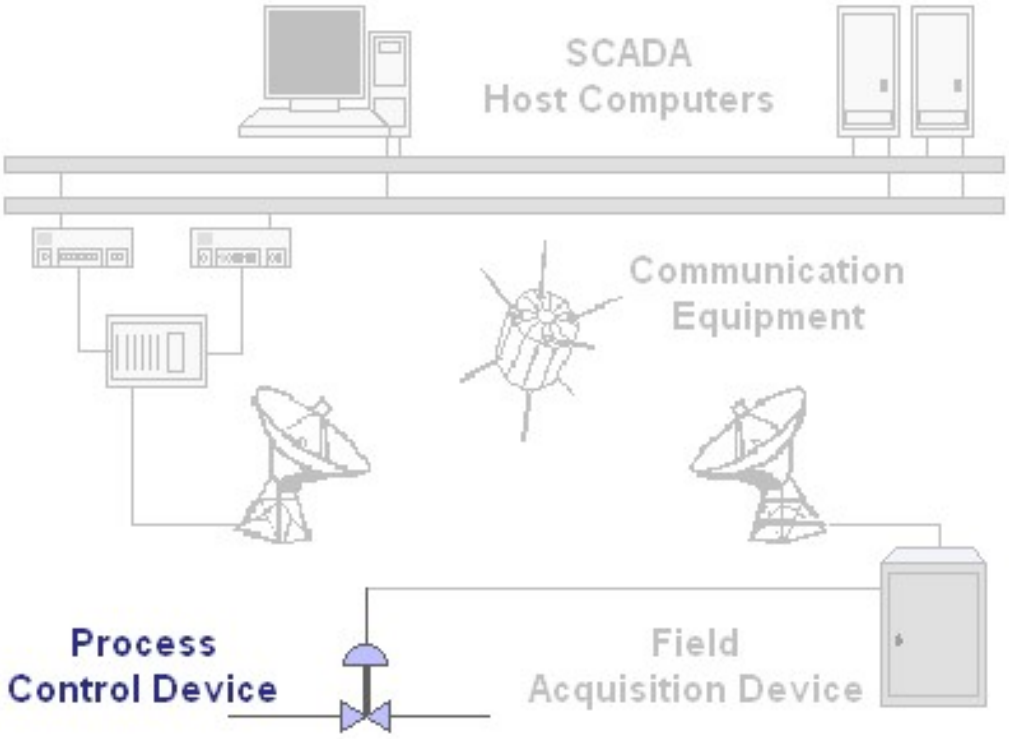
Introduction to SCADA

The basic make-up of a generic SCADA system may look like the following:



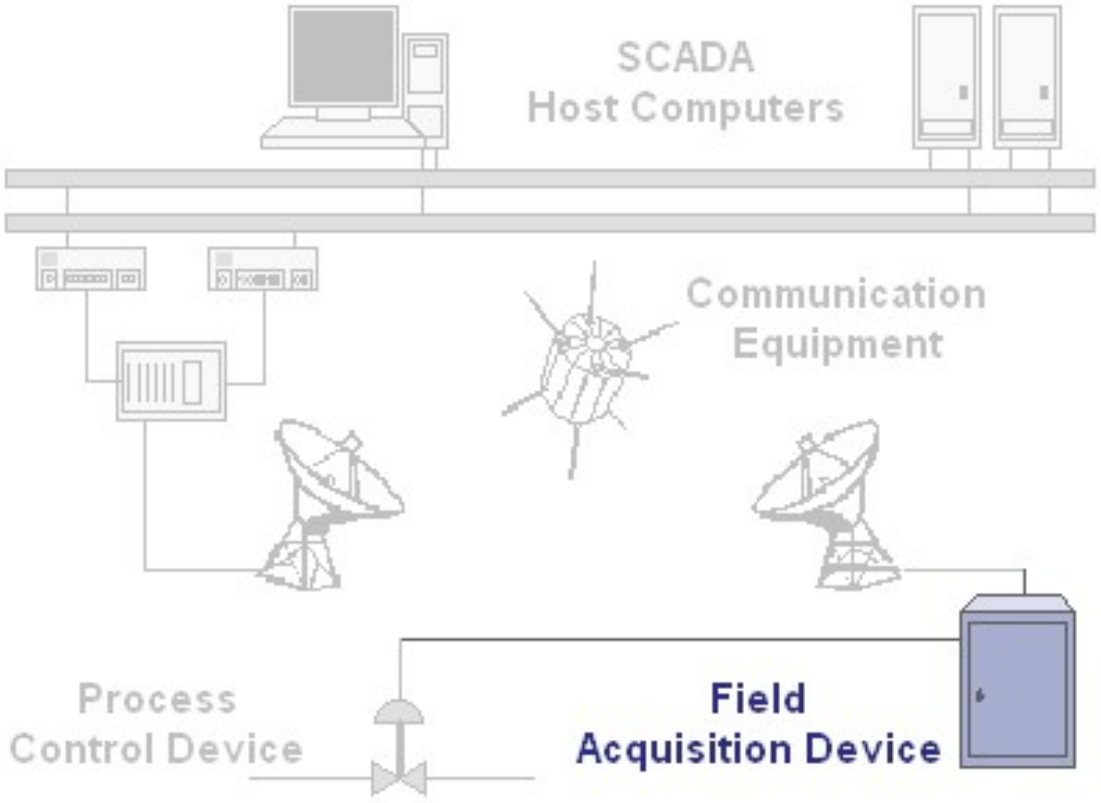
Introduction to SCADA

Since we are controlling & monitoring remote pipeline systems we are collecting information from various pieces of field equipment.



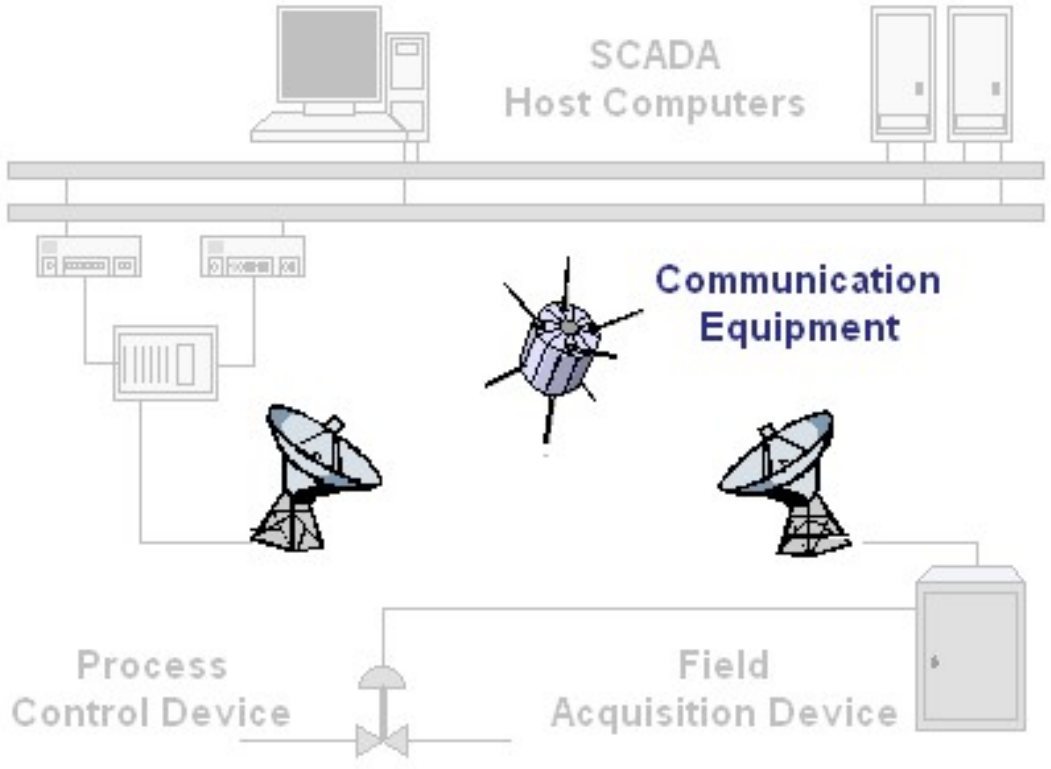
Introduction to SCADA

We collect this information via a PLC (programmable logic controller) or an RTU (remote terminal unit).



Introduction to SCADA

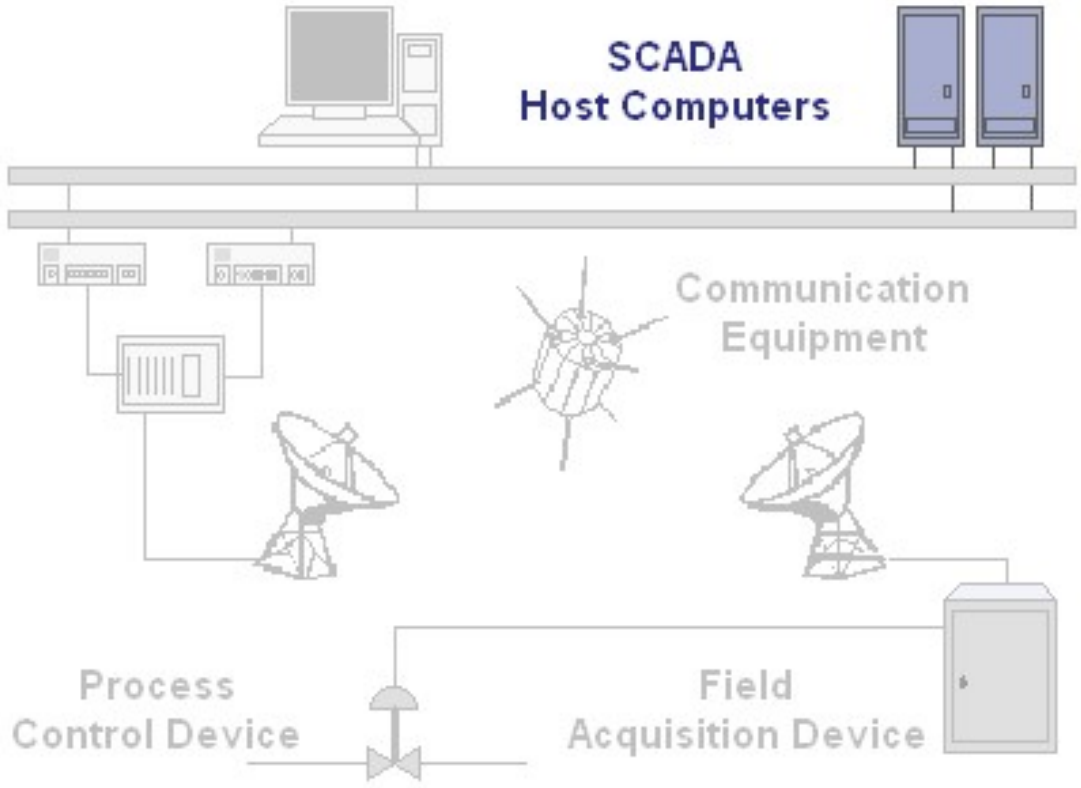
The next element in the system is the means of communication between the acquisition device/s and the SCADA computers.



- Radio
- Microwave
- Satellite
- Leased lines
- Fiber Optics

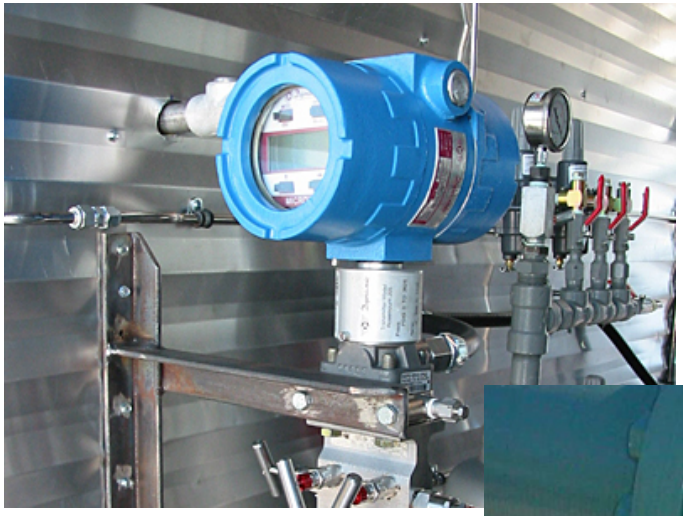
Introduction to SCADA

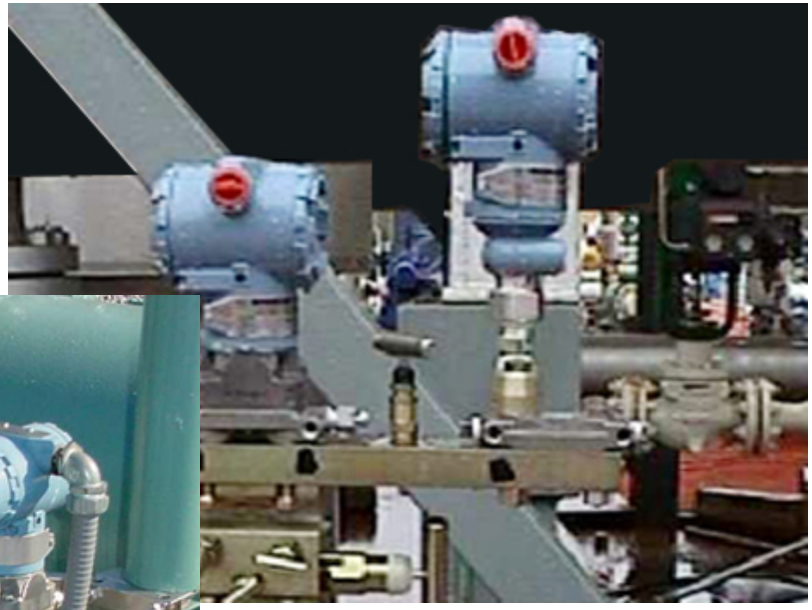
Finally we arrive at the control center, where the SCADA host and clients are located. The host typically consists of a real-time server and a historical server.



Introduction to SCADA

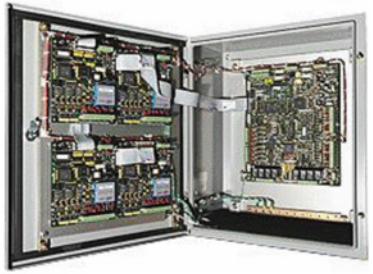
There are a considerable number of field devices which collect and transmit information to the SCADA system.

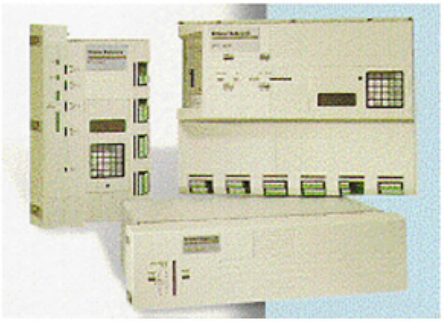




Introduction to SCADA - RTU

Next will be the RTU's (remote terminal units), which are computing devices, usually encased in some sort of weather resistant enclosure, designed to communicate with and control instrumentation.





Introduction to SCADA - RTU

RTU's come in different forms depending on the tasks that they are to perform. For example, an RTU designed for use on a liquids pipeline would likely be designed slightly different than an RTU designed for use in the gas industry.

Introduction to SCADA – PLC's

Programmable logic controllers, or PLC's, have acted as the control arm in automation for many decades. They are now used in a variety of applications including process control, distributed control systems, etc.; but they were first used in automated assembly lines (i.e., automobile manufacturing) and are still used today for the same purpose. Over the years, their functionality has increased and their applications have become more diversified and wide-spread.

Introduction to SCADA – PLC's

Many of the features of PLC's stand in direct contrast to those of RTU's.

While being more versatile than RTU's, sometimes the flexibility and functionality of a PLC is simply not required on many SCADA pipeline applications, and an RTU may be the preferred choice for a particular application.

Introduction to SCADA – Flow Computers

Flow computers are devices that are dedicated to gathering data from measurement devices and performing complex calculations. Flow computers do not provide any pipeline control functionality, as their main purpose is to give accurate and up-to-date readings for flow, volume and energy measurement.

Introduction to SCADA – Flow Computers

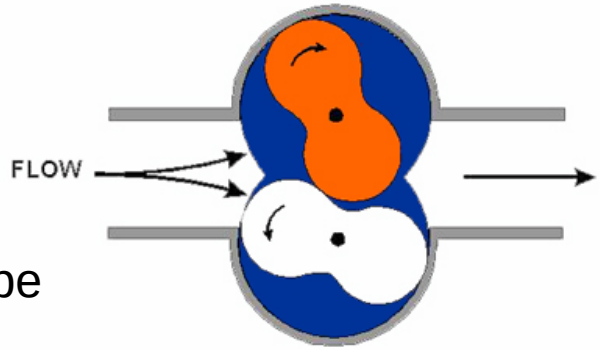
Flow computers commonly interface with data quality instruments (i.e., gas chromatographs) and direct measurement devices (i.e., turbine flow meters) to perform corrected flow and volumetric calculations. The results from the calculations performed on the flow computer are then sent to the main SCADA host for viewing and further data processing (such as accounting).

Introduction to SCADA – Flow Measurement

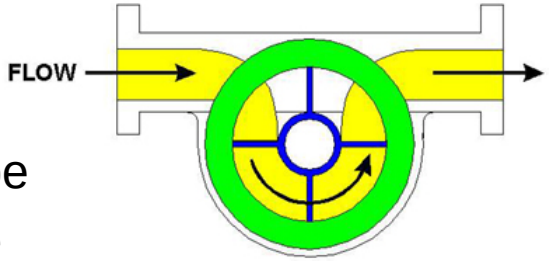
Flow measurement is one of the key elements utilized to monitor and control a pipeline system. There are two distinct types of flow measurement - direct and inferential.

Introduction to SCADA – Flow Measurement

Direct measurement, would mean that the flow rate is measured using a single parameter and is passed directly to the RTU or PLC to represent the current flow value. If we were to measure a flow rate using a positive displacement type meter, each turn of the meter lobe would represent a fixed amount of fluid.



Rotary type positive displacement meter



Vane type positive displacement meter

Introduction to SCADA – Flow Measurement

Inferential measurement would mean that the flow rate is measured using one parameter, but is then translated to another parameter to represent the original value. That is, if we were measuring flow using an orifice plate, the flow would be converted to a differential pressure. This differential pressure is then converted into a voltage that would be proportional to the square of the flow - the flow is therefore "inferred.“

Examples of referential measurement metering would be orifice plates, pitot tubes, vortex shedding meters, etc.

Introduction to SCADA – Flow Measurement

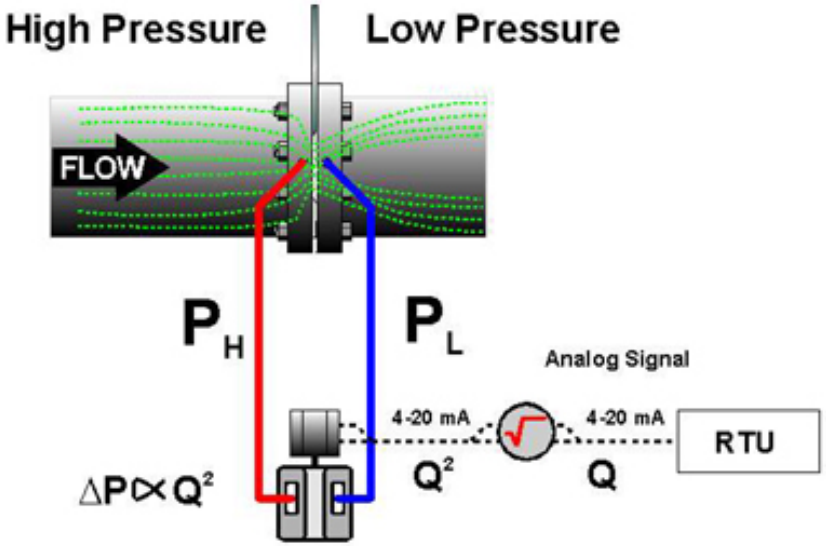
Orifice plates have been in use for literally thousands of years. They were used in ancient Rome to measure flow in aqueducts. They are still used today with great accuracy, and are very cost effective.

In its basic form, an orifice plate is a metal disk with a hole in it. This disk is then installed into a pipe to constrict the flow at that particular spot.

Introduction to SCADA – Flow Measurement

As flow is constricted, the pressure behind the plate decreases (the upstream side of the plate will be at a higher pressure than the downstream side). This differential pressure is proportional to the square of the flow.

Orifice Plate



Introduction to SCADA – Flow Measurement

Ultrasonic meters are becoming more popular as costs of production decrease, and unlike PD meters, or turbine meters, there is very little (if not zero) interference to the flow within a pipe.

Introduction to SCADA - Temperature

Other critical information concerning the commodity being transported is the temperature. Temperature along a pipeline is an essential parameter to be monitored. Many devices are available to measure temperature and send the information back to the SCADA system; however a few stand out as being the most common - thermocouples, resistance thermometer devices (RTD's) and thermistors.

Introduction to SCADA – Control Elements

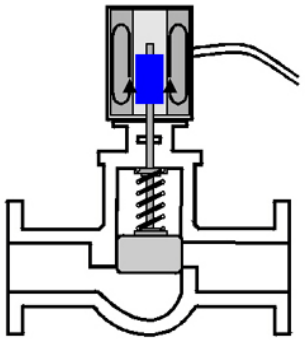
We will next talk control elements. As we previously discussed, it requires numerous components for a pipeline system to function. Control elements are devices that manipulate process variables, such as flow, pressure, temperature, etc.

A control element can be something like a pump, a compressor or a control valve. Obviously, given the high number and variations of each of these types of devices, it would be next to impossible to explain all the instances or combinations of how they are used.

Introduction to SCADA – Control Elements

One of the common types of valves found on a pipeline in general is the solenoid type.

Introduction to SCADA – Control Element



Like most other valves, a solenoid valve consists of a valve plug attached to a valve stem that blocks or opens a flow stream within the valve body. Connected to the top of the valve stem is a permanent magnet.

When a current is induced in this metal coil, it produces a magnetic field that counteracts the field of the permanent magnet.

Introduction to SCADA – Control Element

As the permanent magnet is attached to the valve stem, this will close or open the valve depending on its design.

When power is removed from the coil, the magnetic field collapses and the valve returns to its normal position.

Introduction to SCADA - Communications

A variety of means are used to transmit the signals from the field devices to the SCADA host system.

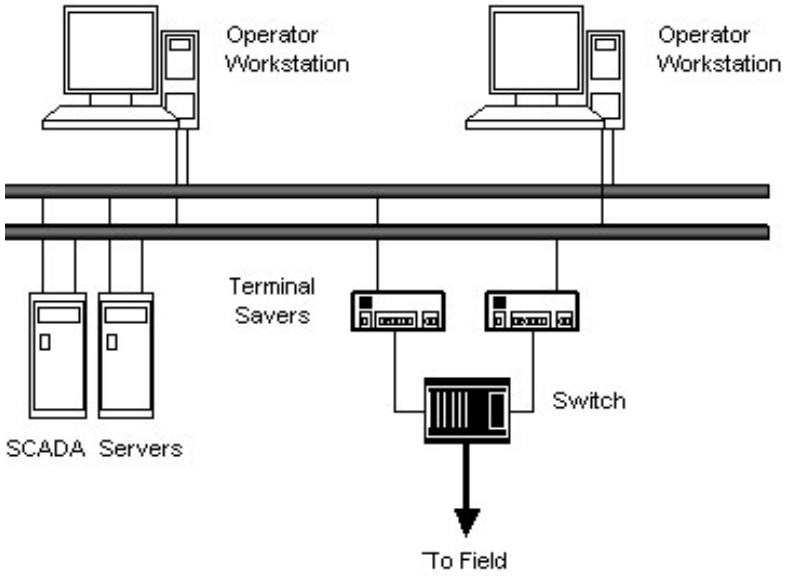
Communications may utilize:

- Radio transmission
- Microwave
- Satellite
- Leased lines
- Fiber optics

Each have distinct advantages and disadvantages. Each have costs that also vary depending on the system being utilized.

Introduction to SCADA - Servers

Every thing discussed so far has been to describe how information on the pipeline system (pressures, flows, temperature, pump operation, valve operation, etc.) makes it way to the end point, the SCADA hosts and clients. As we previously mentioned the host consists of a real-time server and a historical server. The client is the computer & screen that the controller utilizes to monitors and control the pipeline.

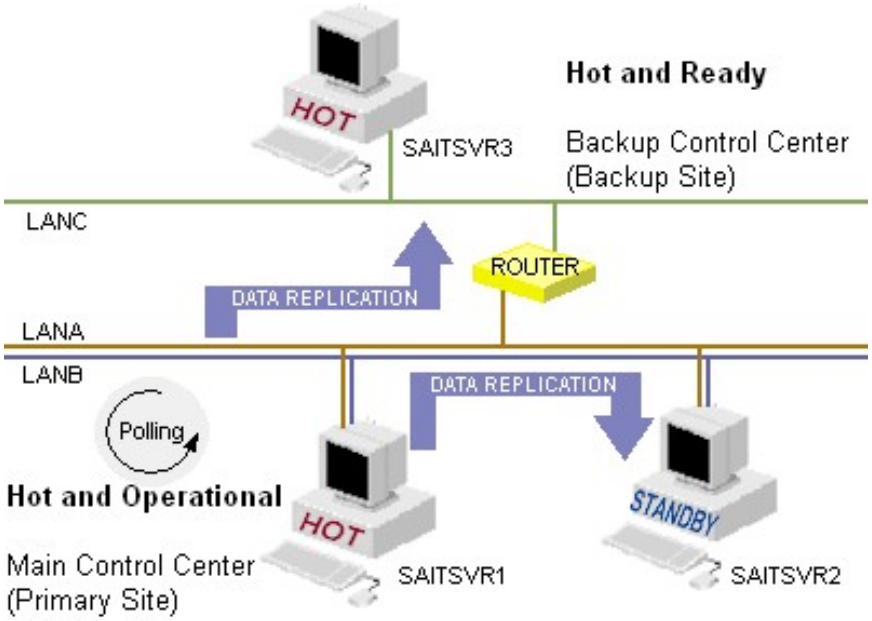


Introduction to SCADA - Displays

SCADA systems, regardless of processing power, must rely on intelligent design decisions regarding how data is to be stored, and transferred between servers. If data is to be shared, decisions must be made as to who is going to see that data, how they are going to see it, and where it will be stored.

Introduction to SCADA

The redundancy model in SCADA systems is based on fault tolerant services and sites. Should one real-time server fail to function within its normal operating parameters (i.e., fault occurs with the O/S, power is lost, critical process fails, etc.) within the same operational site, a back up server can assert and take control.



How Do Pipelines Work?

Regulatory Agencies

49 CFR 195

Hazardous Liquid Pipelines

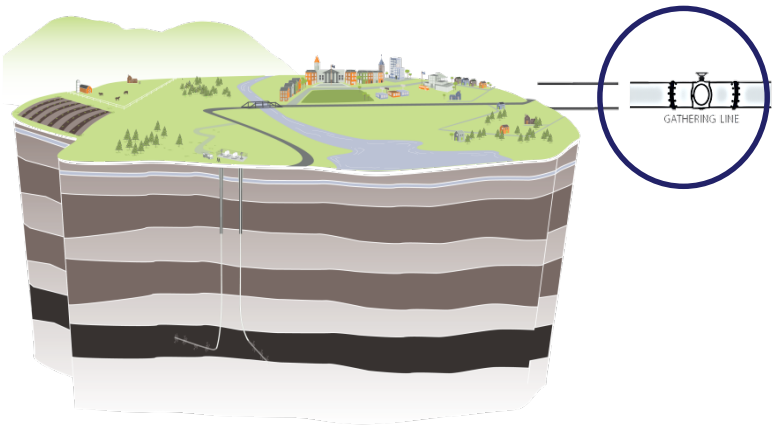
Pipeline Regulations

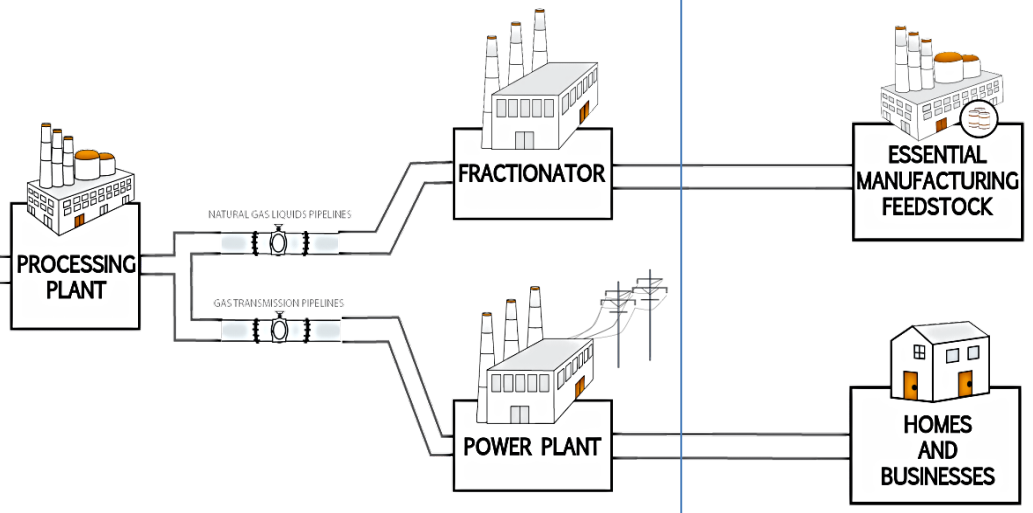
In this module we will be briefly reviewing some of the governmental regulatory agencies and their regulations that affect the design, construction, operation, and maintenance of pipelines.

Phases of Pipeline Transportation

EVERY STAGE IS REGULATED IN SOME ASPECT, EITHER FEDERAL OR STATE

WELL SITE





"UPSTREAM"
EXPLORATION AND PRODUCTION

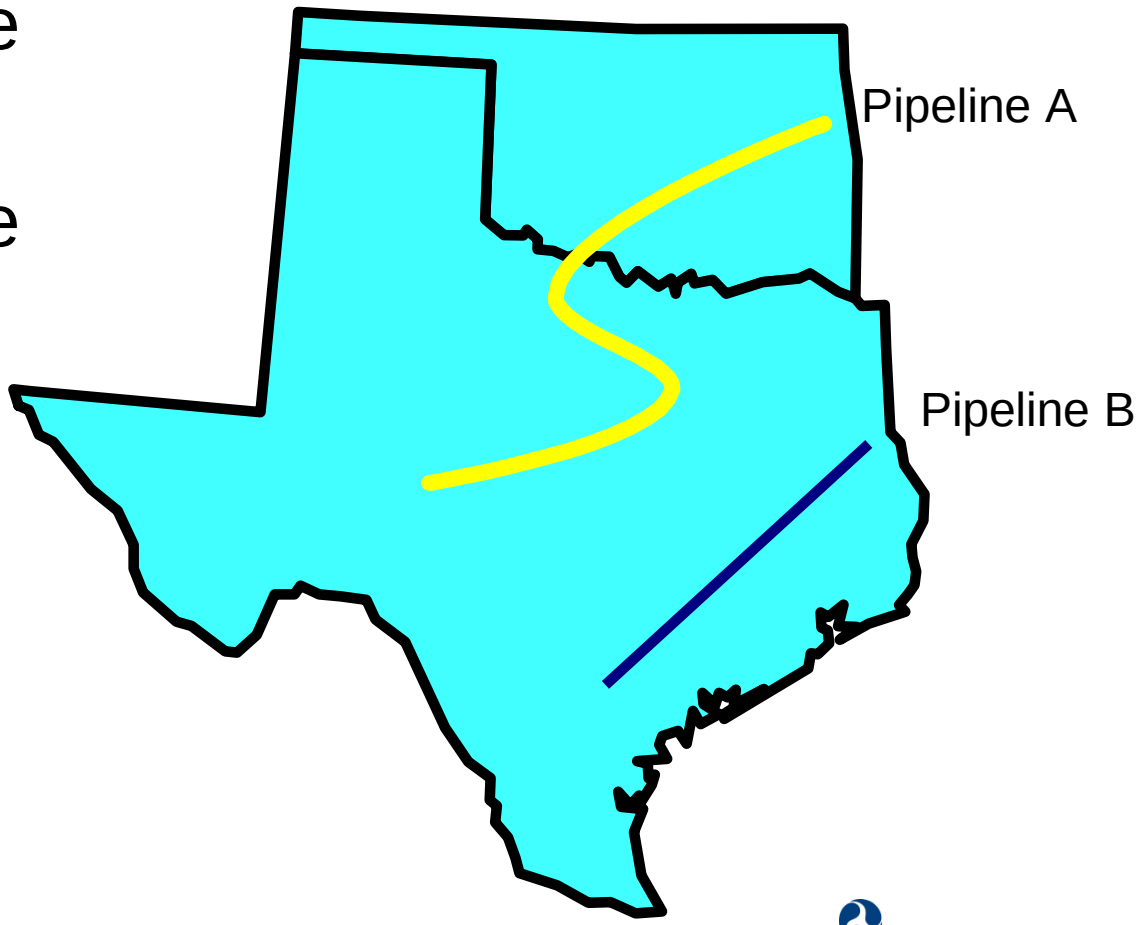
"MIDSTREAM"
GATHERING, PROCESSING, TREATING, COMPRESSING

"DOWNSTREAM"
TRANSMISSION & DISTRIBUTION

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Interstate and Intrastate Pipelines

- A=Interstate
- B=Intrastate



Interstate and Intrastate Pipelines

- Interstate pipelines (typically gas transmission and liquid pipelines) are covered under federal regulations of various agencies.

- Intrastate pipelines (gas distribution, and gas and small liquid midstream companies) fall under the auspices of state agencies, which may have adopted the federal regulations or have their own more stringent versions.

U.S. Department of Transportation

- DOT– is a cabinet-level department

- Under DOT is an agency called PHMSA

Pipeline and Hazardous Materials Administration (PHMSA)

- PHMSA is composed of the Office of Hazardous Materials Transportation (HMT) and the Office of Pipeline Safety (OPS)
- OPS was created by Congress in 1968 and has the overall national responsibility for pipeline safety.

PHMSA
U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

Office of Pipeline Safety Responsibilities

- Responsible for pipeline safety program
- Perform compliance inspections for DOT regulations
- Carry out enforcement actions per 49 CFR Part 190
- Issue Regulations, Advisory Bulletins, and Alert Notices
- Conduct research and data analysis to aid in pipeline safety
- Oversee and administer State grant-in-aid programs

PHMSA Regions & Offices

National Transportation Safety Board

- Independent agency chartered by Congress in 1970's
- Investigates significant transportation incidents, including pipeline
- Determines probable cause of:
  - Pipeline incidents with fatalities or substantial property damage
  - Releases of hazardous materials
  - Transportation incidents of recurring nature
- Issues safety recommendations to Congress and affected parties

National Transportation Safety Board

Department of Homeland Security

- Responsible for overall security of national energy transportation system
- Includes pipeline security responsibilities
- Review and inspect pipeline security programs and initiatives thru TSA (Transportation Security Administration)

Federal Energy Regulatory Board (FERC)

- What FERC Does:
  - Regulates the transmission and sale of natural gas for resale in interstate commerce;
  - Regulates the transportation of oil by pipeline in interstate commerce;
  - Approves the siting and abandonment of interstate natural gas pipelines and storage facilities;
  - Ensures the safe operation and reliability of proposed and operating LNG terminals;

Federal Energy Regulatory Board (FERC)

- What FERC Does Not Do:
  - Regulation of natural gas sales to consumers;
  - Provide oversight for the construction of oil pipelines;
  - Abandonment of service as related to oil facilities;
  - Approve mergers and acquisitions as related to natural gas and oil companies;
  - Have responsibility for pipeline safety
  - Regulation of local distribution pipelines of natural gas.

U.S. Department of Labor

- Responsibility for OSHA
  - Provides for Safe Workplace and Worker Protection
  - Promulgates and enforces Process Safety Management (PSM) regulations for processing plants, refineries, etc.
  - Investigates on-the-job injuries and near misses on federally regulated pipeline projects.

OSHA
Occupational Safety and Health Administration

U.S. Environmental Protection Administration (EPA)

- EPA Primarily enforces the Clean Air Act and Clean Water Act, but has promulgated many regulations affecting pipelines
- Examples:
  - Spill Prevention Plans
  - Storm Water Discharge Plans
  - Carbon Emissions
  - Etc.

Environmental Compliance During Pipeline Construction

- All State and federal regulations and safe work practices must be followed and adhered to at all times. The EPA monitors hazardous spills and environmental violations causing damage to wetlands and water crossings during construction.

Environmental Permitting

- US Army Corps of Engineers
- US Fish and Wildlife Service
- Migratory Bird Treaty Act
- Pipelines on Tribal lands
- Federal land management agencies (BLM, USFS, BOR)

Federal Land Management Agencies

- BLM (Bureau of Land Management)
- USFS (United States Forestry Service)
- BOR (Bureau of Reclamation)

U. S. Army Corps of Engineers

- The Department of the Army Regulatory Program is one of the oldest in the Federal Government. Initially it served a fairly simple, straightforward purpose: to protect and maintain the navigable capacity of the nation's waters.

U. S. Army Corps of Engineers

- The U.S. Army Corps of Engineers, as part of an interagency effort with the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture - Natural Resources Conservation Service, published the final biennial update to the National Wetland Plant List (NWPL) in the federal register.
- Pipelines have to be permitted to cross wetlands and water reservoirs.

U. S. Fish & Wildlife Service

- During the past one hundred years, the United States has enacted wildlife laws and regulations, and ratified international treaties to protect our heritage of wild animals and plants and their habitats.

Migratory Bird Treaty Act

- *Migratory Bird Treaty Act* (1918) conserves migratory birds. Permits are issued for scientific collecting, banding and marking, falconry, raptor propagation, depredation, import, export, taxidermy, waterfowl sale and disposal, and special purposes.
- Migratory bird habitats can affect pipeline routing.

Pipelines on Tribal Lands

- Why is a Right of Way granted over Tribal Lands?
- Normally, a right of way is sought for a public purpose from tribal, local, state or federal governments for roads, railroads, utilities, or other public access needs.

Pipelines on Tribal Lands

Who has possessed authority to grant a Right of Way over Tribal Lands?

- ✓ Individual Acts of Congress
- ✓ Bureau of Indian Affairs
- ✓ Bureau of Land Management
- ✓ Bureau of Reclamation
- ✓ National Park Service
- ✓ U.S. Fish and Wildlife
- ✓ U.S. Forest Service

Pipelines on Tribal Lands

Energy Policy Act of 2005

- The Energy Policy Act of 2005 contains new provisions that authorize tribes to “ grant a right of way over tribal land for a pipeline or an electric transmission or distribution line without approval by the Secretary the Secretary ” in certain circumstances. This is a significant departure from prior law and is designed to encourage tribes to develop their own energy resources .

Regulatory Agencies

Regulatory Agencies

Pipeline Safety Laws

The Start of Pipeline Safety Regulations

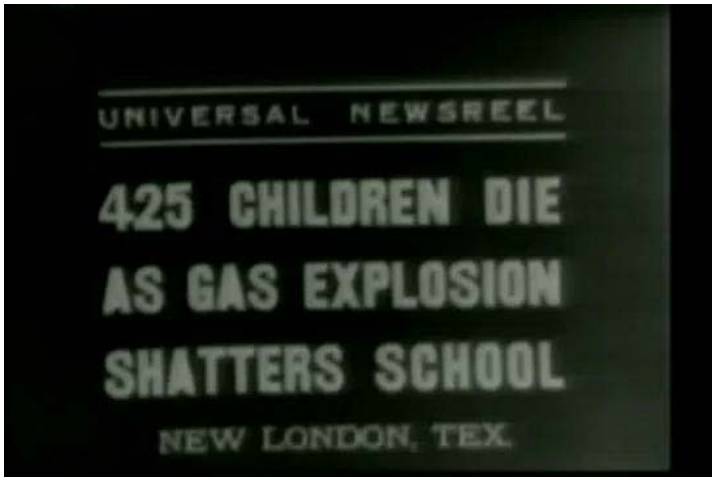
- 1947 Gas piping specification ASME B31.8
- 1959 Oil piping specification ASME B31.4

Incidents prior to the Natural Gas Pipeline Safety Act of 1968

- Pipeline related incidents prior to Act
  - 1937 Gas explosion in New London, Texas kills 298 children
    - Laws passed to add odorants
  - March 1965, Natchitoches, LA. Transmission line rupture, 17 fatalities
  - 1967
    - Queens, NY. 7 injured, 19 families homeless
    - S. Milwaukee, WI. Explosion after 250 people left rehearsal hall.
    - Hastings, NY. One killed, 35 injured, 35 families homeless.
    - Logansport, IN. 8 injured.

Incidents prior to the Natural Gas Pipeline Safety Act of 1968

Incidents prior to the Natural Gas Pipeline Safety Act of 1968



Call for Public Safety

- President Johnson, special message to the Congress,

"To Protect the American Consumer", February 16, 1967,

> "I now call upon the 90th Congress…in the public interest…for there is important unfinished and new business on the agenda to: …
>
> -Insure the safety of natural gas pipelines…"

Pipeline Safety Acts

- Natural Gas Pipeline Safety Act of 1968
  - Authorization to regulate pipeline transportation of gas (natural, flammable, toxic or corrosive) and Liquid Natural Gas (LNG)

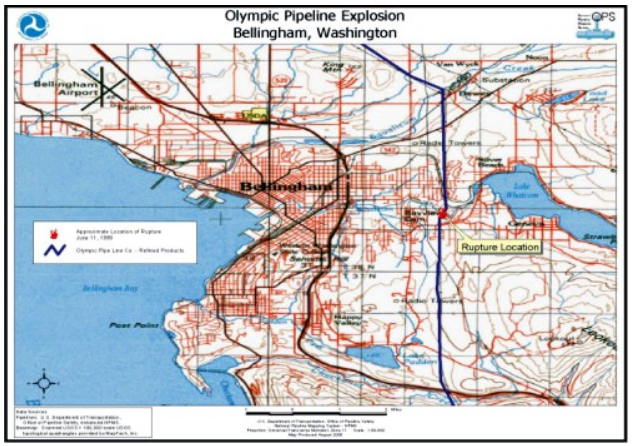
- Hazardous Liquid Pipeline Safety Act of 1979
  - Authorization to regulate pipeline transportation of hazardous liquids (crude oil, petroleum products, ammonia, CO2, LNG)

Recent Incidents Affecting Regulations

- 1999 Gasoline pipeline explosion with 3 fatalities in Bellingham, WA
    - 2001 Integrity Management Rule for Liquid Lines

- 2000 Gas pipeline explosion with 11 fatalities in Carlsbad, NM
    - 2003 Integrity Management Rule for Gas Transmission pipelines

Bellingham, WA



U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Carlsbad, NM

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Carlsbad, NM

Recent Incidents Affecting Regulations

- July 2010 Enbridge rupture and release, Marshall, MI.
  - Accident / Incident reporting time.

- Sept. 2010 PGE Transmission pipeline rupture and fire, San Bruno, CA.
  - Verification of MAOP/MOP records.
  - Testing of untested gas pipelines.

Recent Incidents

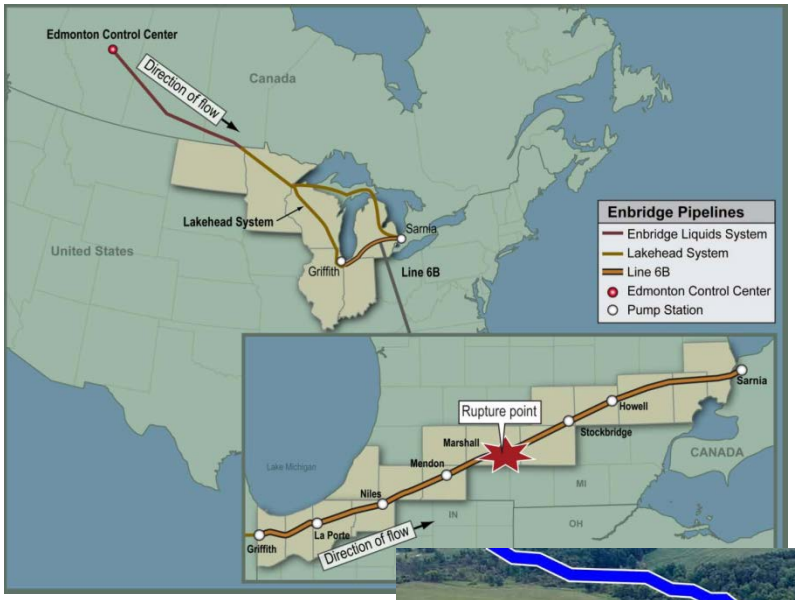
- Allentown, PA 2011
- Philadelphia, PA 2011

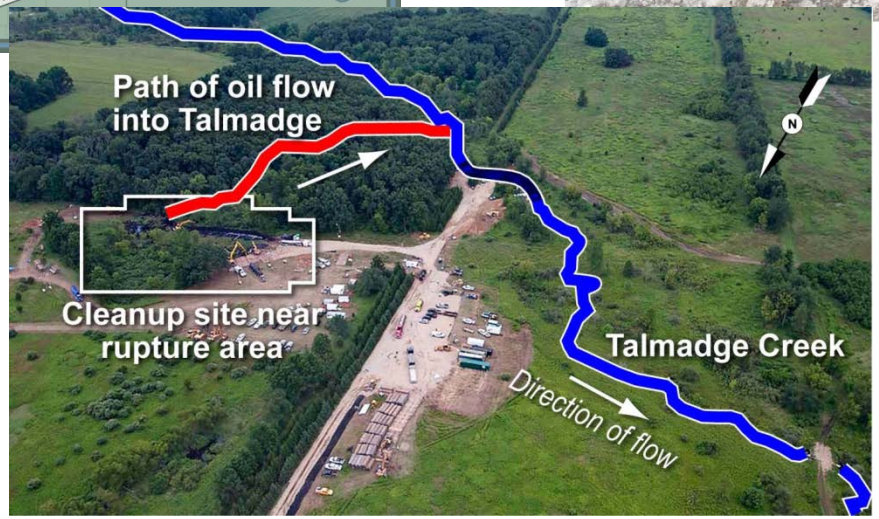
  - Both involved cast iron
  - Replacement and review of replacement programs

Recent Incidents Affecting Regulations

- July 2011 Silvertip pipeline failure, Yellowstone River, Laurel, Montana.
  - Study for depth of cover over pipelines crossing inland bodies of water.
  - May lead to legislative action depth of cover is determined to be a determining factor in hazardous liquid accidents.

Enbridge, Marshall, MI.



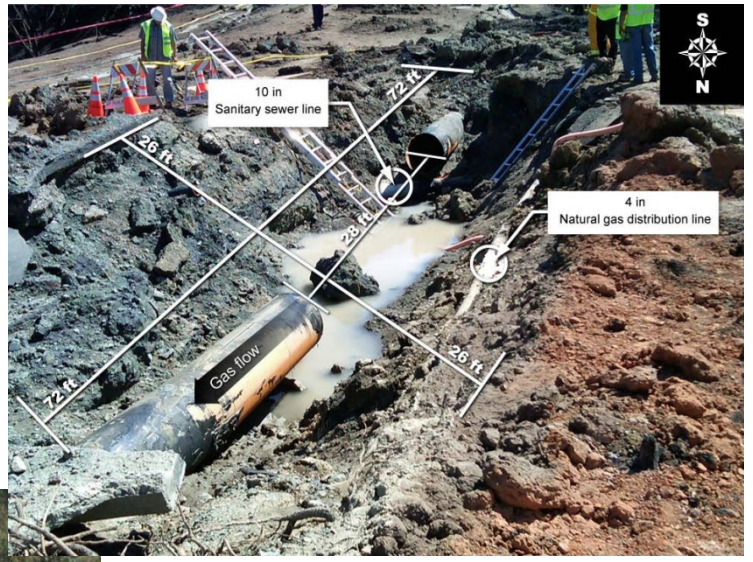


U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

PG&E, San Bruno, CA.

PG&E, San Bruno, CA.



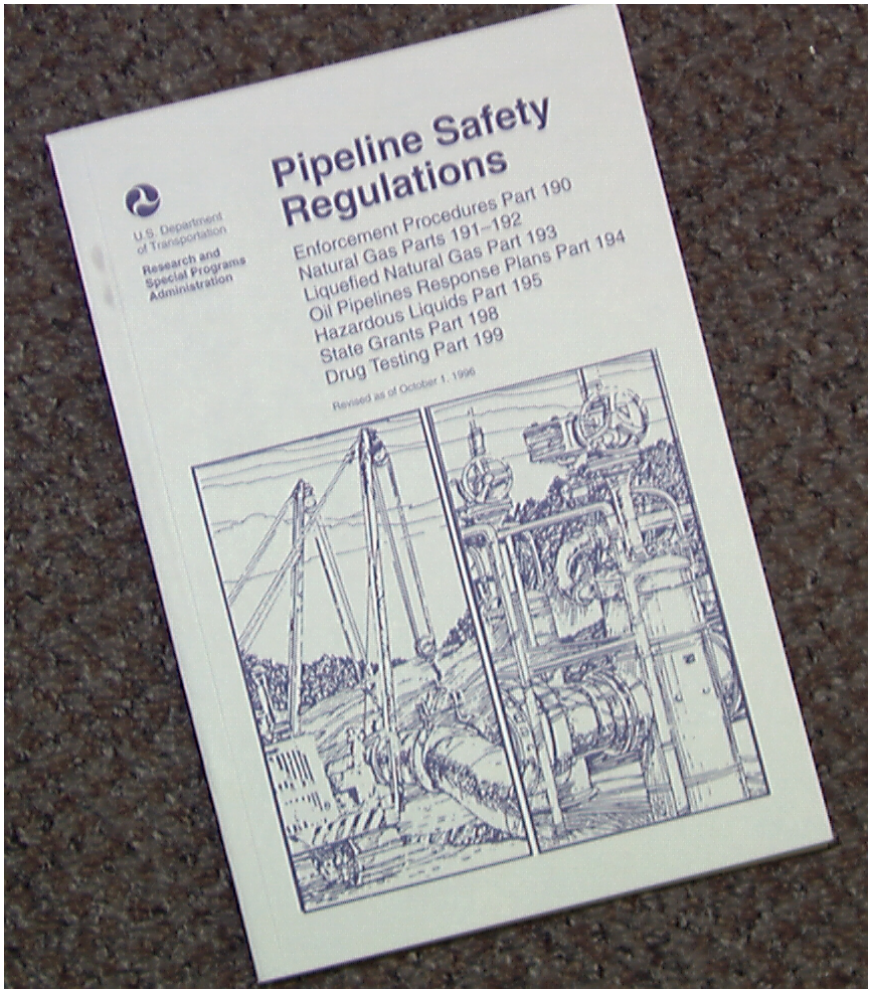
U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Pipeline Safety Acts

The Acts authorize the Secretary of Transportation to prescribe safety standards for the transportation of gas and hazardous liquids.

Regulations from the Acts



Creating a Regulation

- Congress grants authority to DOT
- PHMSA designated agency to create and enforce regulation
- Need for regulation
  - Congressional mandate
  - OPS identifies need
  - National Transportation Safety Board (NTSB) recommendation
  - Request from industry/NAPSR/public
  - TPSSC/HLPSSC recommendation

Creating a Regulation

- Published in Federal Register

- Docket Management System http://www.regulations.gov
  - ANPRM
  - NPRM
    - OPS review/TPSSC/HLPSSC
  - Public Meetings
  - Comment period
  - Final rule

Read the comments and preambles!!!!

Oil Pollution and the Environment

- Oil Pollution Act of 1990
  - Requires operators to prepare plans for oil spill response
    - 49 CFR 194 implemented January 1993
      - Final rule, 2/23/05, eff. 3/25/05

- Pipeline Safety Act of 1992 added *"and the protection of the environment"*, to the law.

Oil Pollution and the Environment

Recodification

- Natural Gas Pipeline Safety Act of 1968, as amended, and

- Hazardous Liquid Pipeline Safety Act of 1979, as amended

(Recodified as US Code Chapter 601 in 1994)

Pipeline Safety Law Updates (Reauthorizations)

- Pipeline Safety Improvement Act of 2002
- Pipeline Inspection, Protection, Enforcement and Safety Act of 2006
- Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011
- PIPES (Protecting our Infrastructure of Pipelines and Enhancing Safety) Act of 2016

PIPES (Protecting our Infrastructure of Pipelines and Enhancing Safety) Act of 2016

- Signed by the President on June 22, 2016

- Reauthorizes pipeline safety/PHMSA through FY 2019.

Key areas:

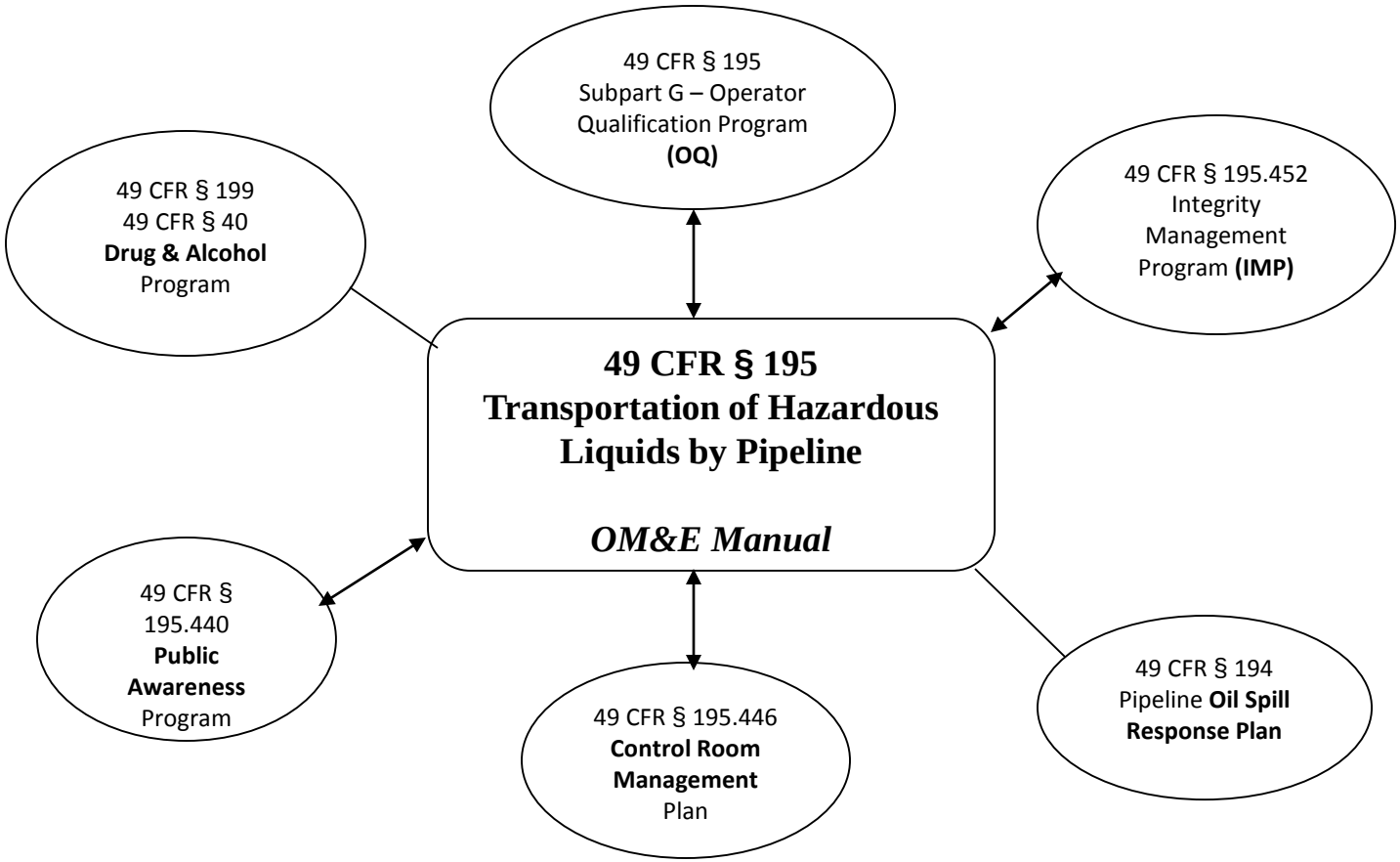
- Underground storage (Aliso Canyon leak – est. 4.62 Bcf lost 10/2015 to 2/2016)
- Emergency orders
- LNG – siting of small scale facilities
- Changes in hazardous liquids HCA definition
- 12 month assessment of certain hazardous liquid lines
- Operators receive timely information from PHMSA inspections
- Authorizes States to participate in PHMSA interstate inspections
- Reporting requirements for unfinished mandates

CFR Part 195
Pipeline Safety Overview

49 CFR 195

Hazardous Liquid Pipelines

Pipeline Safety – Hazardous Liquid Regulations



Scope of Pipeline Regulations

- “Cradle to Grave” safety requirements.
- Design.
- Construction.
- Training & Operator Qualification.
- Operations & Maintenance.
- Emergency Response.
- Integrity Management.
- Abandonment.
- Substance Abuse Prevention.

Regulatory Requirements Liquid vs. Gas

- Generally the same for liquid and gas pipelines.

- Liquid pipelines need to identify unusually sensitive areas:
  - Integrity management HCA.
  - Regulated rural gathering lines.
  - Low-stress pipelines in rural areas.

- Gas pipelines use Class Location for design, pressure testing, non-destructing testing, valve locations, leakage surveys, patrolling, odorization, burial depth, line marking, integrity management, internal inspection and HCAs

Major Regulatory Categories

- O&M Manual.
- Equipment Inspections.
- Integrity Management.
- ROW Surveillance.
- Damage Prevention.
- Corrosion Control.
- Training & OQ.
- Emergency Response.
- Substance Abuse Programs (D/A Testing).
- Records, Reporting.
- Public Awareness.
- Control Room Mgmt.
- MOP.

Compliance Documentation

- Documentation is required for all aspects of design, construction, operation, maintenance, testing, qualification and all regulated functions.

Structure of the Regulations

- Part – 49 CFR Part 195
- Subpart – Subpart A-H
- Section – 195.402 Procedural Manual
- Paragraph – 195.402(e) Emergencies
- Appendices

Amendments to Regulations

- Part 190 – 19
- Part 191 - 25
- Part 192 – 123
- Part 193 - 25
- Part 194 - 7
- Part 195 - 101
- Part 198 - 6
- Part 199 - 27
- Part 40 - 25

◆Numbers are approximate

Subpart A – General (overview)

Scope – which pipelines are covered by these regulations?

- Hazardous Liquid Pipelines.
- Highly Volatile Liquid (HVL) lines.
- Carbon Dioxide (CO2) pipelines.

Subpart B – Reporting (overview)

In general, what reporting is required?

- Annual Reporting.
- Accident Reporting.
- Safety-Related Conditions Reporting.
- Offshore pipeline condition & abandoned underwater facilities reports.

Subpart C – Design (overview)

- Design Formula for Pipe.
- Pipe & Components.
- External Loads.
- Passage of Internal Inspection Devices.

Subpart C – Design (overview)

- Fabricated Assemblies.
- Breakout Tanks.
- CPM Leak Detection.

Subpart D – Construction (overview)

- Inspection of Construction.
- Material Inspection.
- Pipe Bending.
- Welding.

Subpart D – Construction (overview)

- X-Ray of Girth Welds.
- Pipeline Cover & Clearance.
- Crossings of RR & Highway.
- Construction Records.

Subpart E – Pressure Testing (overview)

- Test Pressure.
- Testing Components.
- Testing Breakout Tanks.
- Test Medium.
- Testing Records Required.

Subpart F – Operation & Maintenance (overview)

Basically, you must have a written OM&E Manual that has procedures for:

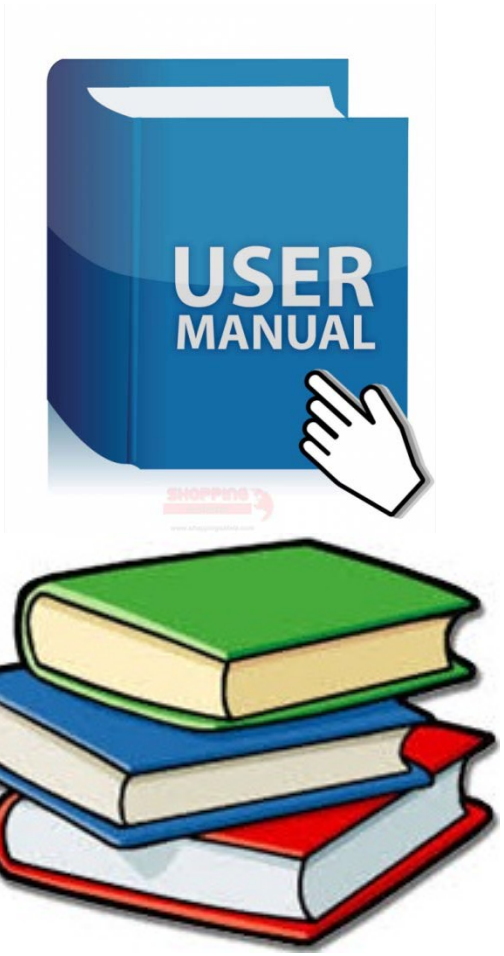
- Maintenance and Normal Operations.
- Abnormal Operations.
- Emergencies.

.

Subpart F - O&M Manual (overview)

- O&M Manual must be up to date and reviewed annually

- Must have procedures
  - Operating (Start-up, Shut-down, AOC);
  - Operations, maintenance, and repair;
  - Abandonment;
  - Liaison with fire, police, public officials.



Subpart F - Emergency Plans (overview)

- Written Plans.
- Prompt & Effective Response.
- Train Personnel & Evaluate Effectiveness.
- Coordination with Agencies.
- Controller procedures.

Subpart F – Inspections (overview)

- Emergency Valves.
- Overpressure Protection.
- Breakout Tanks.
- Corrosion related:
  - Required system monitoring.
  - Internal examinations for open piping systems.
  - Atmospheric external inspections.
  - Coupons in corrosive systems.
  - Cathodic protection potentials.
  - Exposed piping for external damage.

Subpart F - ROW Inspection (overview)

- Periodic inspections required.
- Rights-of-ways
  - Encroachment.
  - Landslides, washouts, unstable soil .
- Navigable waterway crossings.

Subpart F - Damage Prevention (overview)

- Must have a written program (195.442) to prevent damage from excavation activities:
  - Normal excavation, boring, blasting, tunneling, etc.
- Participate in One-call programs.
- Line location and marking procedures.
- Inspection of ROW.
- Inspection of pipelines.
- Pipeline Markers / Signs.

Public Awareness Program (overview) Subpart F

- Educate customers, public, government organizations, and excavators.
  - Recognize a pipeline emergency/hazardous conditions.

- Must reach all areas in which they operate.

Public Awareness Program (overview) Subpart F

- The Public Awareness Program was implemented (around 2006) to address the “3rd party dig in” component associated with accidents
- It is a major program in that it requires its own written plan. It also has its own DOT program inspection forms.
- The Public Awareness Program was developed to reduce pipeline damage from dig-ins by requiring operators to educate and communicate with the public, excavators, officials, etc.
- The program basically accomplishes this by requiring memberships in One-Call programs, public meetings, newspaper notifications, mail-outs, etc., making the public aware of the dangers.

.

Control Room Management (overview) Subpart F

- Procedures.
- Fatigue mitigation.
- Alarms.
- Training.

Control Room Management (overview) Subpart F

- The Control Room Management Program was implemented (around 2011) in response to past accidents associated with communication problems involving pipeline control.
- It is a major program in that it requires its own written plan. It also has its own DOT program inspection forms.
- The Control Room Management Program was developed to reduce the likelihood of accidents due to mis-communication, electronic equipment problems, controller fatigue, etc.
- The program basically accomplishes this by specifying roles during emergencies, equipment checks & alarm management.

Integrity Management (overview) Subpart F

- HCA identification.
- Assessments.
- Analysis.
- Remedial actions.
- Re-assessments.
- Preventive and mitigative measures.
- Measure effectiveness.

Integrity Management Program (overview) Subpart F

- IMP was implemented (around 2002) to address the “material defect” component associated with accidents, etc.
- It is a major program in that it requires its own written plan. It also has its own DOT program inspection forms.
- IMP was developed as a means of addressing the physical infrastructure problems of nation’s aging pipeline systems.
- IMP basically accomplishes this by requiring lines to be assessed by ILI (smart pig), hydro. test, or direct assessment.
- Repairs are required by this program on a specified schedule.

.

Subpart G – Operator Qualification

- OQ was implemented to address the “human error” component associated with accidents, etc.

- It is a major program in that it requires its own written plan. It also has its own DOT program inspection forms.

- OQ was developed as a means of ensuring that operations & maintenance personnel are knowledgeable, skilled and able to perform their specific “covered tasks” (job functions).

Subpart H – Corrosion Control

- Test leads must be installed at specified locations on the pipeline.
- Aboveground pipelines must be properly protected from corrosion (primer & paint, etc.).
- Pipelines must be protected against internal corrosion.

Subpart H – Corrosion Control

- Generally, newly installed buried pipelines must have cathodic protection within 1 year of construction.
- Underground lines must have effective external coating.
- Typically P/Ls are protected by impressed current or sacrificial anodes.

.

49 CFR 194 RESPONSE PLANS (FRP)

- This applies to onshore hazardous liquid pipelines.
- It is a major program in that it requires its own written plan. Plans must be submitted to PHMSA (prefer electronically).
- This program was developed to reduce the likelihood of, and damage caused by, hazardous liquid pipeline leaks.
- This is accomplished by requiring spill pre-planning within the operating companies as well as with OSROs and Federal & State agencies. The program requires training, spill response drills, and response equipment inspection and maintenance.

.

49 CFR 199 (and 49 CFR 40) Drug & Alcohol Testing

- This applies to hazardous liquid pipelines.
- It is a major program in that it requires its own written plan and has its own PHMSA inspection forms.
- The purpose of this program is to prevent drug and/or alcohol misuse in the workplace and to provide safety for the workers, the public, and the environment.
- This is accomplished by requiring pre-employment, post-accident, and random testing of personnel performing “covered functions” on the pipeline.

Pipeline Safety Overview

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Part 195 - Definitions

Retroactive Subparts and Key Definitions from 49 CFR 195

§ 195 Rules of Regulatory Construction

- (a) As used in this part:
  - "Includes" means "including but not limited to."
  - "May" means "is permitted to" or "is authorized to."
  - "May not" means "is not permitted to" or "is not authorized to."
  - "Shall" is used in the mandatory and imperative sense.

- (b) In this part:
  - (1) Words importing the singular include the plural;
  - (2) Words importing the plural include the singular; and,
  - (3) Words importing the masculine gender include the feminine.

§195.0 Scope.

- This part (Part 195) prescribes safety standards and reporting requirements for pipeline facilities used in the transportation of hazardous liquids or carbon dioxide.

§195 Grammar

- "And" means that paragraph and other paragraph(s) at the same level are to be considered all together.

- "Or" indicates any of several options, choices, or conditions.

AND

- (d) The operator's program must specifically include provisions to educate the public, appropriate government organizations, and persons engaged in excavation related activities on:
  - (1) Use of a one-call notification system prior to excavation and other damage prevention activities;
  - (2) Possible hazards associated with unintended releases from a gas pipeline facility;
  - (3) Physical indications that such a release may have occurred;
  - (4) Steps that should be taken for public safety in the event of a gas pipeline release; **and**
  - (5) Procedures for reporting such an event.

OR

- §195.503 Definitions.

- Abnormal operating condition means a condition identified by the operator that may indicate a malfunction of a component or deviation from normal operations that may:
  - (a) indicate a condition exceeding design limits; **or**
  - (b) result in a hazard(s) to persons, property, or the environment.

Impairs Serviceability

- Docket PS-96; Amdt 192-59
- …“impairs serviceability,” in light of the frequent use of this latter term in PHMSA’s pipeline safety standards to refer to damage that could adversely affect safe operations…
- …the phrase “impairs serviceability” is a suitable qualifier to describe pipeline damage that poses a hazard…

Practicable, Impracticable

- **Practicable**
  - capable of being done, effected, or put into practice, with the available means; feasible: a practicable solution.

- **Impracticable**
  - "Impracticable" means "impossible to carry out".

Retroactive Subparts 49 CFR 195

- OPS does not specifically identify retroactive* subparts in Part 195, but Part 192 can be used for guidance. Consider:
  - Subpart A – General.
  - Subpart B – Reporting.
  - Subpart E – Pressure Testing.
  - Subpart F – Operation and Maintenance.
  - Subpart H – Corrosion Control.

* - “Retroactive” means subpart is applicable to all pipelines, regardless of date of installation.

Types of Regulatory Language Used in Regulations

- **Specification (Prescriptive)**

Versus

- **Performance**

Specification Regulations ~ Example - §192.707(d)(1)

- (d) Marker warning. The following must be written legibly on a background of sharply contrasting color on each line marker:
  - (1) The word “Warning,” “Caution,” or “Danger” followed by the words “Gas (or name of gas transported) Pipeline” all of which, except for markers in heavily developed urban areas, must be in letters at least 1 inch (25 millimeters) high with 1/4 inch (6.4 millimeters) stroke.

Specification (Prescriptive) Regulations Advantages:

- Easy to Determine Compliance
- Easy to Determine a Course of Action
- Uniformity of Means of Compliance

Specification Regulations Disadvantages

- Do Not Specify Level of Safety
- Do Not Allow for Variations in Environment, Operating, or Physical Characteristics
- May Require Unnecessary Cost
- Do Not Encourage New Technology

Performance Regulations ~ Example - §195.410(a)(2)(i)

- (2) The marker must state *at least* the following on a background of sharply contrasting color:
  - (i) The word “Warning,” “Caution,” or “Danger” followed by the words “Petroleum (or the name of the hazardous liquid transported) Pipeline”, or “Carbon Dioxide Pipeline,” all of which, except for markers in heavily developed urban areas, must be in letters at least 1 inch (25 millimeters) high with an *approximate* stroke of $^{1}/_{4}$ inch (6.4 millimeters)

Performance Regulations Advantages

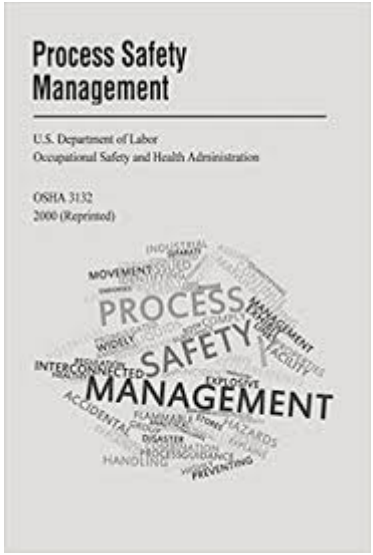
- Allow for Adaptation to an Individual Situation
- Encourage Development of New Equipment
- Allow Economical Solutions to Achieve the Desired Level of Safety
- Promote Safety and Not the Letter of the Law Compliance

Performance Regulations ~ Biggest Disadvantage

- Difficult to Determine What Is and What Is Not Compliance
- Leads to Conflicts with Inspectors

“Process”- Type Regulations
RECENT Initiatives ~ IM, OQ, PA, CRM

- “Common Threads”
  - Formal Written Program
  - Management Commitment & Support
  - Defined Roles & Responsibilities
  - Use of Industry Standards
  - Long-term vs. Short-term
  - Monitoring Progress
  - Periodic Formal Evaluation & Review
  - Management of Change
  - Continuous Improvement



§195.2 KEY Definitions.

Alarm

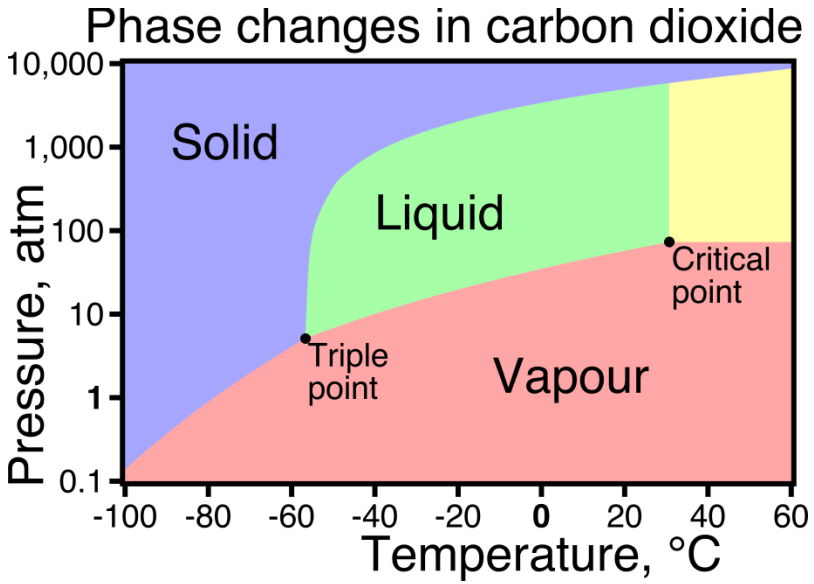
- Alarm means an audible or visible means of indicating to the controller that equipment or processes are outside operator-defined, safety-related parameters.

Breakout Tank

- Breakout tank means a tank used to (a) relieve surges in a hazardous liquid pipeline system or (b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation by pipeline.

Carbon Dioxide

- Carbon dioxide means a fluid consisting of more than 90 percent carbon dioxide molecules compressed to a supercritical state.
- T=31.1º C
- P= 74 atm



Computation Pipeline Monitoring (CPM)

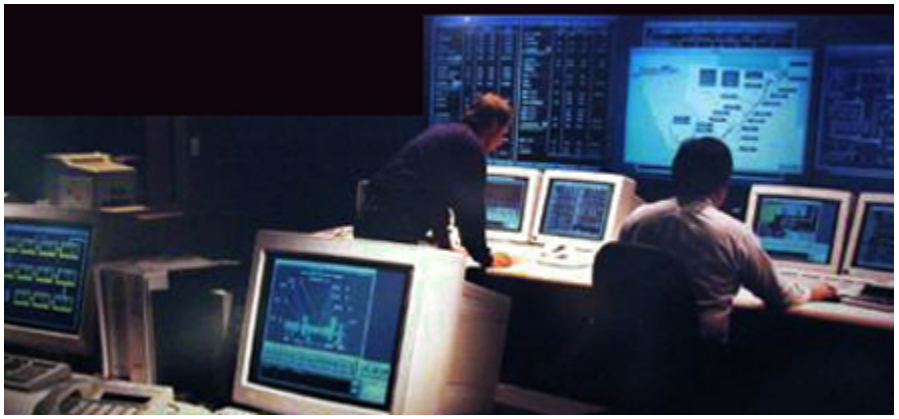
- Computation Pipeline Monitoring (CPM) means a software-based monitoring tool that alerts the pipeline dispatcher of a possible pipeline operating anomaly that may be indicative of a commodity release.

Control Room

- Control room means an operations center staffed by personnel charged with the responsibility for remotely monitoring and controlling a pipeline facility.

Controller

- Controller means a qualified individual who remotely monitors and controls the safety-related operations of a pipeline facility via a SCADA system from a control room, and who has operational authority and accountability for the remote operational functions of the pipeline facility.



Gathering Line

- Gathering line means a pipeline 219.1 mm (8 5/8 in) or less nominal outside diameter that transports petroleum from a production facility.

Hazardous Liquid

- Hazardous liquid means petroleum, petroleum products, anhydrous ammonia, **or ethanol**.

  (revised per Amdt. 195-100, March 31, 2015, 80FR12762)

In-Plant Piping Systems

- In-plant piping systems means piping that is located on the grounds of a plant and used to transfer hazardous liquid or carbon dioxide between plant facilities or between plant facilities and a pipeline or other mode of transportation, not including any device and associated piping that are necessary to control pressure in the pipeline under §195.406(b).

Line Section

- Line section means a continuous run of pipe between adjacent pressure pump stations, between a pressure pump station and terminal or breakout tanks, between a pressure pump station and a block valve, or between adjacent block valves.

Low Stress Pipeline

- Low stress pipeline means a hazardous liquid pipeline that is operated in its entirety at a stress level of 20 percent or less of the specified minimum yield strength (SMYS) of the line pipe.

Maximum Operating Pressure

- Maximum Operating Pressure (MOP) means the maximum pressure at which a pipeline or segment of a pipeline may be normally operated under this part.

- (Part 195 definition only)

Operator

- Operator means a person who owns or operates pipeline facilities.

Person

- Person means any individual, firm, joint venture, partnership, corporation, association, State, municipality, cooperative association, or joint stock association, and includes any trustee, receiver, assignee, or personal representative thereof.

Petroleum

- Petroleum means crude oil, condensate, natural gasoline, natural gas liquids, and liquefied petroleum gas.

Petroleum Product

- Petroleum product means flammable, toxic, or corrosive products obtained from distilling and processing of crude oil, unfinished oils, natural gas liquids, blend stocks and other miscellaneous hydrocarbon compounds.

Pipe or Line Pipe

- Pipe or line pipe means a tube, usually cylindrical, through which a hazardous liquid or carbon dioxide flows from one point to another.

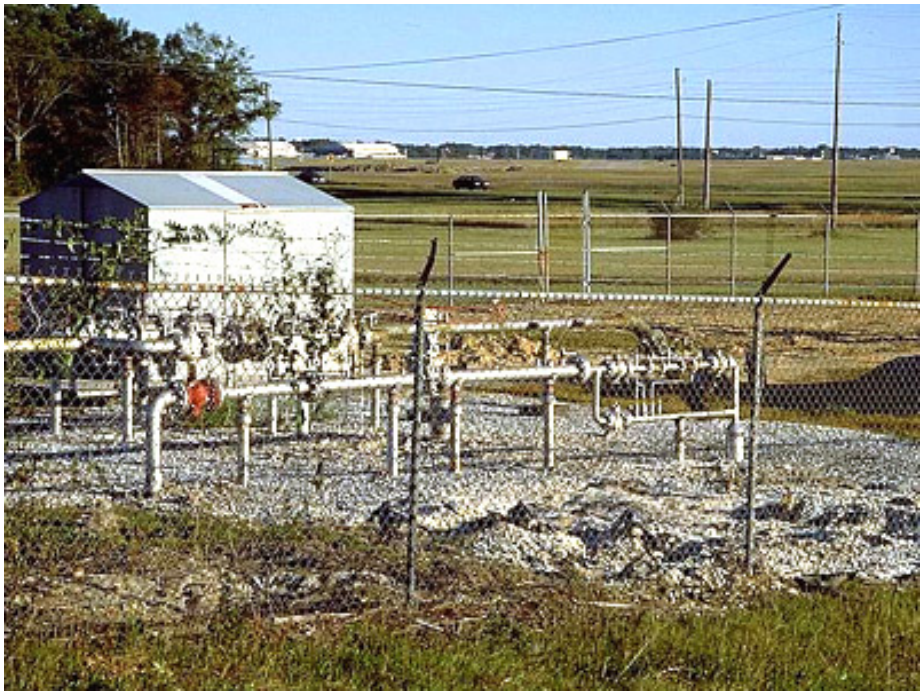
Pipeline or Pipeline System

Pipeline or pipeline system means all parts of a pipeline facility through which a hazardous liquid or carbon dioxide moves in transportation, including, but not limited to,

- line pipe, valves and other appurtenances connected to line pipe,
- pumping units, fabricated assemblies associated with pumping units,
- metering and delivery stations and fabricated assemblies therein, and breakout tanks.

Pipeline Facility

- Pipeline facility means new and existing pipe, rights-of-way, and any equipment, facility, or building used in the transportation of hazardous liquids or carbon dioxide.



Production Facility

Production facility means piping or equipment used in the production, extraction, recovery, lifting, stabilization, separation or treating of petroleum or carbon dioxide, or associated storage or measurement.

(To be a production facility under this definition, piping or equipment must be used in the process of extracting petroleum or carbon dioxide from the ground or from facilities where carbon dioxide is produced, and preparing it for transportation by pipeline. This includes piping between treatment plants which extract carbon dioxide, and facilities utilized for the injection of carbon dioxide for recovery operations.)

Rural Area

- Rural area means outside the limits of any incorporated or unincorporated city, town, village, or any other designated residential or commercial area such as a subdivision, a business or shopping center, or community development.

Specified Minimum Yield Strength (SMYS)

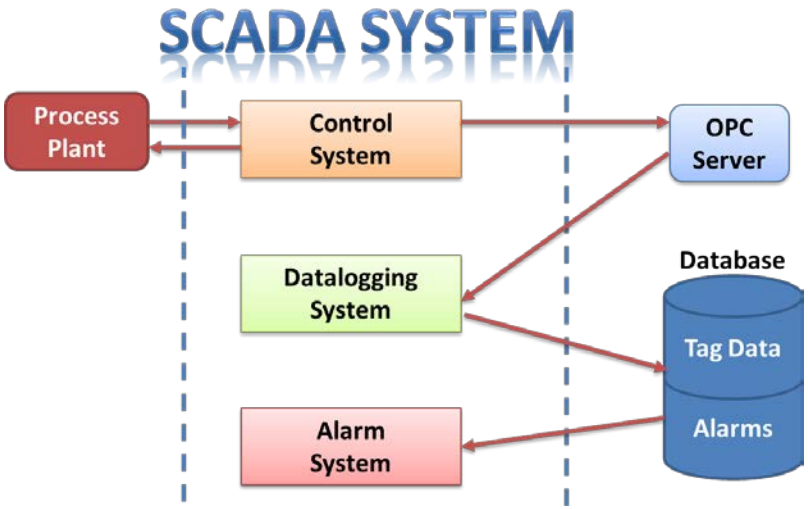
- Specified minimum yield strength means the minimum yield strength, expressed in p.s.i. (kPa) gage, prescribed by the specification under which the material is purchased from the manufacturer.

Stress Level

- Stress level means the level of tangential or hoop stress, usually expressed as a percentage of specified minimum yield strength.

Supervisory Control and Data Acquisition (SCADA) System

- Supervisory Control and Data Acquisition (SCADA) system means a computer-based system or systems used by a controller in a control room that collects and displays information about a pipeline facility and may have the ability to send commands back to the pipeline facility.



Surge Pressure

- Surge pressure means pressure produced by a change in velocity of the moving stream that results from shutting down a pump station or pumping unit, closure of a valve, or any other blockage of the moving stream.

Welder

- Welder means a person who operates machine or automatic welding equipment.

(revised per Amdt. 195-100, March 31, 2015, 80FR12762)

Welder Operator

- Welder operator means a person who performs manual or semi-automatic welding.

(revised per Amdt. 195-100, March 31, 2015, 80FR12762)

§195.3 Incorporation by Reference

- Incorporate by reference all or portions of over 60 consensus standards and specifications for the design, construction, and operation of pipeline facilities.

  - Pipeline Research Council International, Inc. (PRCI).
  - American Petroleum Institute (API).
  - ASME International (ASME).
  - Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. (MSS).
  - American Society for Testing and Materials (ASTM).
  - National Fire Protection Association (NFPA).
  - NACE International (NACE).

Incorporation by Reference

- Any documents or portions thereof incorporated by reference in this part (195) are included in this part as though set out in full. When only a portion of a document is referenced, the remainder is not incorporated in this part.

- Operators must use the currently referenced documents IBR.

- IBR is not retroactive, unless system is “replaced, relocated, or otherwise changed.”

§195.4 Compatibility

- No person may transport any hazardous liquid or carbon dioxide unless the hazardous liquid or carbon dioxide is chemically compatible with both the pipeline, including all components, and any other commodity that it may come into contact with while in the pipeline.

§195.5 Conversion to Service Subject to this part.

- Written procedures required.
  - Review of design, construction, operation and maintenance history.
  - Inspection of ROW.
  - Unsafe conditions and defects corrected.
  - Tested under Subpart E.
- Corrosion control within 12 months.
- Records of investigations, tests, repairs, replacements and alterations for life of pipeline.

§195.8 Transportation…other than Steel Pipe

- Must notify PHMSA 90 days before transportation is to begin.
- Name of product transported, properties, material of pipeline.
- Administrator can order the person not to transport if considered unduly hazardous.

§195.9 Outer Continental Shelf (OCS) Pipelines

- Operators of transportation pipelines on the OCS must identify the specific points on their pipeline where operating responsibility transfers to a producing operator.

- If it is not practicable to durably mark a transfer point, located above water, operator must depict the transfer point on a schematic maintained near transfer point.

- If subsea transfer point, depict on schematic, maintain at nearest upstream facility and provide to PHMSA upon request.

§195.10 Responsibility of Operator for Compliance with this Part.

- An operator may make arrangements with another person for the performance of any action required by this part. However, the operator is not thereby relieved from the responsibility for compliance with any requirement of this part.

Operator Compliance ~ Section 60118 of NGPSA

- Operator shall:
  - Comply with Applicable Safety Standards
  - Prepare and Follow an Operations & Maintenance Plan
  - Maintain Records Required by the Safety Standards

Understanding Inspection Intervals

- …at intervals not exceeding 15 months, but at least once each calendar year
- …at intervals not exceeding 7½ months, but at least twice each calendar year
- …at intervals not exceeding 4½ months, but at least four times each calendar year

Once Each Calendar Year, NTE 15 Months

May	Jun	Jul	Aug
Sep	Mar	Nov	Dec
Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Mar	Nov	Dec
Jan	Feb	Mar	Apr

Once Each Calendar Year, NTE 15 Months

May	Jun	Jul	Aug
Sep	Oct	Nov	Dec
Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec
Jan	Feb	Mar	Apr

2 Times per Calendar Year, NTE 7-1/2 Months

May	Jun	Jul	Aug
Sep	Oct	Nov	Dec
Jan #1	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep #2	Oct	Nov	Dec
Jan	Feb	Mar	Apr

2 Times per Calendar Year, NTE 7-1/2 Months

May	Jun	Jul	Aug
Sep	Oct	Nov	Dec
Jan	Feb	Mar	Apr
May	Jun #1	Jul	Aug
Sep	Oct	Nov	Dec #2
Jan	Feb	Mar	Apr

Questions

Subpart C - Design Requirements

49 CFR Part 195 - Transportation of Hazardous Liquids by Pipeline

§195.100 Scope.

- This subpart prescribes minimum design requirements for new pipeline systems constructed with steel pipe and for relocating, replacing, or otherwise changing existing systems constructed with steel pipe. However, it does not apply to the movement of line pipe covered by §195.424.

Components, Temperature

- §195.101 Qualifying metallic components other than pipe.
  - Manufactured according to referenced standard or earlier version if:
    - ❑ No defects to impair strength or tightness.
    - ❑ Earlier standard equal or more stringent for testing, materials, pressure and temperature ratings.

- §195.102 Design temperature.
  - Components must be chosen for temperature environment.
  - CO2 components suitable for low temperature.

§195.104 Variations in Pressure.

- If, within a pipeline system, two or more components are to be connected at a place where one will operate at a higher pressure than another, the system must be designed so that any component operating at the lower pressure will not be overstressed.

Basic Pipeline Design

We will start with pipe design parameters, understanding that MAOP or MOP will be the ultimate consideration:

"Maximum Allowable Operating Pressure" means the maximum pressure at which a gas pipeline or segment of a pipeline may be operated in accordance with federal regulations.

“Maximum Operating Pressure” is similar for liquid pipelines.

Barlow's Hoop Stress Formula for Steel Pipe

P = (2St/D), *Where:*

P = Design Pressure
S = Yield Strength
D = Outside Diameter
t = Wall Thickness

Barlow's Hoop Stress Formula for Steel Pipe

P = (2St/D), ***That is:***

P = Equivalent Design Pressure that results in 100% yield of pipe, psi;

S = SMYS= Specified Minimum Yield Strength of Pipe, psi;

D = Actual Outside Diameter of Pipe, inches (as opposed to Nominal Pipe Diameter);

t = Nominal Wall Thickness of Pipe

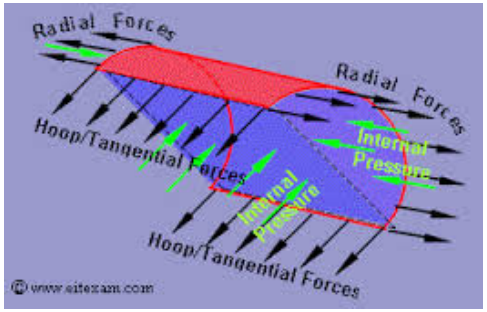
Barlow's Hoop Stress Formula for Steel Pipe

$$P = (2St/D)$$

P = Equivalent Design Pressure that results in 100% yield of pipe by hoop stress, psi;

- What is Hoop Stress?

  Hoop stress is a stress in a pipe wall. It is represented by the forces inside the cylinder acting towards the circumference perpendicular to the length of the pipe



Barlow's Hoop Stress Formula for Steel Pipe

$$P = (2St/D)$$

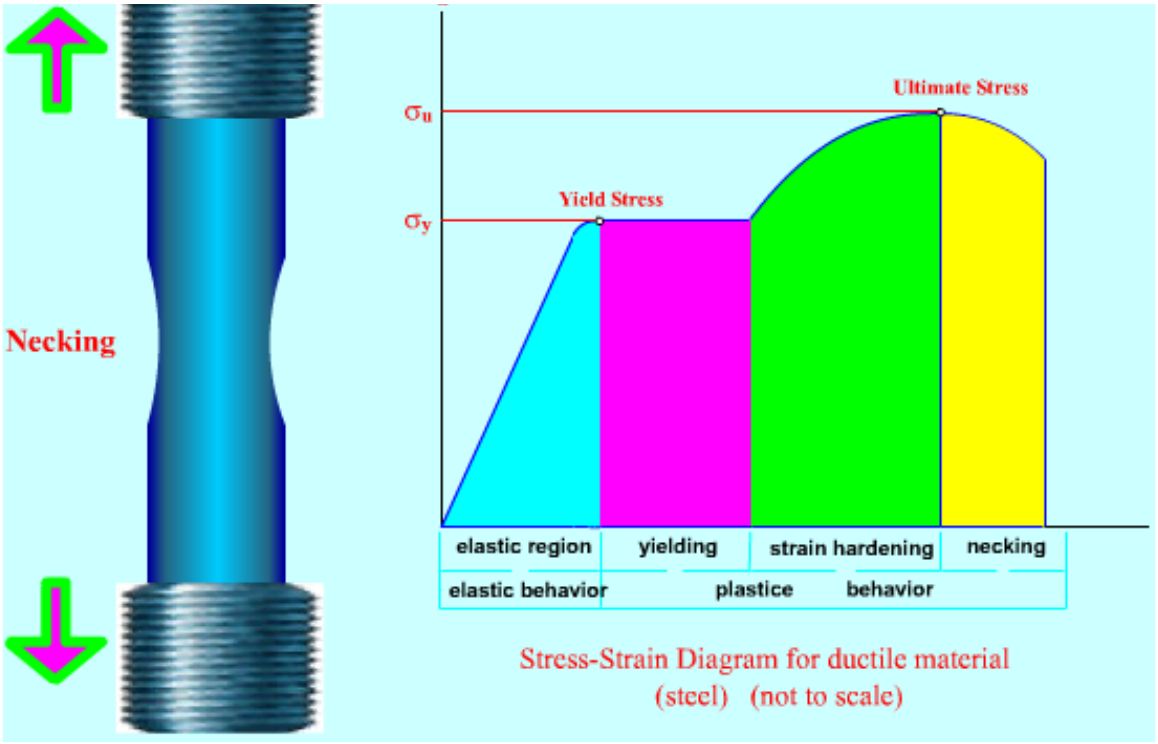
S = SMYS= Specified Minimum Yield Strength of pipe as specified by customer and provided by manufacturer, psi; ex., API 5LX-42 thru 5LX-80

Specification	Allowable Stress (psi)*	SMYS (psi)	Poisson Ratio	Density (lb/ft^3)	Modulus Elasty (10^6psi)
API 5L X42	20.000	42.000	0.3	489	29.5000
API 5L X46	21.000	46.000	0.3	489	29.5000
API 5L X52	22.000	52.000	0.3	489	29.5000
API 5L X56	23.700	56.000	0.3	489	29.5000
API 5L X60	25.000	60.000	0.3	489	29.5000
API 5L X65	25.700	65.000	0.3	489	29.5000
API 5L X70	27.300	70.000	0.3	489	29.5000
API 5L X80	30.000	80.000	0.3	489	29.5000

* Based on Code ASME B31.3

Specified Minimum Yield Strength

Yield Strength (YS): is the strength at which a material exhibits a specified limiting permanent set or produces a specified total elongation under load.



Barlow's Hoop Stress Formula for Steel Pipe

$$P = (2St/D)$$

D = Actual Outside Diameter of Pipe, inches (as Opposed to Nominal Pipe Diameter);

1. For pipe < 14 inches nom. O.D, actual diameter is > nominal O.D.; examples, 6" nom. O.D. = 6.625" actual O.D.; 12" nom. O.D. = 12.75" actual O.D.

2. For pipe ≥ 14 inches nom. O.D., actual O.D. and nominal O.D. are the same; example, 24" nom. O.D. = 24" actual O.D.

Barlow's Hoop Stress Formula for Steel Pipe

$$P = (2St/D)$$

t = Nominal Wall Thickness of Pipe

Note – pipe is manufactured/ordered with a specified nominal wall thickness with a given tolerance; actual w. t. is usually thicker than nominal w. t. if measured with a micrometer or U. T. gauge.

Barlow's Hoop Stress Formula for Steel Pipe

Let's do an example:

P = (2St/D), *pipe specs are:*

P = Design Pressure = ????
Pipe is API 5L X42
Nominal O. D. = 12 in.
Nominal W. T. = 0.250 in.

Barlow's Hoop Stress Formula for Steel Pipe

P = (2St/D)

P = (2 x 42,000 psi x 0.25 in.) / 12.75 in. = **1,647 psi**

= Equivalent Pressure at 100% Yield

How to Calculate MOP (or OP) as % of SMYS

P=2St/D

STEP 1: Calculate P value that represents 100% stress level "S."

S = Specified Minimum Yield Strength (SMYS).

D = Nominal outside diameter of the pipe in inches.

t = Nominal wall thickness of the pipe in inches.

STEP 2: Divide the MOP (or the operating pressure, OP) by the value calculated for P and multiply by 100.

$$\%SMYS = (MOP/P)(100)$$

% SMYS (Example Calculation)

P=2St/D

MOP (liquid) = 500 psig

D = Nominal outside diameter = 12.75 inches

t = Nominal wall thickness = 0.375 inches

Pipe Grade is X-56, S=SMYS = 56,000 psig

P @ 100% SMYS = 2(56,000)(0.375)/12.75

= 3294 psi

MOP as % SMYS = 500/3294 x 100 = 15%

How to Calculate % SMYS (Alternate Method)

S = DP/2t

STEP 1: Calculate stress level "S" by using the following:

D = Nominal outside diameter of the pipe in inches.

Here, P= MOP (liquids) or MAOP (gas) in psig.

t = Nominal wall thickness of the pipe in inches.

STEP 2: Divide the calculated stress "S" by the material's yield strength "YS" and multiply by 100.

%SMYS = (S/YS)(100)

% SMYS (Alternate Example Calculation)

S = DP/2t

D = Nominal outside diameter = 12.75 inches

P = MOP (liquid) = 500 psig

t = Nominal wall thickness = 0.375 inches

Pipe Grade is X-56, YS = 56,000 psig

S = (12.75)(500)/(2)(0.375) = 8,500 psig

%SMYS = (S/Y)(100) = (8,500/56,000)(100)

MOP as %SMYS = 15%

Code Design Formula for Steel Pipe

- When designing a pipeline, we can't apply Barlow's Formula as derived.
- We must reduce the pressure calculation by applying safety, or derating, factors as shown on the next slide.

§195.106 Internal Design Pressure.

$$P = (2\ St/D) \times E \times F$$

P = Design Pressure
S = Yield Strength
D = Outside Diameter
t = Wall Thickness
E = Longitudinal joint factor
F = Design factor

Code Design Formula for Steel Pipe

- For today's pipe, E is usually not a factor, so it would equal 1 (one).
- For hazardous liquid pipelines the F design factor is 0.72 for onshore pipelines; 0.60 for pipelines offshore or in navigable waterways; or 0.54 for cold expansion pipe that is heated.

§195.106 Internal Design Pressure (Example)

P = (2 St/D) x E x F

Given:

S = Yield strength (SMYS) = 42,000 psig

t = Nominal wall thickness = 0.375 inch

D = Nominal outside diameter = 14 inches

E = Seamless pipe = 1.0

F = Design factor = 0.72

Solve for: P = Internal Design Pressure.

P = {(2 x 42,000 x 0.375)/14} x 1.0 x 0.72 = **1,620 psig**

External Pressure, Loads, Fracture Propagation

- **§195.108 External Pressure**.
  - Any external pressure that will be exerted on the pipe must be provided for in designing a pipeline system.

- **§195.110 External Loads**.
  - (a) Anticipated external loads (e.g.) earthquakes, vibration, thermal expansion, contraction must be provided for in design.
  - (b) Supports must not cause excess localized stress. Stress from attachments must computed and compensated for.

- **§195.111 Fracture Propagation**.
  - A carbon dioxide pipeline system must be designed to mitigate the effects of fracture propagation.

Pipe

- §**195.112 New pipe.**
  - Steel able to withstand internal pressures and external loads.
  - Made in accordance with a written specification.
  - Marked with specification, SMYS or grade and size. Must be visible until installed.

- **§195.114 Used pipe.**
  - Made to a known specification.
  - No buckles, cracks, grooves, gouges, dents, surface defects exceeding specification.
  - Corroded areas, wall thickness less than specification.

§195.116 Valves

- Sound engineering design.
- Compatible with pipe/fittings.
- Compatible materials.
- Test according to API 6D.
- Position indicator.

§195.116 Valves

- Marked.
  - ❑ Manufacturer name, class or max. working pressure, material, size.

  Generally, older pipeline valves (pre-1988) are rated as:
  - ANSI 300 valve is rated for 720 psig operation.
  - ANSI 600 valve is rated for 1,440 psig operation.
  - ANSI 900 valve is rated for 2,160 psig operation.

* After 1988 the ratings may be higher…
  - ANSI 300 ……..740 psig
  - ANSI 600……1,480 psig
  - ANSI 900……2,220 psig

*Need to be aware of which specification (version & date) your particular valve was manufactured/tested under & go by that.

ANSI Flange Ratings

ANSI Class	Old Rating	Current Rating
150	275 psi	285 psi
300	720 psi	740 psi
400	960 psi	985 psi
600	1440 psi	1480 psi
900	2160 psi	2220 psi

§195.118 Fittings

- Butt welding fittings marked and meet requirements of ASME B16.9 or MSS SP-75.

- No buckles, dents, cracks, gouges, defects that might reduce strength.

§195.120 Passage of Internal Inspection Devices

- New pipeline and line section where line pipe, valve, fitting or component is replaced must be designed and constructed for passage of instrumented internal inspection devices.

- Not applicable to manifolds, station piping, tank farms or storage facilities, cross-overs, pipe size where no tool available, some offshore or other where designated.

§195.120 Passage of Internal Inspection Devices

- Exception.
  - Emergencies, construction time constraints or unforeseen construction problems.
  - Document why impractical to comply.
  - Within 30 days petition Administrator approval.
  - If petition denied must modify within 1 year.

Components

- §195.122 Fabricated branch connections – may not reduce strength.
- §195.124 Closures – comply with ASME BPV code.
- §195.126 Flange connection –compatible with other components and suitable for service.
- §195.128 Station piping – must meet the applicable requirements of this subpart.
- §195.130 Fabricated assemblies – meet requirements of this subpart.

Rural Gathering & Low-Stress Pipelines

49 CFR Part §195.1 Which pipelines are covered by this Part?

§195.1 (a) Covered. Except for the pipelines listed in paragraph (b) of this Section, this part applies to pipeline facilities and **the transportation of hazardous liquids or carbon dioxide** associated with those facilities in or affecting interstate or foreign commerce, including pipeline facilities on the Outer Continental Shelf. Covered pipelines include, but are not limited to:

(1) Any pipeline that transports a highly volatile liquid;

(2) Any pipeline segment that crosses a waterway currently used for commercial navigation;

(3) Except for a gathering line not covered by paragraph (a)(4) of this Section, any pipeline located in a rural or non-rural area of any diameter regardless of operating pressure;

49 CFR Part §195.1 Which pipelines are covered by this Part?

(4) Any of the following **onshore gathering lines** used for transportation of petroleum:

(i) A pipeline located in a non-rural area;

(ii) A regulated rural gathering line as provided in §195.11; or

(iii) A pipeline located in an inlet of the Gulf of Mexico as provided in §195.413.

49 CFR Part §195.1 Which pipelines are covered by this Part?

§195.1 (b) *Excepted.* This Part **does not apply** to any of the following:

(1) Transportation of a hazardous liquid transported in a gaseous state;

(2) Transportation of a hazardous liquid through a pipeline by gravity;

(3) Transportation of a hazardous liquid through any of the following **low-stress pipelines**:

(i) A pipeline subject to safety regulations of the U.S. Coast Guard; or

(ii) A pipeline that serves refining, manufacturing, or truck, rail, or vessel terminal facilities, if the pipeline is less than one mile long (measured outside facility grounds) and does not cross an offshore area or a waterway currently used for commercial navigation;

49 CFR Part §195.1 Which pipelines are covered by this Part?

§195.1 (b) *Excepted.* This Part **does not apply** to any of the following:

(4) Transportation of petroleum through an onshore rural gathering line that does not meet the definition of a "regulated rural gathering line" as provided in §195.11. This exception does not apply to gathering lines in the inlets of the Gulf of Mexico subject to §195.413;

§ 195.11 What is a regulated rural gathering line and what requirements apply?

Each operator of a regulated rural gathering line, as defined in paragraph (a) of this section, must comply with the safety requirements described in paragraph (b) of this section.

Note: Added by Final Rule - Federal Register: June 3, 2008 (Volume 73, Number 107, page 31634). This amendment also addressed low-stress pipelines.

Regulated Rural Gathering Line

(a) *Definition*. …means an onshore gathering line in a rural area that meets **all** of the following criteria:

- (1) Has a nominal diameter from 6-5/8 inches (168 mm) to 8-5/8 inches (219.1 mm).
- (2) Is located in or within one-quarter mile (.40 km) of an unusually sensitive area as defined in §195.6.
- (3) Operates at a maximum pressure established under §195.406 corresponding to-
  - (i) A stress level greater than 20-percent of the specified minimum yield strength of the line pipe; or
  - (ii) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure of more than 125 psi (861 kPa) gage.

Safety Requirements - §195.11(b)

Operator must have written procedures to comply with:

1) Identify segments by April 3, 2009.

2) After July 3, 2009, design, install, construct, inspect, test according to this part.

3) For non-steel pipelines built after 7/3/09, notify the Administrator according to §195.8.

Safety Requirements - §195.11(b)

Operator must have written procedures to comply with:

4) Comply with reporting requirements (195 Subpart B)

5) Establish MOP according to §195.406.

6) Install & maintain line markers (§195.410).

7) Establish continuing public education program, (Public Awareness, §195.440).

Safety Requirements - §195.11(b)

Operator must have written procedures to comply with:

8) Establish Damage prevention Program (§195.442).

9) Comply with 195 Subpart H – Corrosion Control.

10) Prevent & mitigate internal corrosion…

11) Operator Qualification requirements (§195.505).

§195.11 Regulated rural gathering lines

New Unusually Sensitive Areas 195.11(c)

- If new USA is identified, and a segment of pipeline becomes regulated as a result, then operator must comply with Safety Requirements in §195.11(b) within 6 months.

(some exceptions for corrosion control compliance dates)

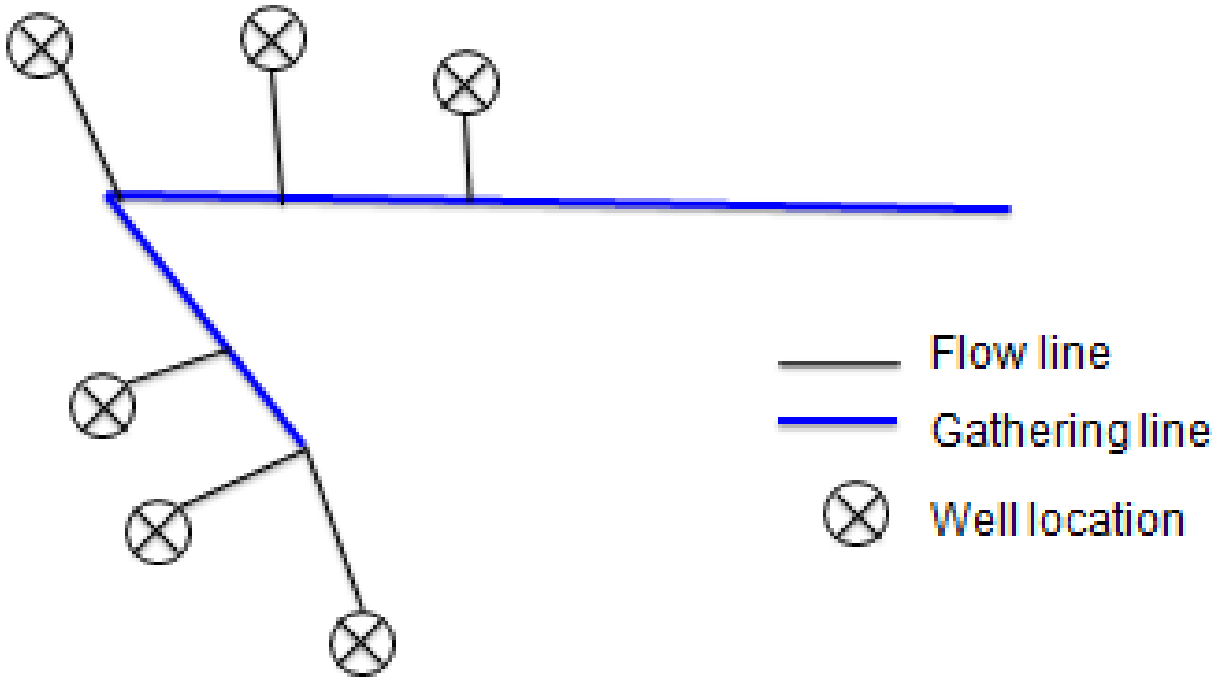
Record Retention §195.11(d)

- Operator must maintain records demonstrating compliance.

Rural Gathering

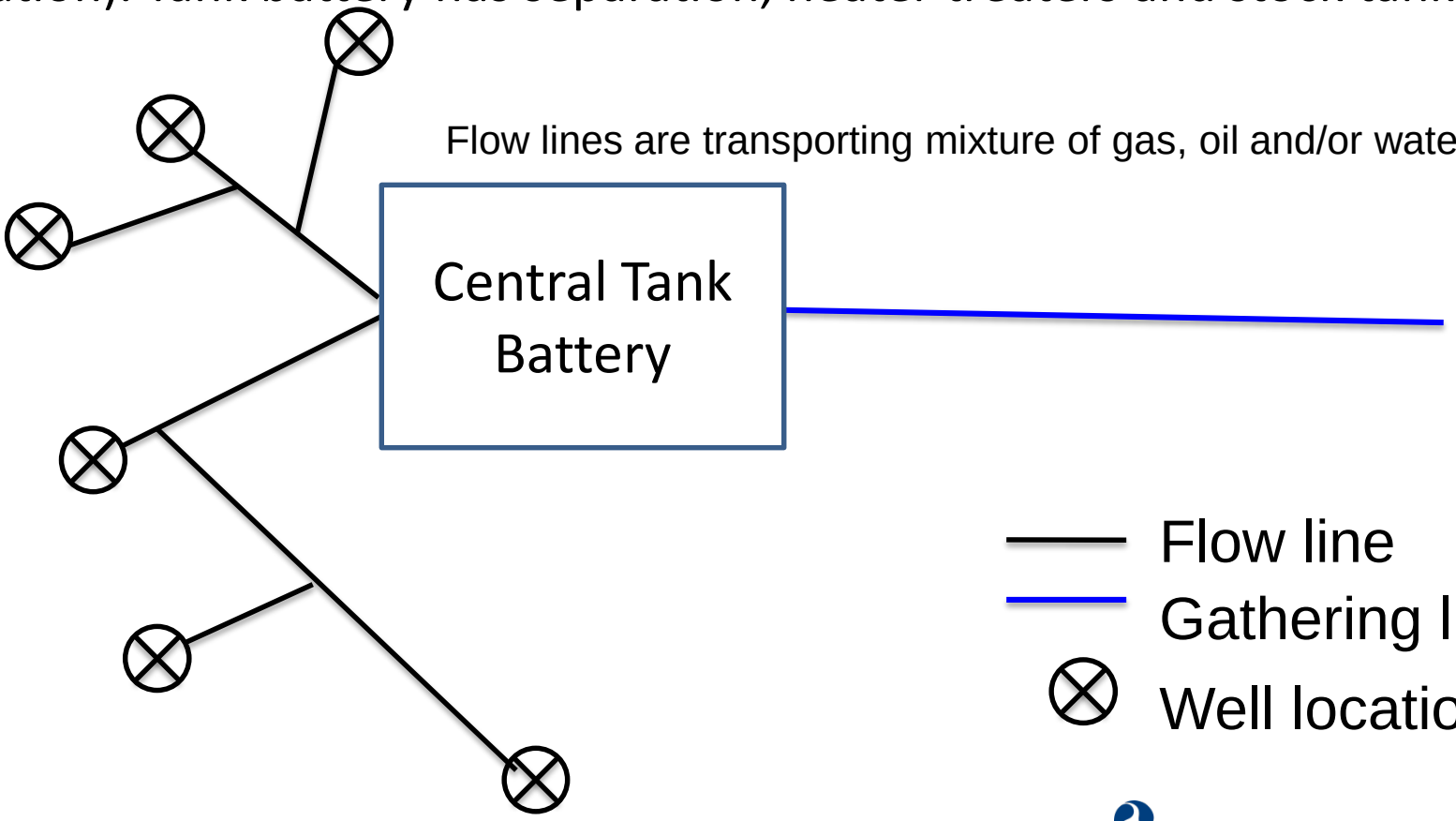
End of production (not official)

Wells have separation, heater treaters and stock tanks.



End of production

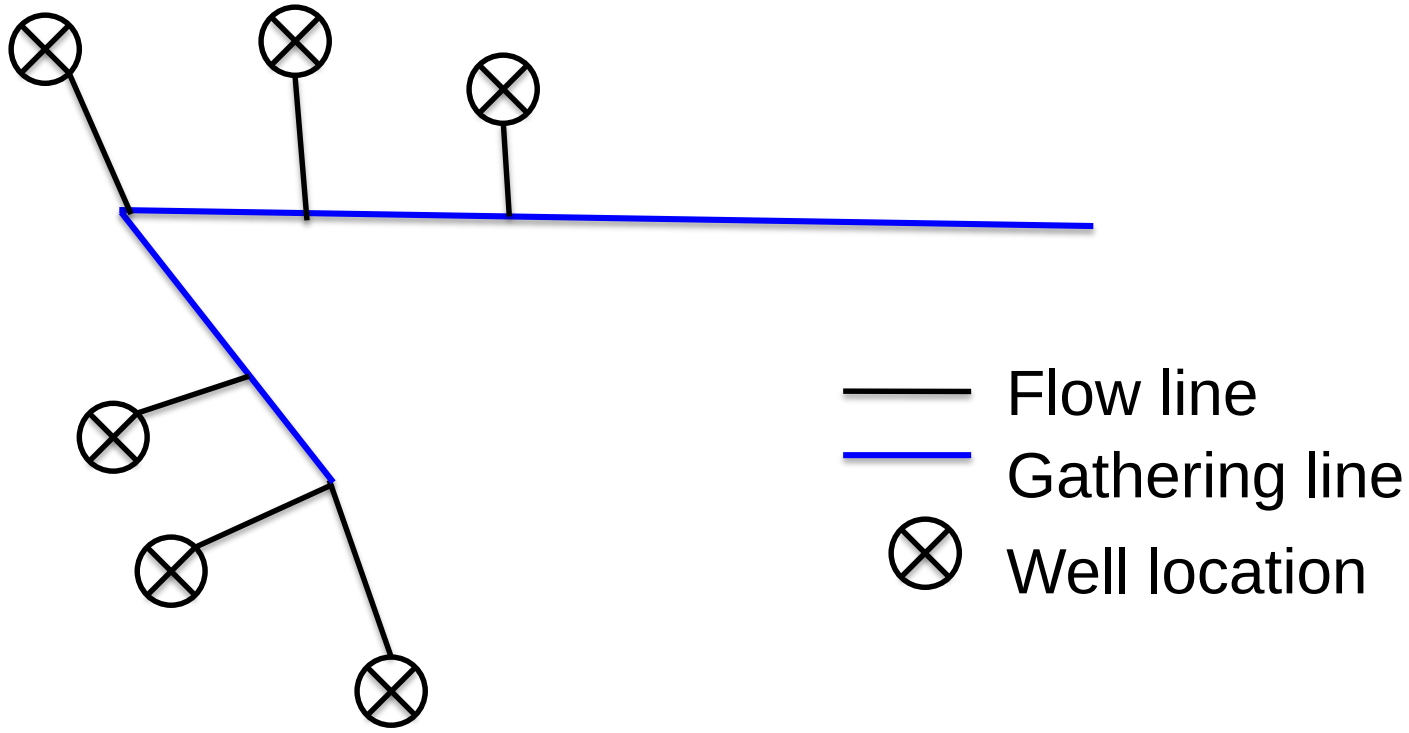
Wells all flow to central tank battery (no treatment of well stream on location). Tank battery has separation, heater treaters and stock tanks.



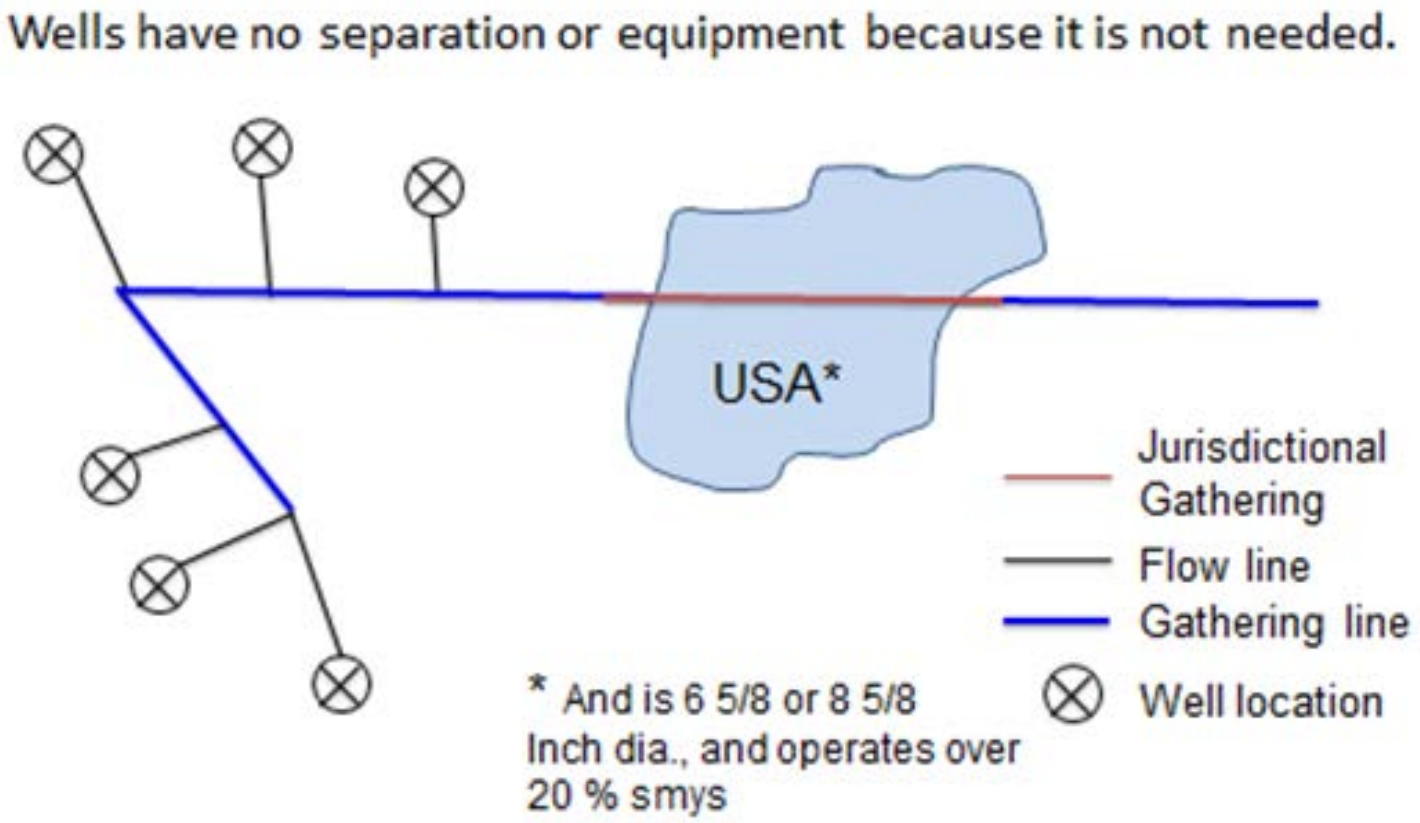
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

End of production

Wells have no separation or equipment because it is not needed.



End of production & jurisdictional segment (not official)



Low-stress pipelines

- Amended, Final Rule - Federal Register Volume 76, Number 87 (Thursday, May 5, 2011, as amended July 21, 2011).

- Effective Date: October 1, 2011

§195.12 What requirements apply to low-stress pipelines in rural areas?

(a) General.

This Section sets forth the requirements for each category of low-stress pipeline in a rural area set forth in paragraph (b) of this Section. This Section does not apply to a rural low-stress pipeline regulated under this Part as a low-stress pipeline that crosses a waterway currently used for commercial navigation; these pipelines are regulated pursuant to §195.1(a)(2).

§195.12 What Requirements Apply to Low-Stress Pipelines in Rural Areas?

(b) Categories.

Operators of rural low-stress pipelines must meet applicable requirements and compliance deadlines for categories of pipeline listed in paragraph (c) of this Section.

- Category 1 is the most regulated of the 3 categories
- Category 2 is in the middle, as far as regulations
- Category 3 is the least regulated of the 3 categories

Low Stress Pipelines in Rural Areas – Category 1

- (i) Has a nominal diameter of 8-5/8 inches (219.1 mm) or more.

- (ii) Is located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in § 195.6.

- (iii) Operates at a maximum pressure established under § 195.406 corresponding to:
  - (A) A stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe.
  - (B) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gauge.

Low Stress Pipelines in Rural Areas – Category 2

- (i) Has a nominal diameter of less than 8-5/8 inches (219.1mm).

- (ii) Is located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in §195.6.

- (iii) Operates at a maximum pressure established under §195.406 corresponding to:
  - (A) A stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe; or
  - (B) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gage.

Low Stress Pipelines in Rural Areas – Category 3

- (i) Has a nominal diameter of any size and **is not** located in or within one-half mile (.80 km) of an unusually sensitive area (USA) as defined in §195.6.

- (ii) Operates at a maximum pressure established under §195.406 corresponding to a stress level equal to or less than 20-percent of the specified minimum yield strength of the line pipe.

- (iii) If the stress level is unknown or the pipeline is not constructed with steel pipe, a pressure equal to or less than 125 psi (861 kPa) gage.

§195.12 (c) Requirements.

Category 1

- Identify segments by April 3, 2009.
- Begin reporting by January 3, 2009.
- Establish IM program, §195.452, by July 3, 2009.
  - May use §195.452(a) in lieu of ½ mile buffer.
  - All baseline assessments (§195.452(c)) before July 3, 2015, 50% before January 3, 2012.
- Comply with all parts by July 3, 2009, except Subpart H by July 3, 2011.

§195.12 (c) Requirements.

Category 2

- Identify segments by July 1, 2012.
- Begin reporting by January 3, 2009.
- Establish IM program, §195.452, by Oct. 1, 2012.
  - May use §195.452(a) in lieu of ½ mile buffer.
  - All baseline assessments (195.452(c)) before Oct. 1, 2016, 50% before April 1, 2014.
- Comply with all parts by Oct. 1, 2012, except Subpart H by Oct. 1, 2014.

§195.12 (c) Requirements.

Category 3

- Identify segments by July 1, 2012.
- Begin reporting by January 3, 2009.
- Comply with all parts except §195.452 (IM), Subpart B (reporting), Subpart H before Oct. 1, 2012.
- Comply with Subpart H before Oct. 1, 2014.

§195.12 (d) Economic Compliance Burden

- May notify PHMSA of the following situation:
  - Category 1 rural low-stress.
  - Carries crude from production.
  - Flow rate <= 14,000 bpd.
  - Operator would abandon or shut-down as a result of economic burden of compliance.

- Notice must include operating information, history, cost of compliance, amount of production…

- PHMSA will analyze and may grant special permit for alternative safety requirements.

§195.12 (e) Changes in USAs

For Category 1 or 2 lines, If a newly identified USA causes a segment to meet the criteria of paragraph (b) of this Section, operator must:

- Comply with appropriate IM requirements, as listed in Paragraph (c) of this Section within 12 months of Identification of new USA

- Baseline assessment (IM), as required in Paragraph (c) must be performed in accordance with the schedule listed in §195.452(d)(2) – IMP Regulations.

§195.12 (f) Record Retention

Operators must maintain records to document compliance.

- Segment identification records for (c)(1)(i), (c)(2)(i), and (c)(3)(i) [segment identification] must be maintained for the life of the pipe.

- Other recordkeeping requirements are as listed in 195 record retention requirements of the referenced section or subpart.

Onshore Petroleum Line Summary

- Gathering lines.
  - Non-rural, covered.
  - Regulated rural, covered.
  - **Some rural are excepted.**
- Low stress lines.
  - **All lines covered.**
  - Compliance dates based on category.
  - Rural low-stress (Category 3) excepted from IM
- Transportation lines, covered.
- Production lines & facilities, excepted.

Gathering & Low Stress Lines

Pipeline Construction Overview

49 CFR 195

Hazardous Liquid Pipelines

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Pipeline Construction Overview

Major Cross-Country Projects

- Transmission Lines (oil and gas)
- Gathering Lines

Pipeline Construction

- A **pipeline construction project** looks much like a moving assembly line. A large project typically is broken into manageable lengths called “spreads,” and utilizes highly specialized and qualified workgroups. Each spread is composed of various crews, each with its own responsibilities. As one crew completes its work, the next crew moves into position to complete its piece of the construction process.

- Projects are designed to minimize the impact to residential areas, as well as agricultural lands. Land disturbed during the construction period will be returned to as close to original condition as possible. Agricultural lands will be properly restored using approved, modern mitigation techniques designed to ensure full productive reuse of the agricultural lands.

Pipeline Construction - Preliminary

- Pipeline Design
- Route Selection
- Rights-of-Way Acquisition
- Contractor Selection
- Permits & Approvals

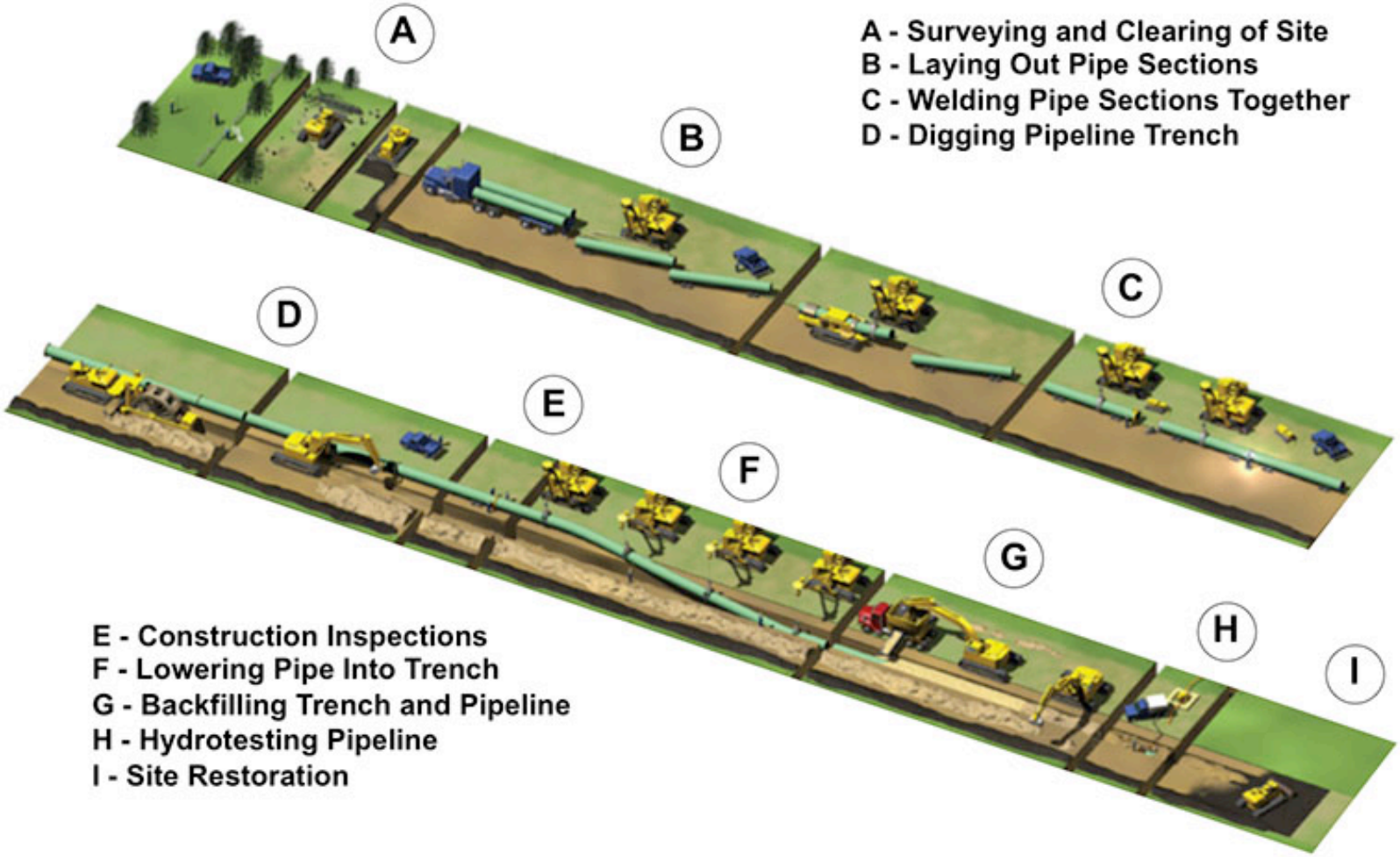

RIGHT OF WAY AGREEMENT

Pipeline Construction – Right-of-Way/Eminent Domain

- Land owners don't always desire to either sell their properties or give up their rights of way for pipeline projects. Easements and ROW's must be negotiated or in some cases "eminent domain" is exercised:

  "The right of a government or its agent to expropriate private property for public use, with payment of compensation."

Typical Pipeline Construction Spread



U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Pipeline Construction

Step 1. Pre-construction survey

Before construction begins, crews survey environmental features along proposed pipeline segments. Utility lines and agricultural drainages are located and marked to prevent accidental damage during pipeline construction. Next, the pipeline's centerline and the exterior right of way boundaries are staked.

Pipeline Construction

Step 2. Clearing and grading

The pipeline right of way is cleared of vegetation. Temporary erosion control measures are installed prior to any earth-moving activities.

Step 3. Trenching

Topsoil is removed from the work area and stockpiled separately in agricultural areas. Crews use backhoes or trenching machines to excavate a pipeline trench. The soil that is excavated during ditching operations is temporarily stockpiled on the non-working side of the trench.

Step 3. Trenching - Boring (cont'd)

Boring under roads, railroads, streams etc.

Pipeline Construction

Step 4. Pipe stringing & bending (cont'd)

A mechanical pipe-bending machine bends individual joints of pipe to the desired angle at locations where there are significant changes in the natural ground contours or where the pipeline route changes direction.

Pipeline Construction

Step 5. Welding and coating pipe

After the stringing and bending are complete, the pipe sections are aligned, welded together, and placed on temporary supports (skids) along the edge of the trench.

Pipeline Construction

Step 5. Welding and coating pipe (cont'd.)

All welds are then visually and radiographically inspected.

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Pipeline Construction

Step 5. Welding and coating pipe (cont'd)

Line pipe, normally mill-coated or yard-coated prior to stringing, requires a field coating at the welded joints. Prior to the final inspection, the entire pipeline coating is electronically inspected to locate and repair any coating faults or voids.

Pipeline Construction

Step 6. Lowering pipe in and backfilling

The pipe assembly is lowered into the trench by side-boom tractors. The trench is backfilled using a backfilling or bladed equipment; no foreign materials or large rocks are permitted in the trench.

Pipeline Construction

Step 7. Testing

After backfilling, the pipeline is hydrostatically tested following federal regulations. Test water is obtained and disposed of in accordance with applicable federal, state and local regulations.

Pipeline Construction

Step 8. Restoration

After the pipeline is backfilled and tested, disturbed areas are restored as close as possible to their original contours. Restoration measures are maintained until the area is restored, as closely as possible, to its original condition.

Pipeline Construction

Emerging methods – Directional drilling

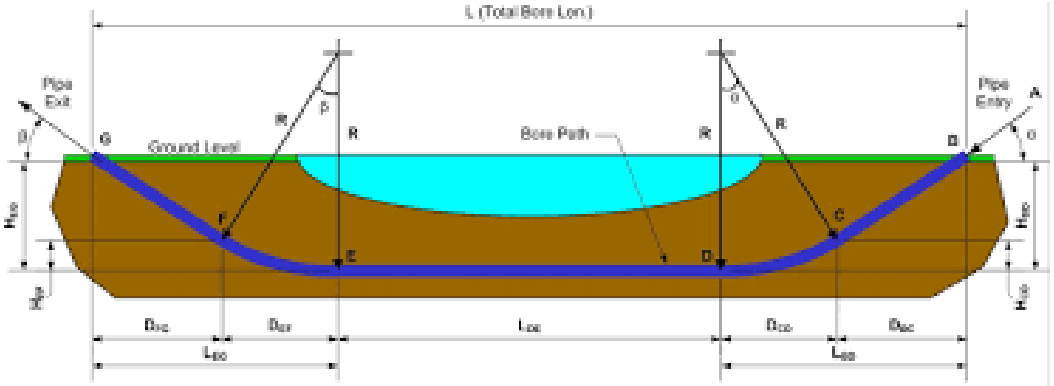
Pipeline Construction

Emerging methods – Directional drilling

Pipeline Construction

Emerging methods – Directional drilling

- River crossings
- Interstate Highways
- Residential Neighborhoods



Safety Considerations

- Overhead power lines and equipment-don't be in contact with equipment or stand near (water, mud other conductors).
- Wear proper personal protective equipment.
- Beware of lengths of welded pipe on skids without proper cribbing.
- Don't stand near pipe being lifted from ground.
- Don't stand near pipe truck being unloaded.

Safety Considerations

- Be aware of trenching and shoring safety precautions.
  - Don’t stand near the edge of an excavation
  - Don’t enter an unsafe excavation
  - Equipment vibrations can cause a cave-in
- Avoid slip, trip and fall hazards.
- Welding can cause a “flash.”
  - Welding at night near glass can reflect the same damaging radiation
- Be aware when x-rays are being tested, and the radiographic source location.
- Don’t touch the “tail” of the “jeep.”

Pipeline Construction

Pipeline Construction

Subpart D - Construction

49 CFR 195

Hazardous Liquid Pipelines

Images Provided by David Bull, Don McCoy, and Google Images

§195.200 Scope

- This subpart prescribes minimum requirements for constructing new pipeline systems with steel pipe, and for relocating, replacing, or otherwise changing existing pipelines that are constructed with steel pipe.

- However, this subpart does not apply to the movement of pipe covered by §195.424 (Subpart F – Operation and Maintenance).

§195.202 Compliance with specifications or standards

- Construct according to comprehensive written specifications or standards of this part.

§195.204 Inspection-general

- Inspected to ensure construction in accordance with this subpart.

- Inspectors must be trained and qualified in the phase of construction to be inspected. **(Note)**

§195.205 Repair, alteration and reconstruction of aboveground breakout tanks…in service

NOTE: This material is covered in the "**Breakout Tanks**" module of this course…

§195.206 Material inspection

- Pipe and components must be visually inspected at installation site.

§ 195.207 Transportation of pipe.

(a) *Railroad*. In a pipeline operated at a hoop stress of 20% or more of SMYS, an operator may not use pipe having an outer diameter to wall thickness ratio of 70 to 1, or more, ……must be transported in accordance with API RP 5L1.

- Continued -

§ 195.207 Transportation of pipe.

(b) *Ship or Barge*. In a pipeline operated at a hoop stress of 20% or more of SMYS, an operator may not use pipe having an outer diameter to wall thickness ratio of 70 to 1, or more, ……unless transported in accordance with API RP 5LW.

(c) *Truck.* In a pipeline to be operated at a hoop stress of 20 percent or more of SMYS, an operator may not use pipe having an outer diameter to wall thickness ratio of 70 to 1, or more, that is transported by truck unless the transportation is performed in accordance with API RP 5LT (incorporated by reference, *see* §195.3).

Stringing Pipe

§ 195.208 Welding of supports and braces

Note: Construction Welding is covered in the "Welding Requirements" module of this course.

§ 195.210 Pipeline Location

…ROW should be selected, as far as practicable, to avoid private dwellings, industrial and public assembly areas.

…Pipeline within 50 ft. of such areas must be provided with at least an additional 12 inches of cover (§195.248).

Excavation / Ditching

§195.212 Bending of Pipe

(a) Pipe must not have a wrinkle bend.

(b) Each field bend must comply with the following:

(1) A bend may not impair the serviceability of the pipe.

(2) Each bend must have a smooth contour ……

(3) On pipe containing a longitudinal weld must be as near as possible to the neutral axis of the bend unless -

The bend is made with an internal bending mandrel; or

The pipe is 12-3/4 inch or less nominal outside diameter or has a wall thickness ratio less than 70.

§195.212 Bending of Pipe

(c) Each circumferential weld which is located where the stress during bending causes a permanent deformation in the pipe must be NDT tested either before or after the bending process.

§195.246 Installation of pipe in a ditch

- (a) All pipe installed in a ditch must be installed in a manner that minimized the introduction of secondary stresses and the possibility of damage to the pipe.

- (b) Offshore location – see regs.,

basically pipe must be installed

so that top of pipe is below the underwater natural bottom.

Lowering-in Pipeline

§195.248 Cover over buried pipeline

- On land, pipe must be buried below level of cultivation.
- Gulf of Mexico pipelines (cover requirements) may be less if impracticable and additional protection provided.
- Cover between top of pipe and ground level, road bed, river bottom or underwater natural bottom must comply with the following:

- Continued -

§195.248 Cover over buried pipeline

Location	Cover - inches	
	For normal excavation	For rock excavation (Note 1)
Industrial, commercial, & residential areas	36	30
Crossing of inland bodies of water with a width of at least 100 feet (30.5 meters) from high water mark to high water mark	48	18
Drainage ditches at public roads and railroads	36	36
Deepwater port safety zones	48	24
Gulf of Mexico and its inlets in waters less than 15 feet (4.6 meters) deep as measured from mean low water	36	18
Other offshore areas under water less than 12 ft (3.7 meters) deep as measured from mean low water	36	18
Any other area	30	18

(Note 1) Rock excavation is any excavation that requires blasting or removal by equivalent means.

§195.250 Clearance between pipe and underground structures

- Any pipe installed underground must have at least 12 inches (305 millimeters) of clearance between the outside of the pipe and the extremity of any other underground structure, except that for drainage tile the minimum clearance may be less than 12 inches (305 millimeters) but not less than 2 inches (51 millimeters).

- However, where 12 inches (305 millimeters) of clearance is impracticable, the clearance may be reduced if adequate provisions are made for corrosion control.

§195.250 Clearance between pipe and underground structures

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

§195.252 Backfilling

- When a ditch for a pipeline is backfilled, it must be backfilled in a manner that:
  - (a) Provides firm support under the pipe; and
  - (b) Prevents damage to the pipe and pipe coating from equipment or from the backfill material.

Cleanup

§195.254 Above ground components

- (a) Any component may be installed above ground in the following situations, if the other applicable requirements of this part are complied with:
  - (1) Overhead crossings of highways, railroads, or a body of water.
  - (2) Spans over ditches and gullies.
  - (3) Scraper traps or block valves.
  - (4) Areas under the direct control of the operator.
  - (5) In any area inaccessible to the public.

- (b) Each component covered by this section must be protected from the forces exerted by the anticipated loads.

Aboveground Valve Installation

§195.256 Crossing of railroads and highways

- The pipe at each railroad or highway crossing must be installed so as to adequately withstand the dynamic forces exerted by anticipated traffic loads.

- Casings are not required by Part 195 !!!

- But casings may be required by others.
  - TxDOT.
  - Railroads.
  - Other state DOTs.

§195.258 Valves: General

- Must be accessible, protected from damage and tampering.

- Submerged valves in navigable waters must be marked or located to facilitate quick location when needed.

§195.260 Valves: Location

- Must be installed at:
  - Suction and discharge of pump station.
  - Lines entering or leaving breakout tank area.
  - On mainline at locations on the pipeline to minimize damage or pollution from release as appropriate for the terrain or populated area.
  - On each lateral takeoff without interrupting the trunk line.
  - On each side of a water crossing more than 100 feet wide from high-water to high-water.
  - On each side of a reservoir holding water for human consumption.

- Continued -

§195.260 Valves: Location.

- (e) On each side of a water crossing that is more than 100 feet (30 meters) wide from high-water mark to high-water mark…

§195.260 Valves: Location.

- …unless the Administrator finds in a particular case that valves are not justified.
- Apply for a waiver and show that alternative provides a level of safety equivalent to the valve spacing requirement.

§195.262 Pumping equipment

- Adequate ventilation and warning devices (for hazardous vapors) must be installed in pump station buildings.

The following must be provided in pump stations:

- Overpressure protection.
- ESD (Emergency Shut Down).
- Auxiliary power if needed for safety devices.

- Continued -

§195.262 Pumping equipment

The following must be provided in pump stations:

- Each safety device must be tested before station may be used.
- Equipment must be installed on property under operator's control and 50 ft. from boundary of station.

- Continued -

§195.262 Pumping Equipment

- Must have adequate fire protection installed. If fire system requires power, must have separate power supply from the station.

§195.266 Construction Records

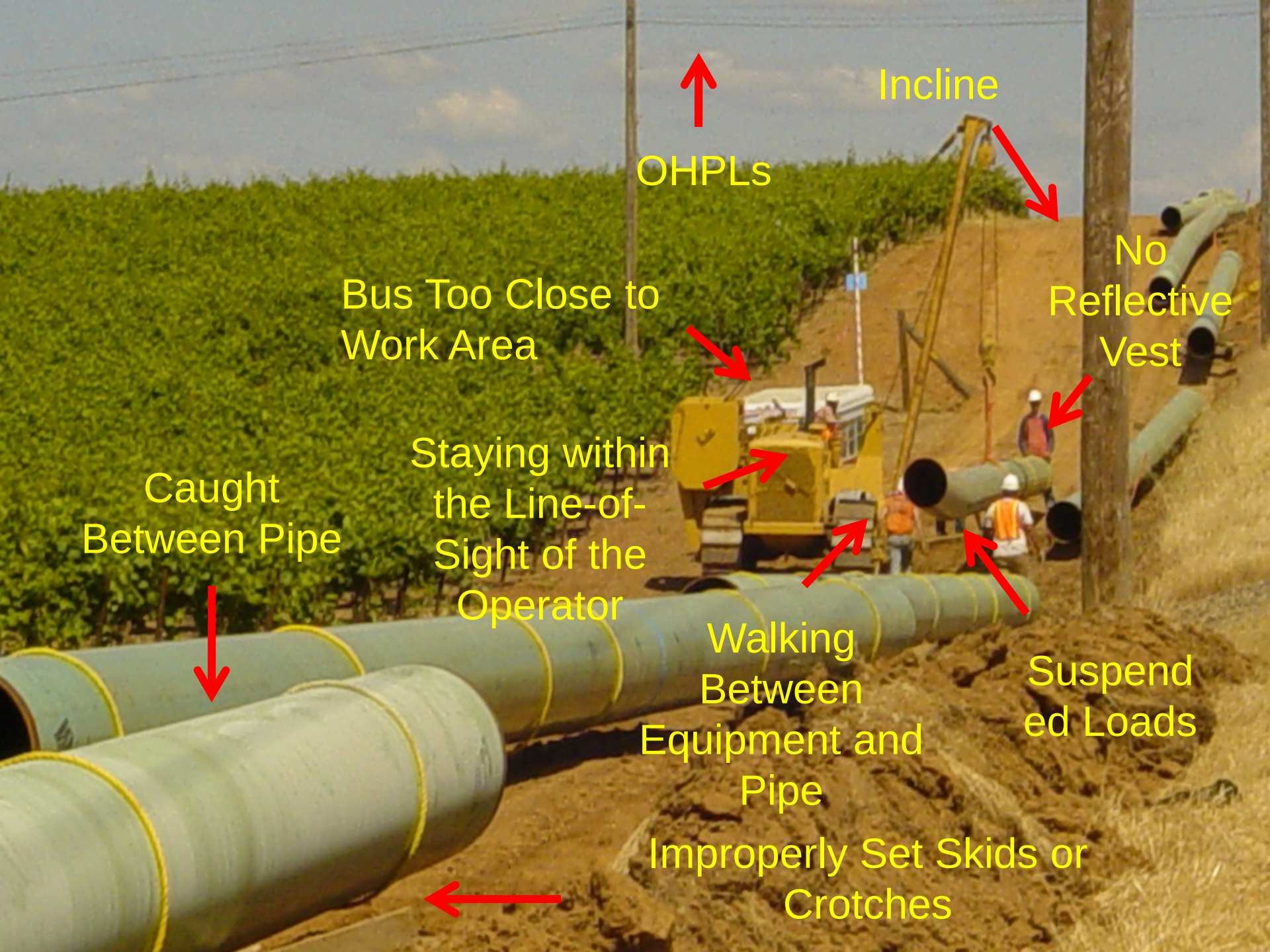
- A complete record that shows the following must be maintained by the operator involved for the life of each pipeline facility:
  - (a) The total number of girth welds and the number nondestructively tested, including the number rejected and the disposition of each rejected weld.
  - (b) The amount, location, and cover of each size of pipe installed.
  - (c) The location of each crossing of another pipeline.

§195.266 Construction Records

- (d) The location of each buried utility crossing.
- (e) The location of each overhead crossing.
- (f) The location of each valve and corrosion test station.

Safety Considerations

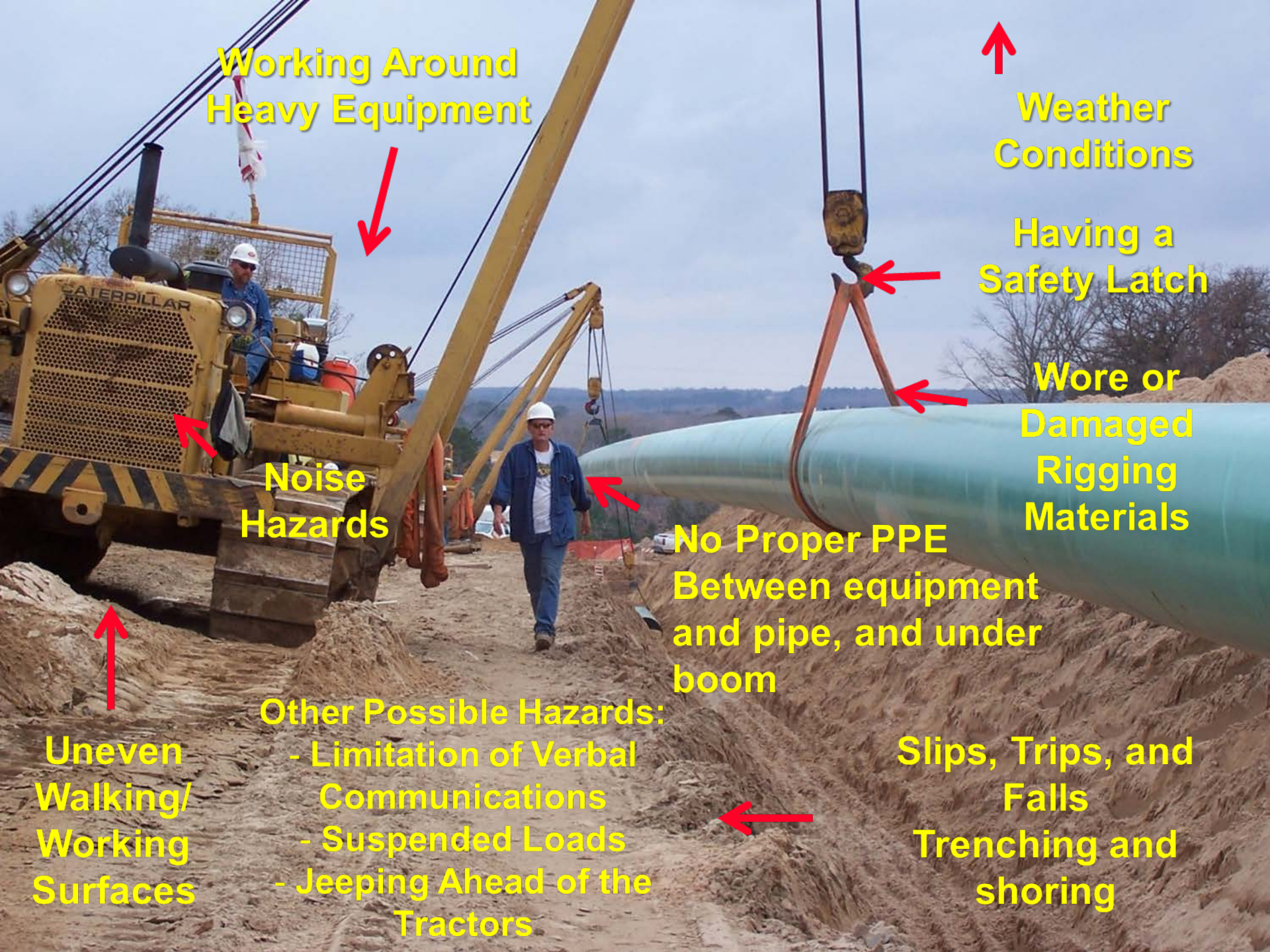
- Overhead power lines and equipment-don't be in contact with equipment or stand near (water, mud other conductors)
- Wear proper personal protective equipment
- Beware of lengths of welded pipe on skids without proper cribbing
- Don't stand near pipe being lifted from ground
- Don't stand near pipe truck being unloaded
  - Note improperly chocked pipe


OHPLs
Incline
Bus Too Close to Work Area
No Reflective Vest
Staying within the Line-of-Sight of the Operator
Caught Between Pipe
Walking Between Equipment and Pipe
Suspend ed Loads
Improperly Set Skids or Crotches

Safety Considerations

- Sideboom A-frames don't fall up
- Sidebooms can flip over when lifting pipe
- Sidebooms and other equipment can roll over backward on an incline
- Be aware of worn cables or slings
- Hydraulic hoses can break causing unintended equipment movement
- Sandblasting and coating use high pressure air


CATERPILLAR


Working Around Heavy Equipment
Weather Conditions
Having a Safety Latch
Wore or Damaged Rigging Materials
Noise Hazards
No Proper PPE Between equipment and pipe, and under boom
Uneven Walking/ Working Surfaces
Other Possible Hazards:
- Limitation of Verbal Communications
- Suspended Loads
- Jeeping Ahead of the Tractors
Slips, Trips, and Falls
Trenching and shoring

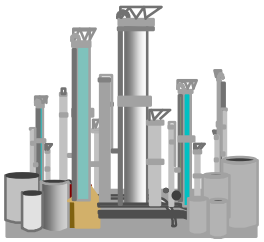
Construction

CFR Part 195
Pipeline Welding

49 CFR 195

Hazardous Liquid Pipelines

Welding Terms



--- and other strange nomenclature

Welding

A joining process that produces a coalescence of metals (or non-metals) by heating them to the welding temperature,

- with or without the application of pressure, or by pressure alone, and

- with or without the use of filler metals

Process

A method of performing welding, such as:

- shielded metal arc welding
- submerged arc welding
- gas metal arc welding
- gas tungsten arc welding
- oxyacetylene welding

Procedure

A way of performing or effecting something; a course of action.

WPS-Welding Procedure Specification

A document providing in detail the required variables for specific application to assure repeatability by properly trained welders

Shielded Metal Arc Welding (SMAW)

An arc welding process that produces a coalescence of metals by heating with an arc between a covered metal electrode and the work pieces.

"Stick" Welding

-continued-

Shielded Metal Arc Welding (SMAW)

- Shielding is obtained from decomposition of the electrode covering.
- Filler metal is obtained from the electrode.

Submerged Arc Welding (SAW)

An arc welding process that uses an arc between a bare metal electrode and the weld pool. The arc and molten metal are shielded by a blanket of granular flux.

Gas Metal Arc Welding (GMAW)

An arc welding process that produces coalescence of metals by heating them with an arc between a continuous filler metal (consumable) electrode and the work.

"MIG" welding

Gas Metal Arc Welding (GMAW)

Shielding is obtained entirely from an externally supplied gas or gas mixture.

Gas Tungsten Arc Welding (GTAW)

An arc welding process that produces coalescence of metals by heating them with an arc between a tungsten (non-consumable) electrode and the work piece.

"TIG" welding

-continued-

Gas Tungsten Arc Welding (GTAW)

Shielding is obtained from an externally supplied gas or gas mixture.

Oxyacetylene Welding (OAW)

An oxy-fuel gas welding process that uses acetylene as the fuel gas.

Base metal

The metal to be welded or cut. May be referred to as the “work piece”.

Weld metal

The portion of the base metal that has been melted during welding.

Heat-affected zone (HAZ)

That portion of the base metal that has *not* been melted during welding, but whose mechanical properties and/or microstructure have been altered by the heat of welding or cutting.

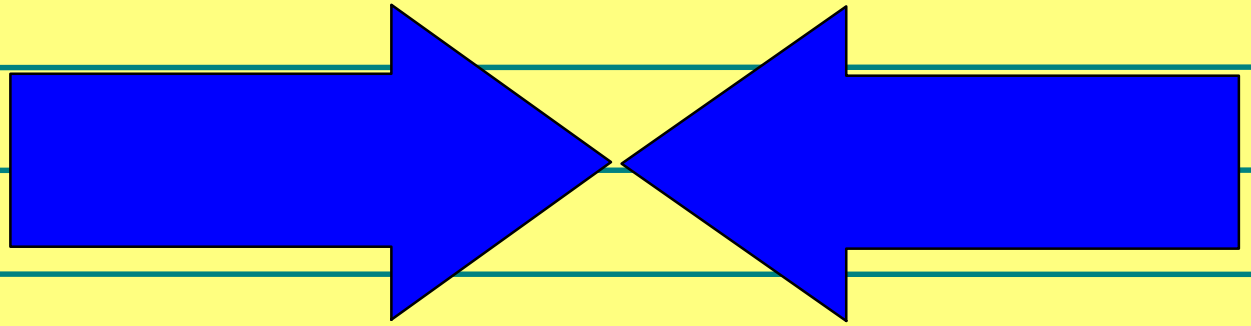
Joint

The junction of members or the edge of members that are to be joined.Usually beveled or otherwise designed for welding.

“V” Groove or “U” Groove

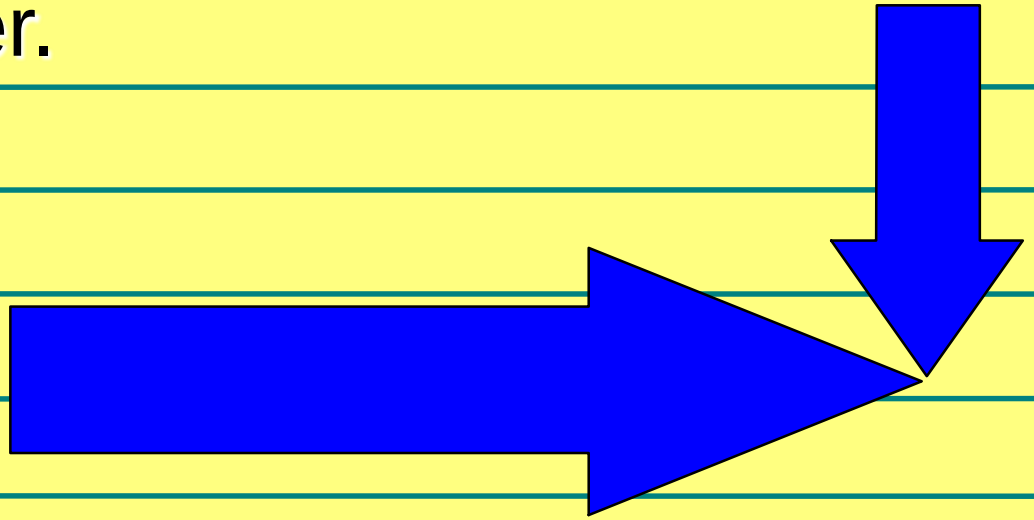
Butt weld (joint)

A joint between two members aligned approximately in the same plane.



Fillet weld

A weld of approximately triangular cross section joining two surfaces at approximately right angles to each other.



Welding electrode

A component of the welding circuit that terminates at the arc. May also be the source of filler metal.

Polarity

Manner in which the electrode holder and work piece connection are connected to the electrical supply.

-continued-

Polarity

- DCEN direct current electrode negative. (straight polarity)
- DCEP direct current electrode positive. (reverse polarity)

Welding position

- flat
- horizontal
- vertical
- overhead

  - fixed
  - rolled

Weld pass

A single progression of welding along the joint. The result of a pass is a weld bead.

Stringer (root) bead

The first pass in the weld, usually made without any appreciable weaving motion.

Hot pass

The weld pass that immediately follows the stringer (root) pass.

Filler passes

The weld passes that follow the hot pass and fill the weld groove flush or almost flush with the surface of the work pieces.

Cover or Cap pass

The weld pass that finishes the welded joint. The cover bead is higher than the adjacent surface and overlaps the groove.

Arc burn

A metallurgical notch, caused by ground clamps or from striking an arc on the base metal at any point other than:

- in the weld groove, or
- the immediate surface next to the groove that will be covered by the weld cap

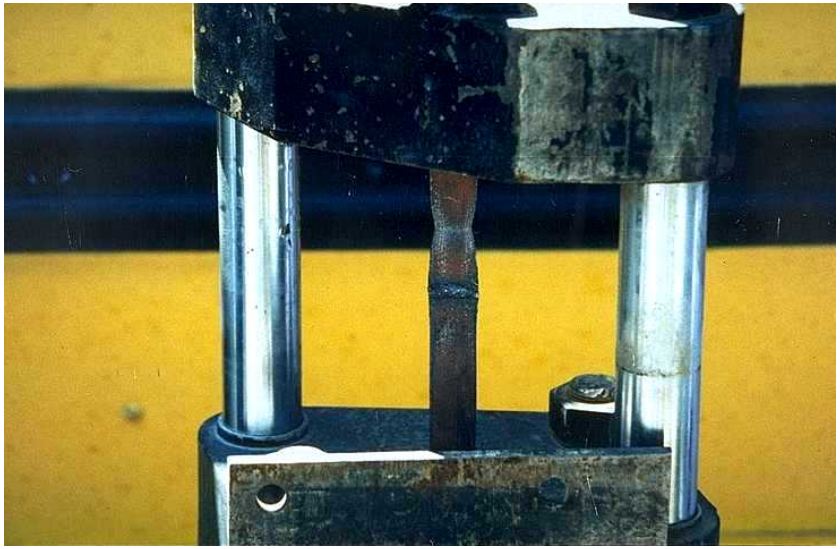
Arc Burn

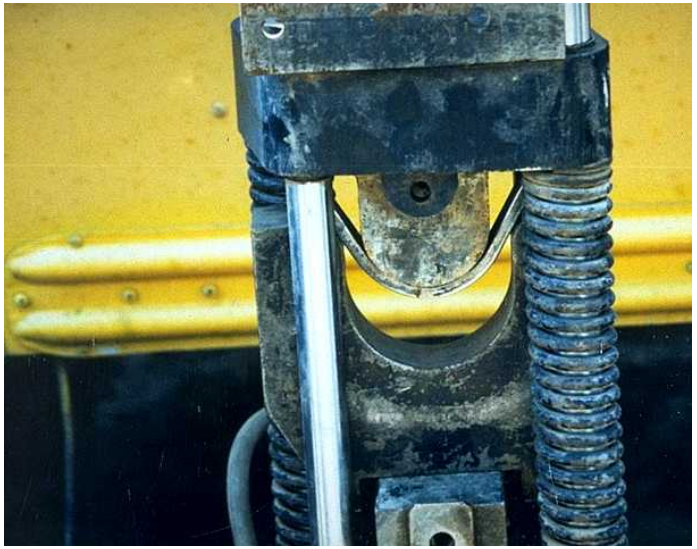
§ 195.208 Welding of supports and braces

Supports or braces may not be welded directly to pipe that will be operated at a pressure of more than 100 psig.

§195.214 Welding procedures

(a) Welding must be performed by a qualified welder in accordance with welding procedures qualified under section 5 of API 1104 or Section IX of the ASME Boiler & Pressure Vessel Code…… The quality of the test welds used to qualify the welding procedure shall be determined by destructive testing.

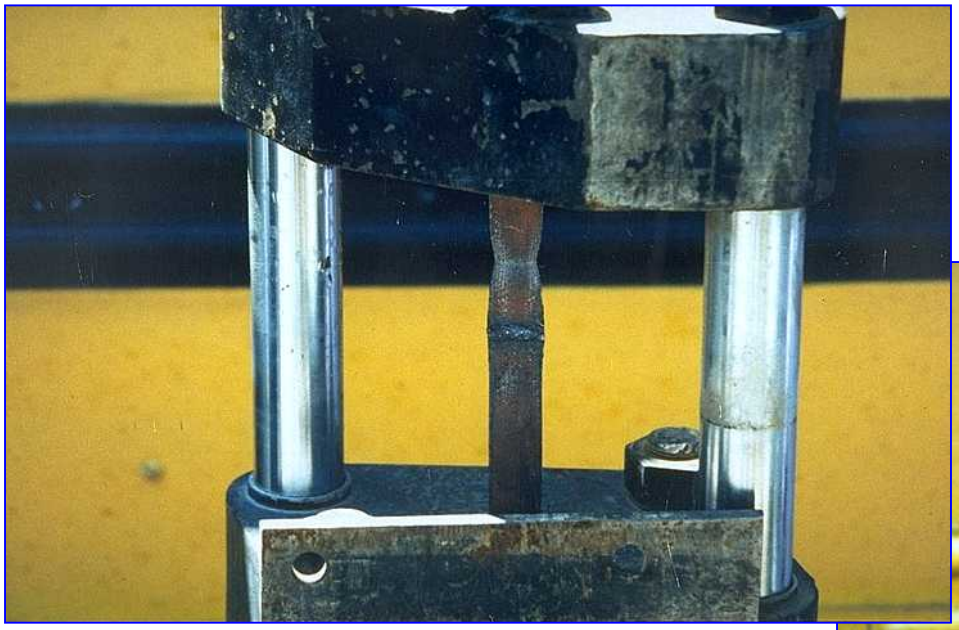




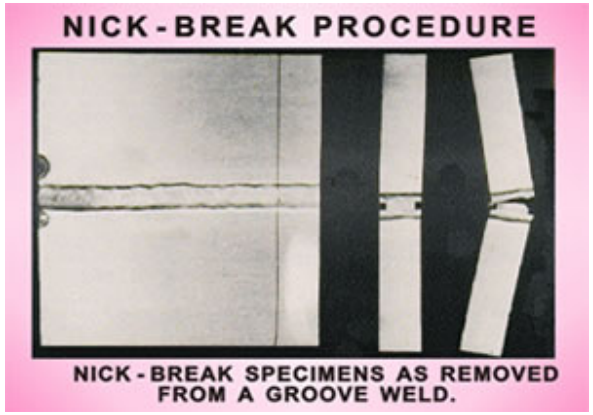
Welding - General

- Performed by a Qualified Welder
- Using Qualified Welding Procedures
- Procedures Qualified by Destructive Testing

Procedure/welder must be qualified by destructive testing



1. Tensile Test
2. Nick-Break Test
3. Bend Test



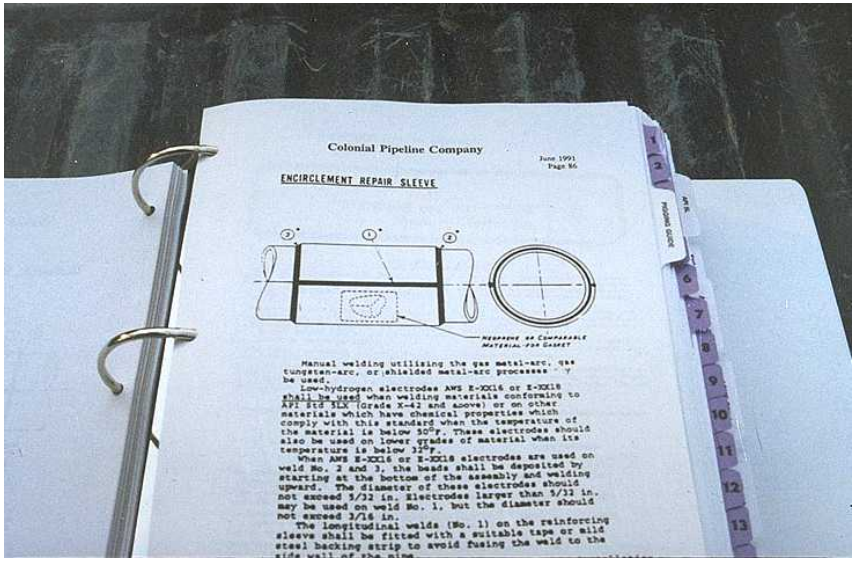
Welding - General

"Qualified Procedure" *vs* *"Qualified Welder"*

1. "Qualified procedure test" verifies integrity/ metallurgy of that weld
2. "Qualified welder test" verifies ability of that welder

§195.214 Welding procedures

(b) Each welding procedure must be recorded in detail, including the results of the qualifying tests. This record must be retained and followed whenever the procedure is used.



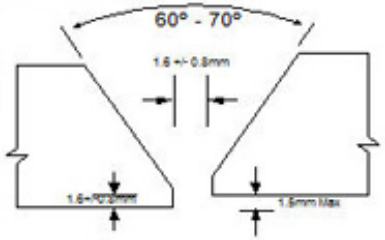
Welding Procedure Specification

Client:	Mobil	Project:	221010Goatee	REF No.	WPS 6 R1
Procedure Description:	12" Heavy Wall Offshore Tie-in				0290/1/WPS5
Material:	AS3679.1 Grade 250API 5L X65	Diameter:	168.3	Thickness:	18.3
Position:	6G	Clamp Type:	Internal		
Preheat °C (Min):	100	Interpass °C (Max):	300		

	ROOT	HOT PASS	FILL & CAP
Welding Process	SMAW	SMAW	SMAW
Welding Direction	Vertical Down	Vertical Down	Vertical Down
Filler	Lincoln SA70+	Lincoln SA70+	Bohler BVD90M
Polarity	DC +ve	DC +ve	DC +ve
Shielding Gas	N/A	N/A	N/A
Purge Gas	N/A	N/A	N/A

Pass No	Filler Size (mm)	Amps	Volts	Speed (mm/sec)	Heat Input (kJ/mm)
1	3.2mm	70-130	18-33	3.3-6.6	0.4-0.8
2	4.0mm	110-210	18-35	2.9-6.8	0.6-1.3
FILL	4.0mm	145-260	16-27	1.6-7.0	0.6-2.2
CAP	4.0mm	130-230	16-26	1.8-5.3	0.6-1.7

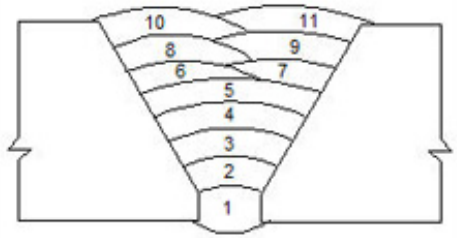
Weld Preparation



NOTES

1. API Std 1104BP3094-SP-PL-3010R1
2. Clamp removal stage : **100% completion of root (external clamp may be used in the event of a breakdown – removed after 50% minimum completion of the root.)**
3. Time lapse between root and second pass : **16 Minutes**
4. Time lapse between second pass and 1st fill : **12 Minutes**
5. Minimum number of passes before pipe movement : **2 passes**
6. Minimum number of passes before break in welding : **3 passes**
7. Minimum Number of welders- **Root & second pass: 2 , Fill & Cap : 1**
8. Method of cleaning : **Grinder / Wire brush**
9. Method of Preheat : **Gas Torch**
10. Qualification reference number : **48280/PP/WP6 R1**

Pass Location



Company Welding Engineer Approved ..... **Approved for Client** .....

Qualified Welders ???

§195.216 Welding: Miter joints

A miter joint is not permitted (not including deflections up to 3 degrees that are caused by misalignment).

§195.222 Welders: Qualification of welders

(a) Each welder or welding operator must be qualified in accordance with section 6 or 12 of API 1104 or section IX of the ASME Boiler & Pressure Vessel Code ….., except that a welder qualified under an earlier edition than listed in §195.3 may weld but may not re-qualify under that earlier edition.

API 1104 - Welder Multiple Qualification

- Must Make Butt Weld First
- Layout, Cut & Fit Branch Connection
- Cut Hole in Run for Branch
- Make Fillet Weld on Branch/Run Joint

API 1104 - Welder Multiple Qualification

- Cut Full-Size Hole in Run Pipe
- Run Pipe Shall Be Horizontal
- Branch Shall Extend Vertically Downward From Run Pipe

API 1104 - Welder multiple qualification

✓ Butt & Branch Welds Must Be Made on Pipe at Least 6.625”

✓ 12.75” Qualifies for all Pipe Diameters

✓ Butt Weld Made in Fixed Horizontal or 45° Angle Position

§195.222 Welders: Qualification of welders

(b) No welder may weld with a welding process unless, within the preceding 6 calendar months, the welder has –

(1) Engaged in welding with that process, and

(2) Had one weld tested and found acceptable under Section 9 of API 1104.

§195.224 Welding: Weather

Welding must be protected from weather conditions that would impair the quality of the completed weld.

Weather Protection for Welding

§195.226 Welding: Arc burns

- All arc burns must be repaired.
- An arc burn may be repaired by completely removing the notch by grinding, if the grinding does not reduce the remaining wall thickness to less than the minimum required…
- Use dilute solution of ammonium persulfate to check
- If not reparable by grinding, it's a "cut-out"
- A ground may not be welded to the pipe or fitting that is being welded.

§195.228 Welds & welding inspection: Standards of acceptability

(a) Each weld and welding must be inspected to insure compliance with the requirements of this subpart. Visual inspection must be supplemented by nondestructive testing.

§195.228 Welds & welding inspection: Standards of acceptability

(b) The acceptability of a weld is determined according to the standards in Section 9 of API 1104. However, if a girth weld is unacceptable under those standards for a reason other than a crack, and if Appendix A to API 1104 applies to the weld, the acceptability of the weld may be determined under that appendix.

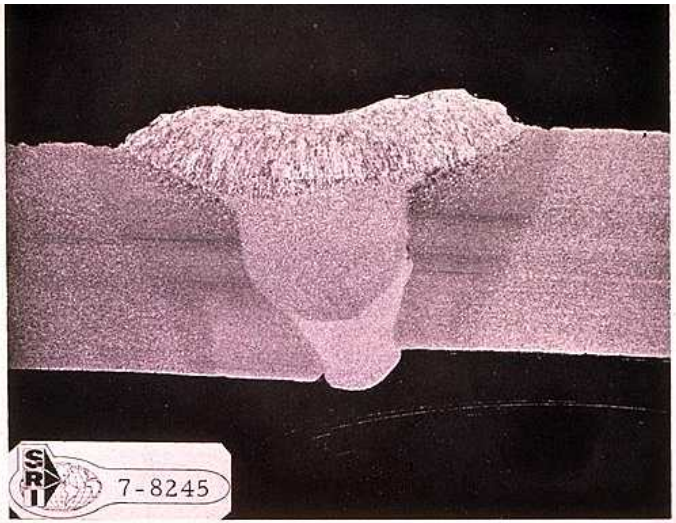


FIGURE 10
Hi-Low and Internal Undercut

§195.230 Welds: Repair or removal of defects

- Unacceptable welds must be removed or repaired.
  - Cracks > 8% of weld length must be removed.
  - Defect removed down to sound metal and the segment to be repaired must be preheated if conditions exist which would adversely affect the quality of the weld repair. After repair, the segment of the weld that was repaired must be inspected to ensure its acceptability .
  - Any repairs of cracks or previous repairs must have a written, qualified procedure.

§195.234 Welds: Nondestructive testing

(a) A weld may be nondestructive tested by any process that will clearly indicate any defect that may affect the integrity of the weld.

(b) Any nondestructive testing of welds must be performed -

(1) In accordance with a written set of procedures for nondestructive testing, and

(2) With personnel that have been trained in the established procedures and in the use of the equipment employed in the testing.

Nondestructive Testing

§195.234 Welds: Nondestructive testing

(c) Procedures for the proper interpretation of each weld inspection must be established to ensure the acceptability of the weld under §195.228.

(d) 10% of girth welds made by each welder each day must be tested.

- Continued -

§195.234 Welds: Nondestructive testing

(e) All girth welds made each day in the following locations must be tested:

- Where release would pollute water.
- In railroad or public road ROWs, overhead crossings, tunnels.
- Within incorporated subdivision of a State government.

- Continued -

§195.234 Welds: Nondestructive testing

- Populated areas, residential subdivisions, shopping centers, schools, designated commercial areas, industrial facilities, public institutions, and places of public assembly.

- Used pipe – 100% of old girth welds.

- 100% of girth welds at pipeline tie-ins, including tie-ins of replacement sections.

Subpart E - Pressure Testing

49 CFR 195
Hazardous Liquid Pipelines

Images Provided by David Bull, Don McCoy, and Google Images

§195.300 Scope

- This subpart prescribes minimum requirements for the pressure testing of steel pipelines. However, this subpart does not apply to the movement of pipe under §195.424.

§195.302 General Requirements

- (a) Except as otherwise provided in this section and in §195.305(b) , no operator may operate a pipeline unless it has been pressure tested under this subpart **without leakage**.

In addition, no operator may return to service a segment of pipeline that has been replaced, relocated, or otherwise changed until it has been pressure tested under this Subpart **without leakage**.

Exceptions to Pressure Testing

Older pipelines had exemption until 1998, testing required by Dec. 7, 2003.

- Various older lines with MOP established under 192.406(a)(5) – 4 hour chart or log of pressure.
- Older CO2 lines or in rural area used for production.
- Low stress built before 1994, no HVL.
- Risk based alternative.
- HVL, low-stress and risk based alternative lines still retain some exemptions.

Risk-Based Alternative to Pressure Testing Older Pipelines

- §195.303 Risk-based alternative to pressure testing older hazardous liquid and carbon dioxide pipelines.

- All existing regulated pipelines (except older HVL, low stress, risk based) should have been tested or evaluated.

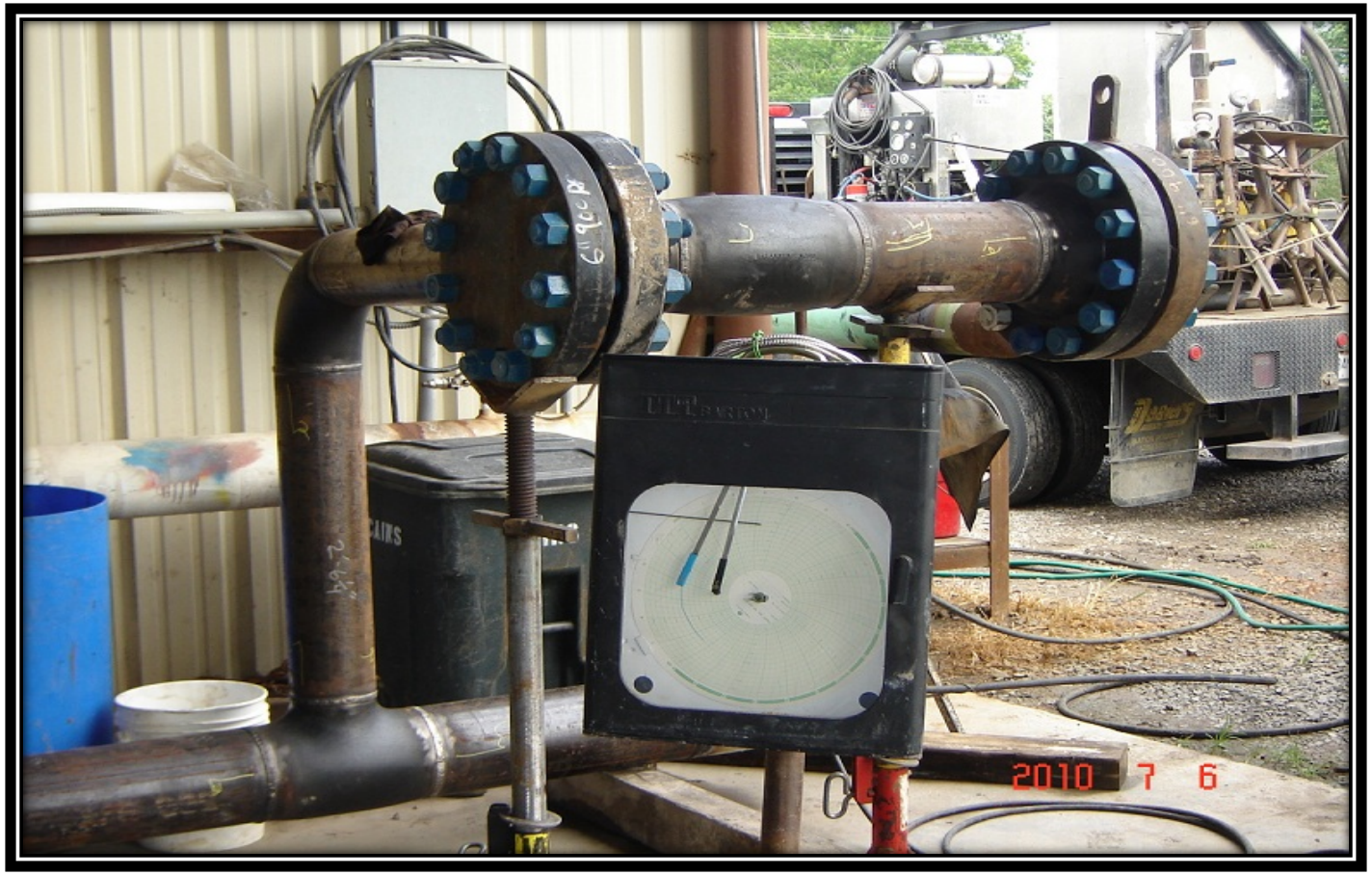
- If an older line becomes a regulated line, 195.302 and 195.303 will need to be reviewed for applicability.

Pressure Test

§195.304 Test Pressure

The test pressure for each pressure test conducted under this subpart must be maintained throughout the part of the system being tested for at least 4 continuous hours at a pressure equal to 125 percent, or more, of the maximum operating pressure and, in the case of a pipeline that is not visually inspected for leakage during test, for at least an additional 4 continuous hours at a pressure equal to 110 percent, or more, of the maximum operating pressure.

Pressure/Temperature Recorder



Pressure test

§195.305 Testing of Components

- (a) Each pressure test under §195.302 must test all pipe and attached fittings, including components, unless otherwise permitted by paragraph (b) of this section.

- (b) If a component is the only item being replaced or added need not be tested if tested at the factory or manufactured under quality control that ensures it is equal to a tested prototype.

§195.306 Test Medium

- Water must be used except-
  - liquid petroleum that does not vaporize rapidly may be used if - outside populated areas, patrolled, buildings evacuated while pressure > 50% SMYS, continuous communication.

- CO_2 pipelines – inert gas or CO_2 can be used if conditions meet those listed above, plus:

  - Max. hoop stress does not exceed 80% SMYS

  - Pipe involved is new, with a longitudinal joint factor of 1

- Air or inert gas may be used in low-stress pipelines.

§195.308 Testing of Tie-Ins

- Pipe associated with tie-ins must be pressure tested, either with the section to be tied in or separately.

- Welds associated with the tie-ins need to be radiographed. (See 195.234 for non-destructive testing.)

§195.310 Records

(a) A record must be made of each pressure test required by this subpart, and the record of the **latest** test must be retained as long as the facility tested is in use

§195.310 Records

(b) The record required by paragraph (a) of this section must include:

(1) The pressure recording charts.

(2) Test instrument calibration data.

(3) The name of the operator, the name of the person responsible for making the test, and the name of the test company used, if any.

(4) The date and time of the test.

(5) The minimum test pressure.

(6) The test medium.

§195.310 Records

(7) A description of the facility tested and the test apparatus;

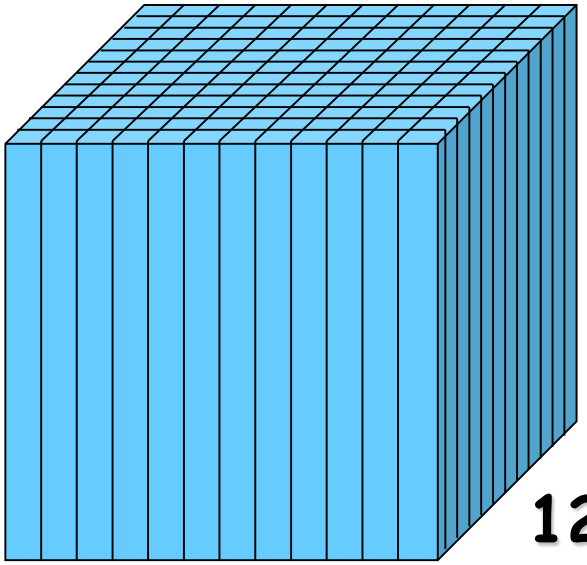
(8) An explanation of any pressure discontinuities, including test failures, that appear on the pressure recording charts; and,

(9) Where elevation differences in the section under test exceed 100 feet (30 meters), a profile of the pipeline that shows the elevation and test sites over the entire length of the test section.

(10) ***Temperature of the test medium or pipe during the test period***.

Basic Measurement - psi

- 1 cubic foot of water weighs 62.4 pounds.
- 1 cubic foot consists of 144 columns (1" x 1" x 12")



- Therefore each column would weigh - 62.4 lbs/144 = 0.433 lbs

Basic Measurement - head

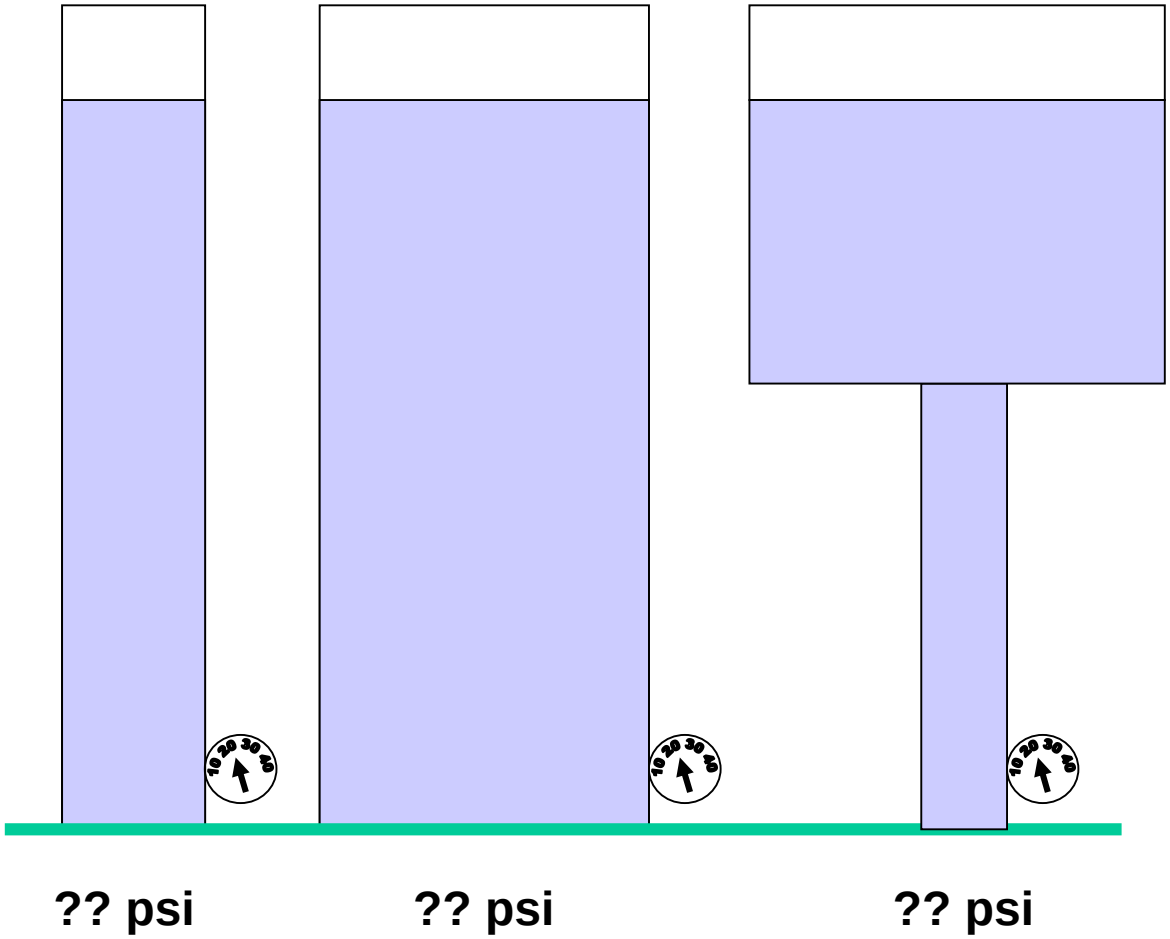
Height of a fluid times its weight

.433 psi per 1 foot of liquid

2.31 feet of head per 1 psi

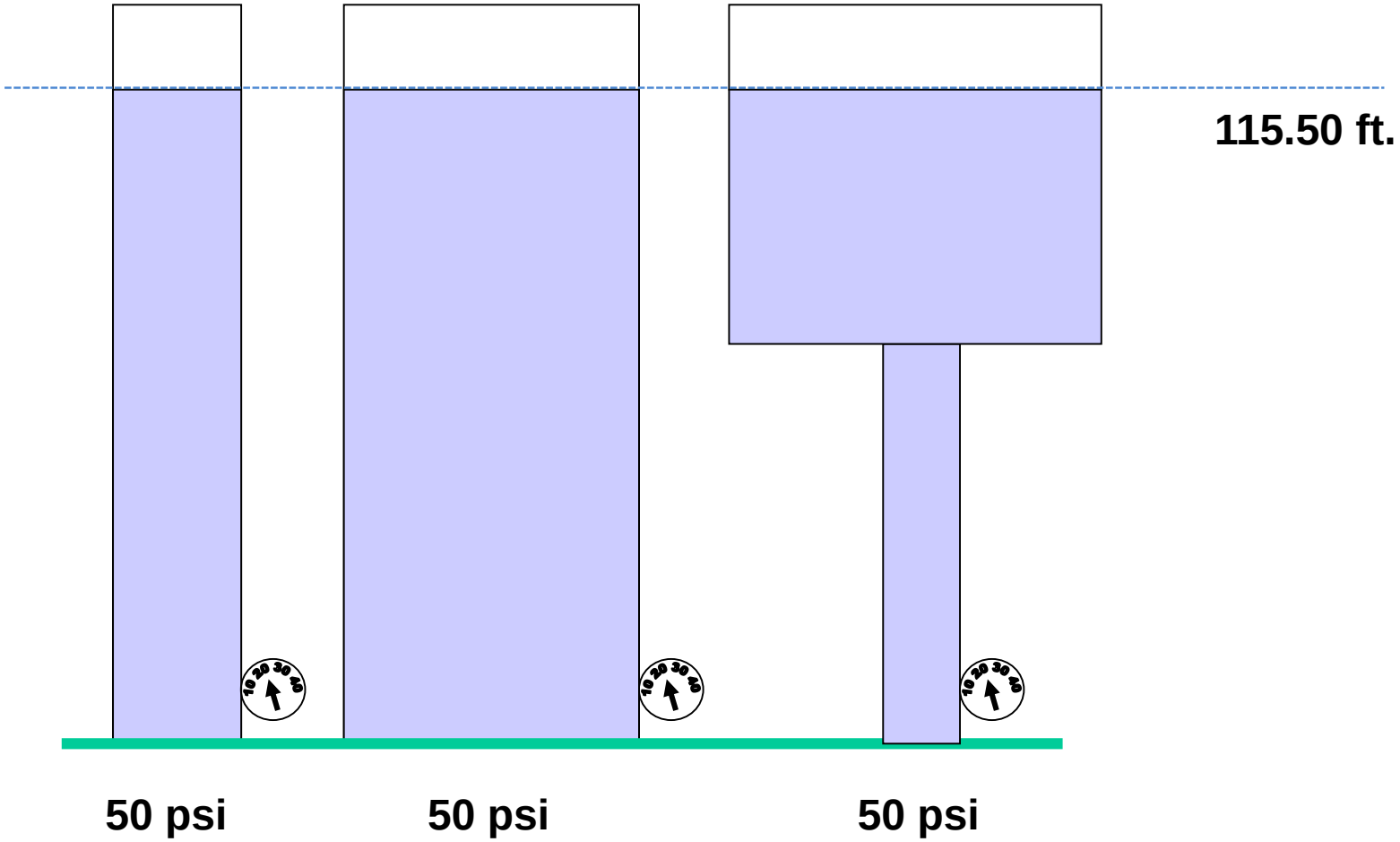
(water - s.g. 1.00)

Basic Measurement - head

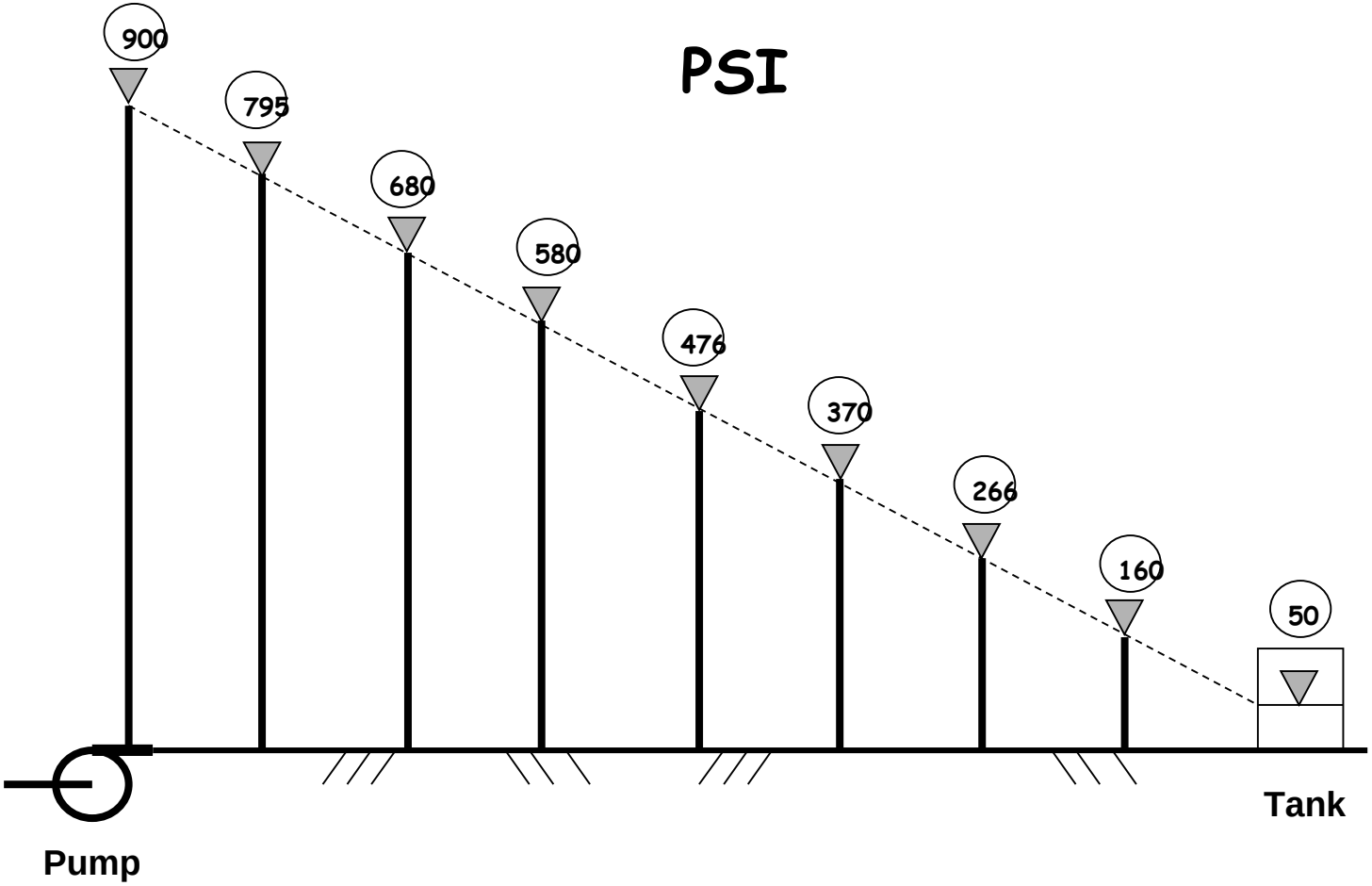


U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

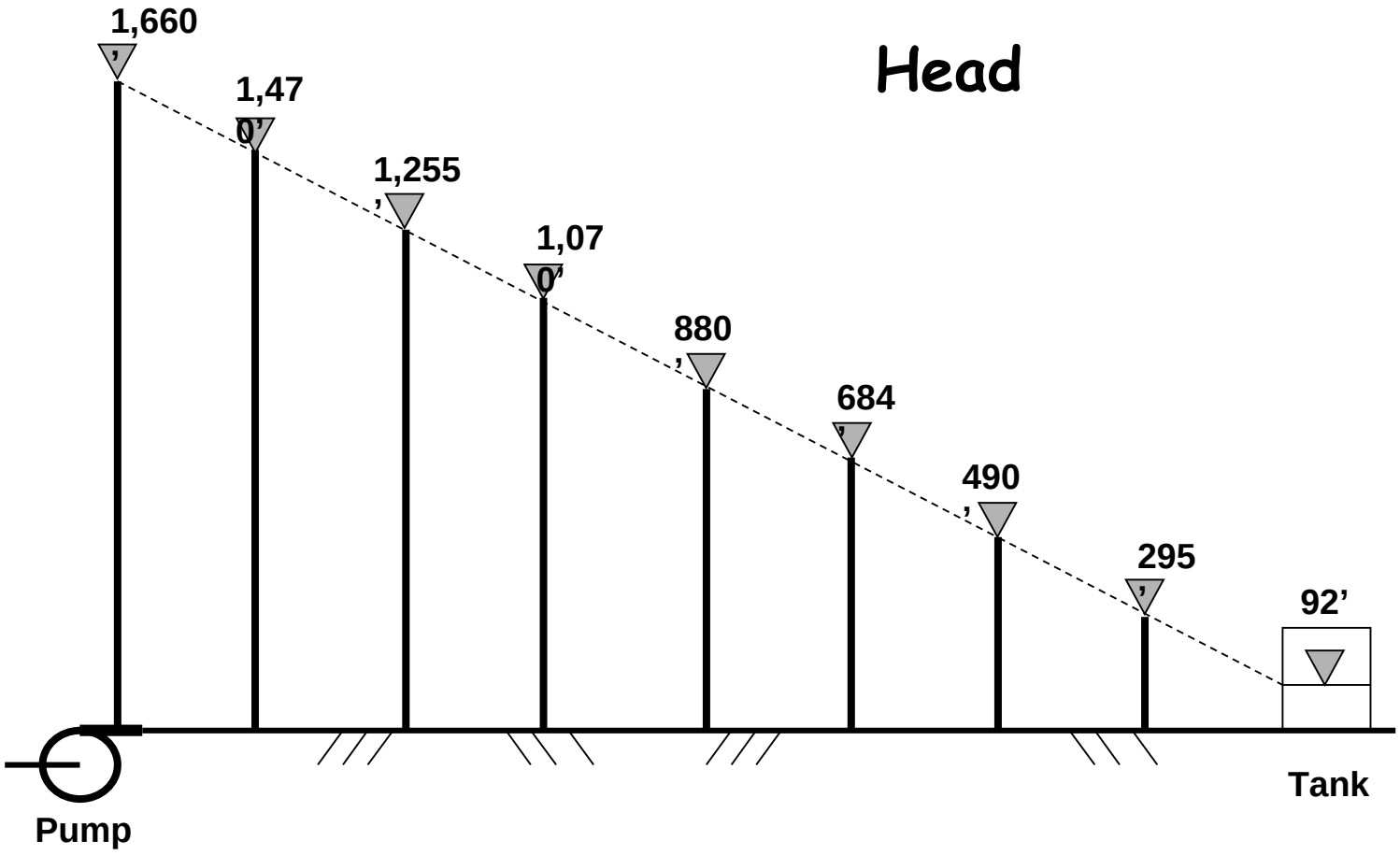
Basic Measurement - head



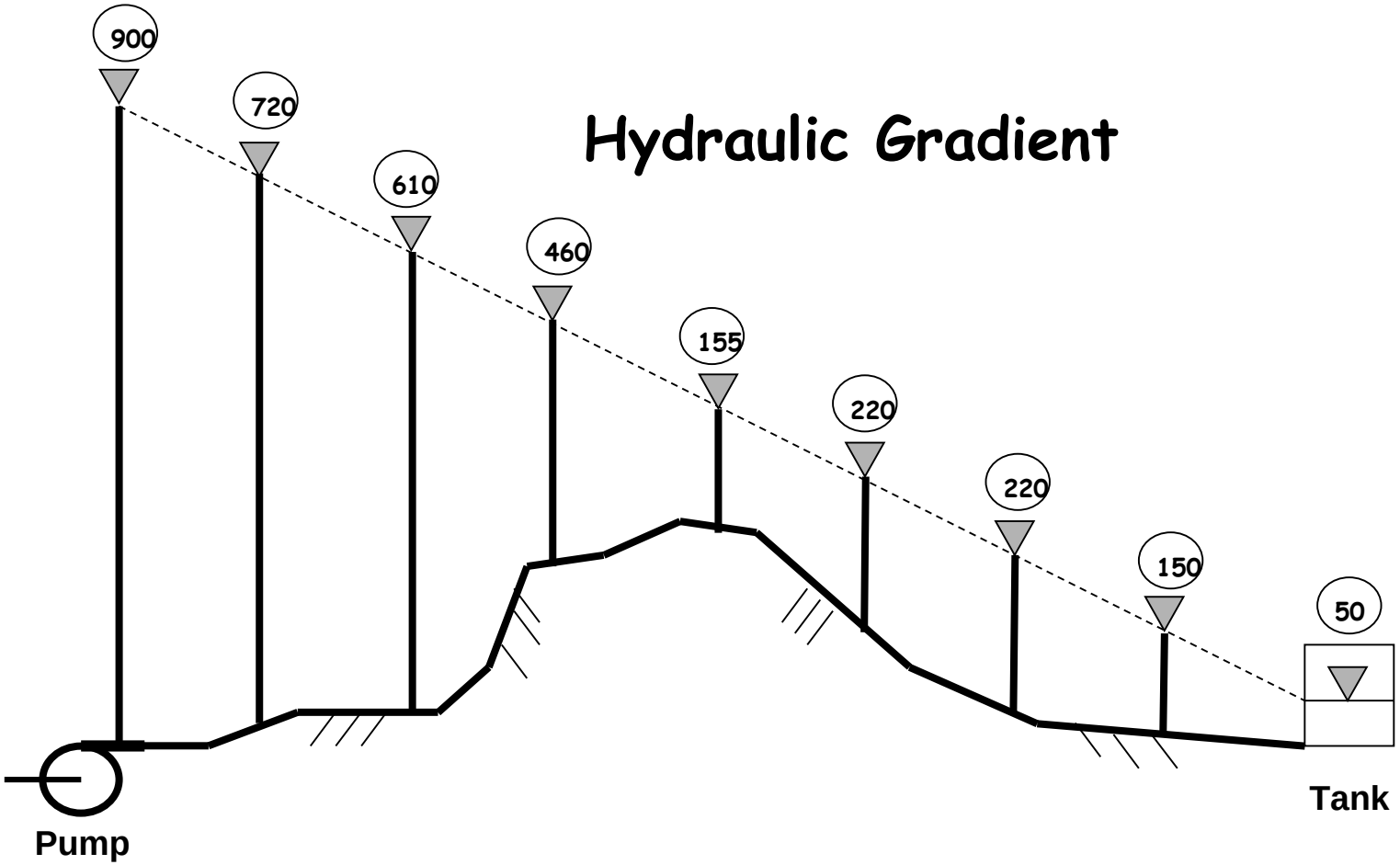
Basic Measurement – friction loss



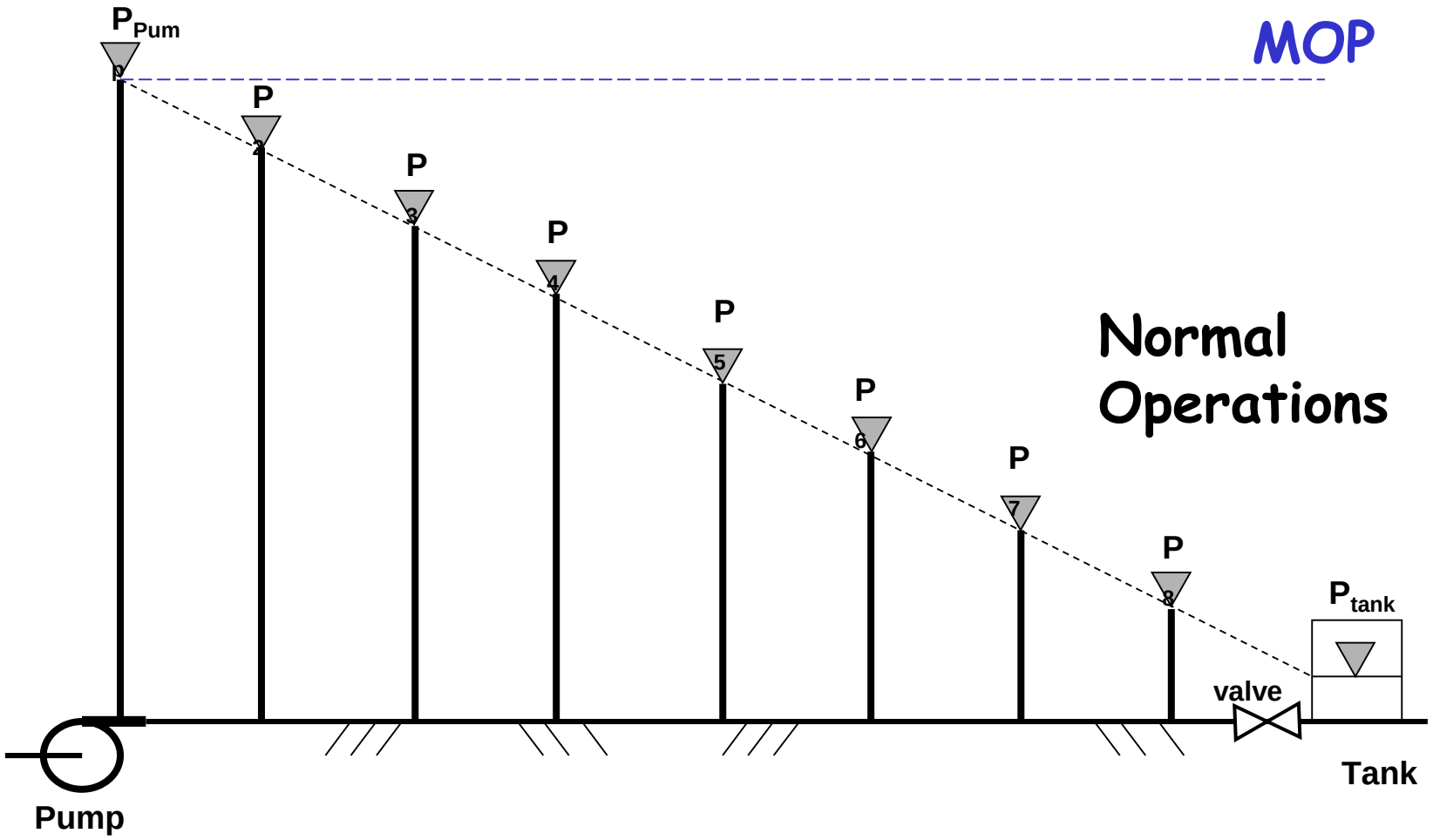
Basic Measurement – friction loss



Basic Measurement – hydraulic gradient

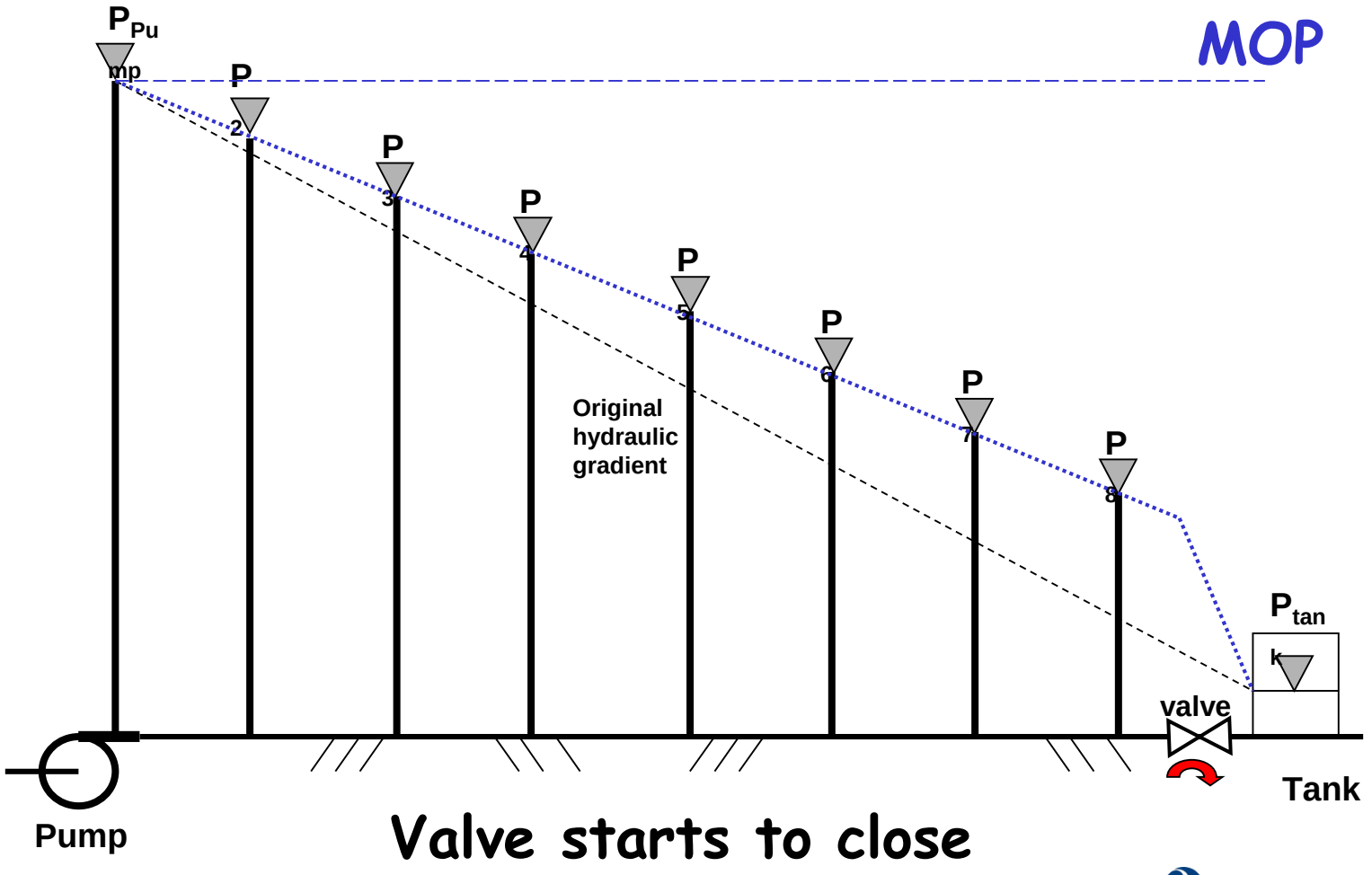


Pipeline Operation - MOP



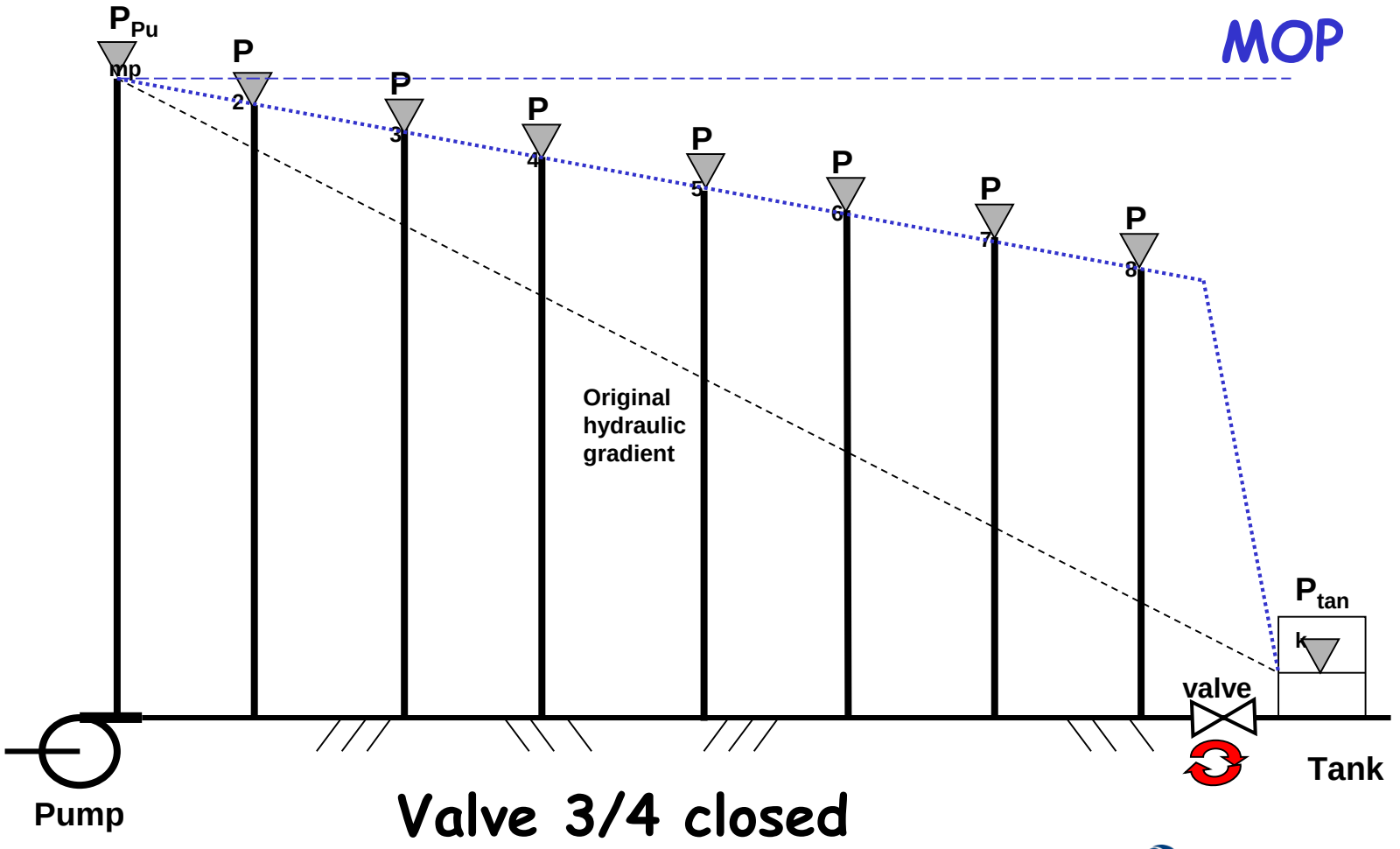
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Pipeline Operation - MOP

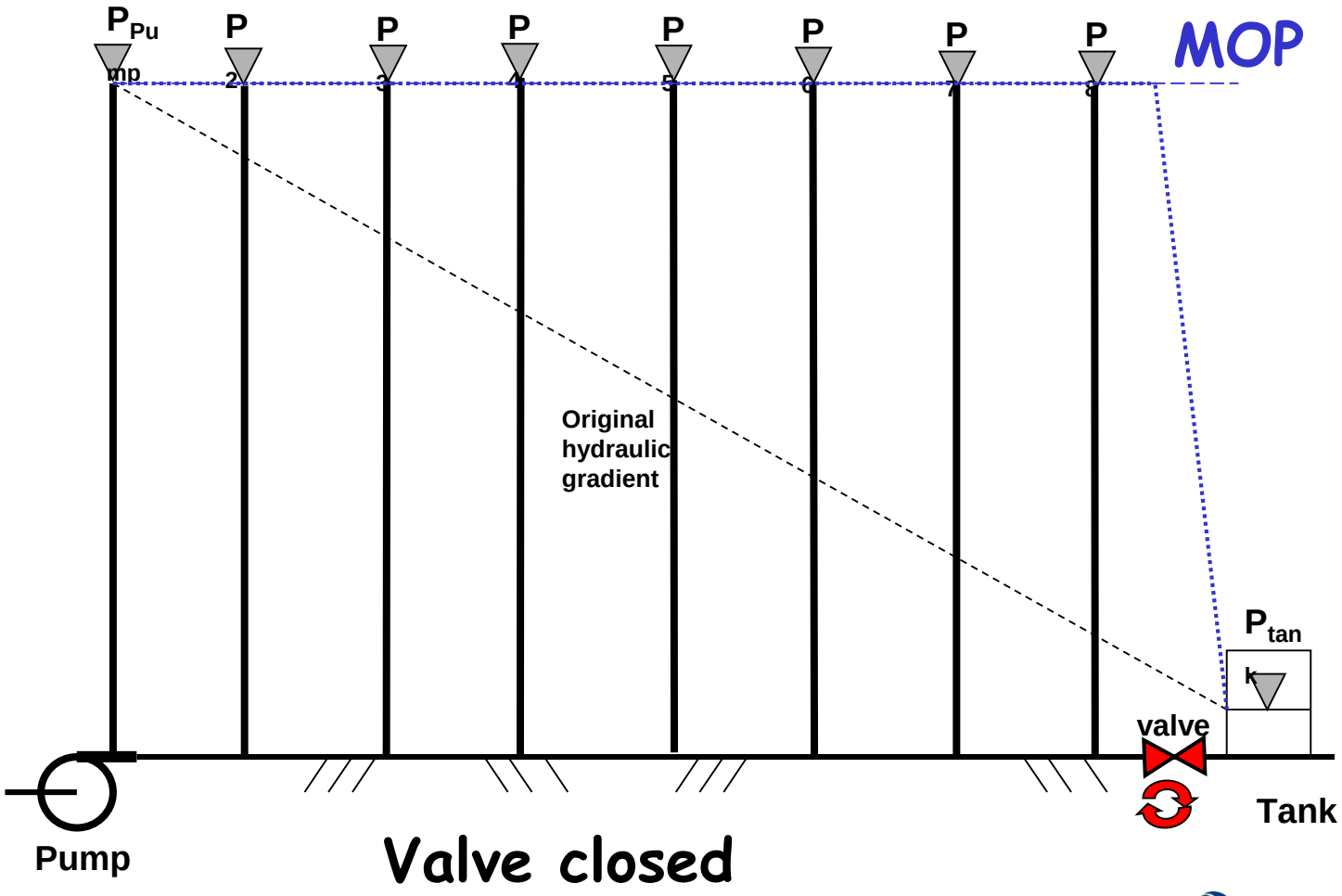


U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

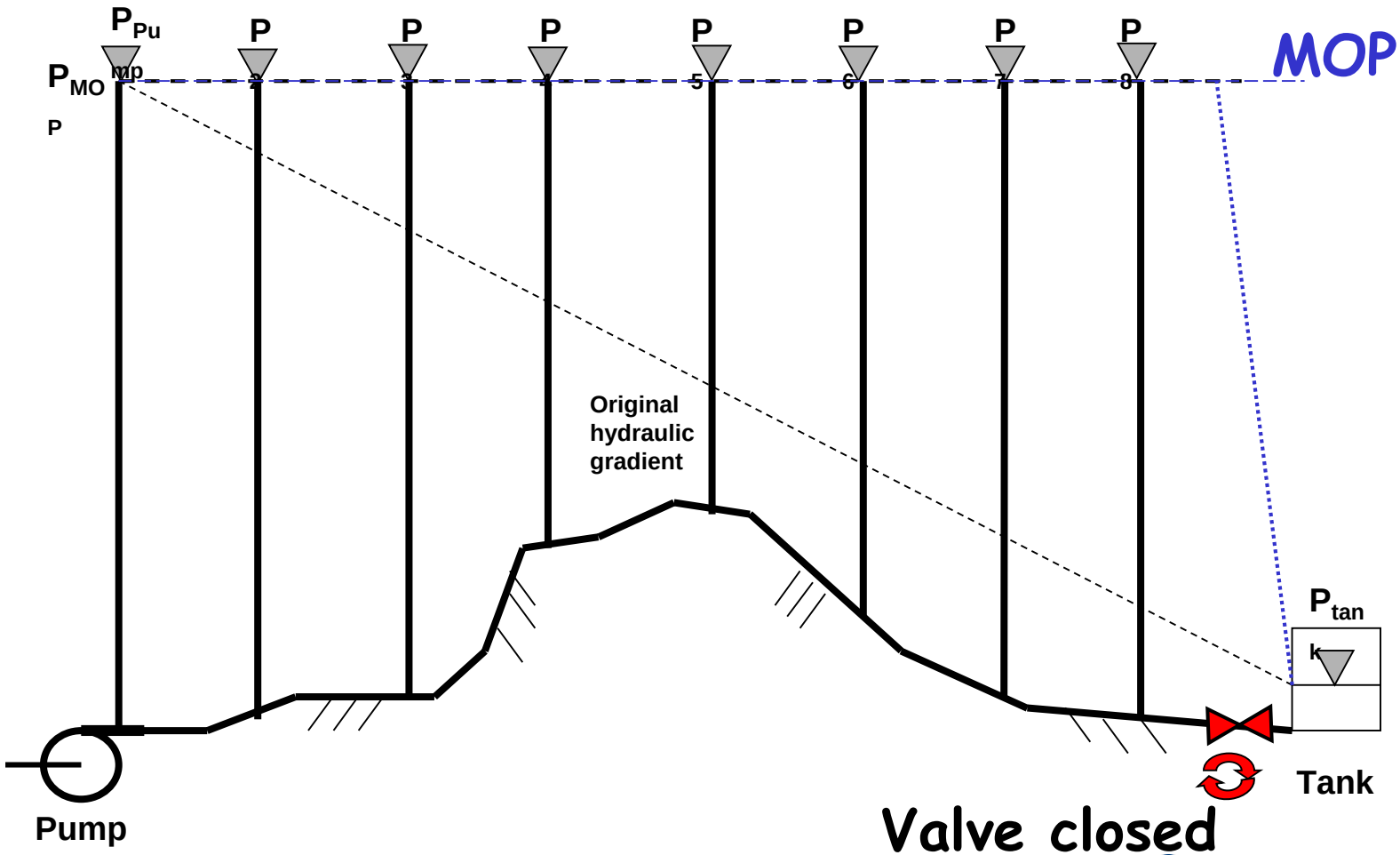
Pipeline Operation - MOP



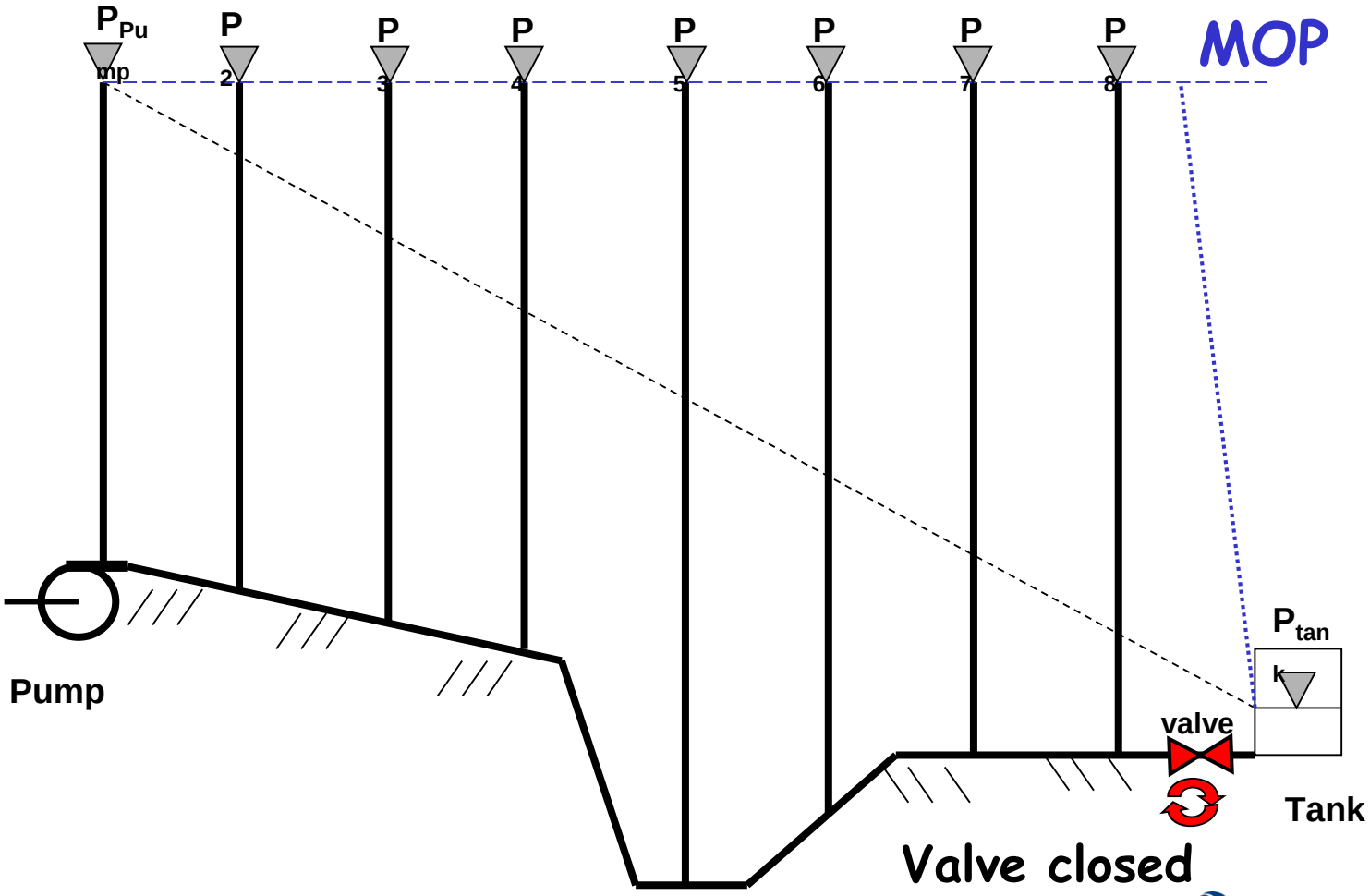
Pipeline Operation - MOP



Pipeline Operation - MOP



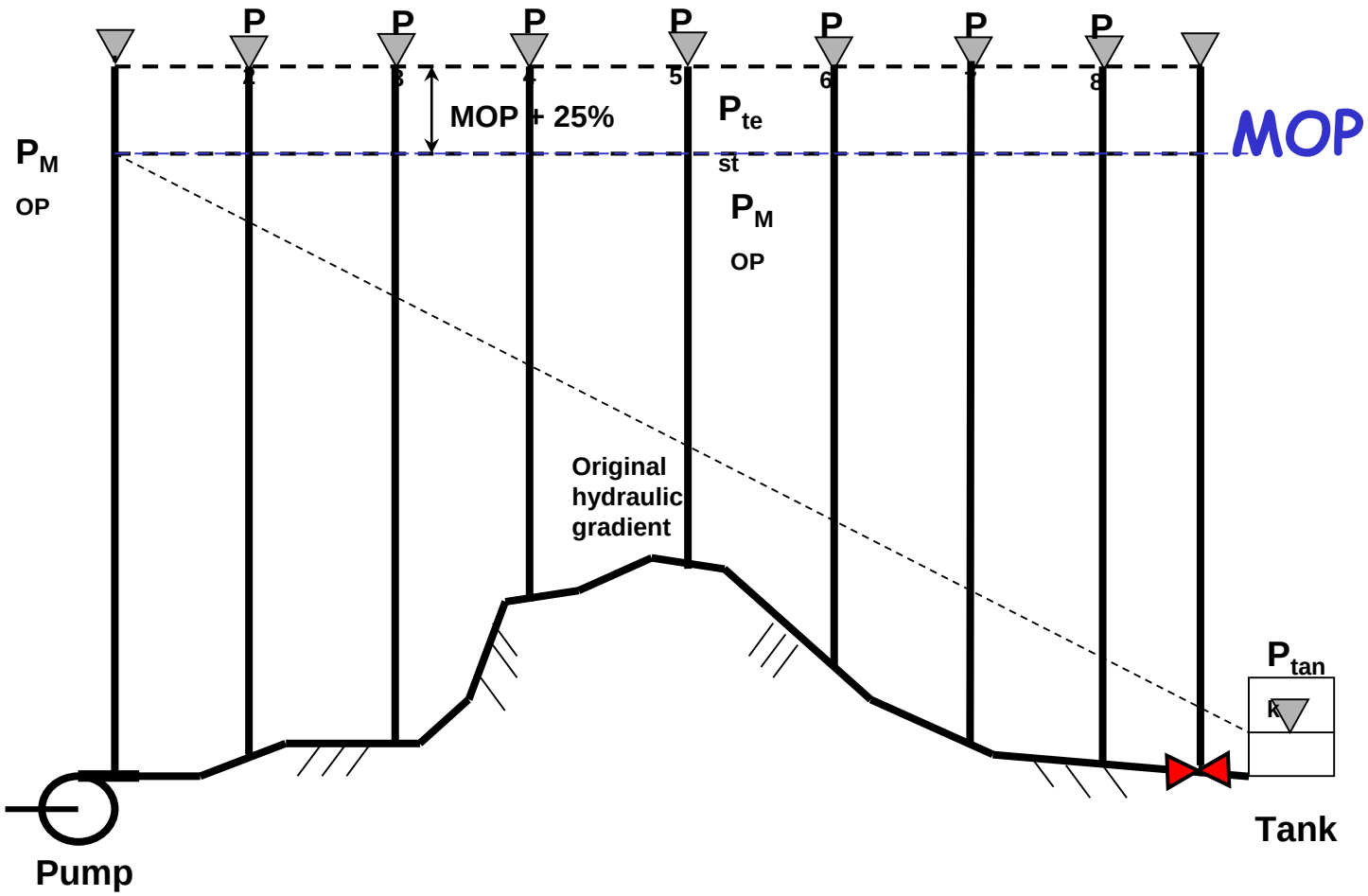
Pipeline Operation - MOP



U.S. Department of Transportation

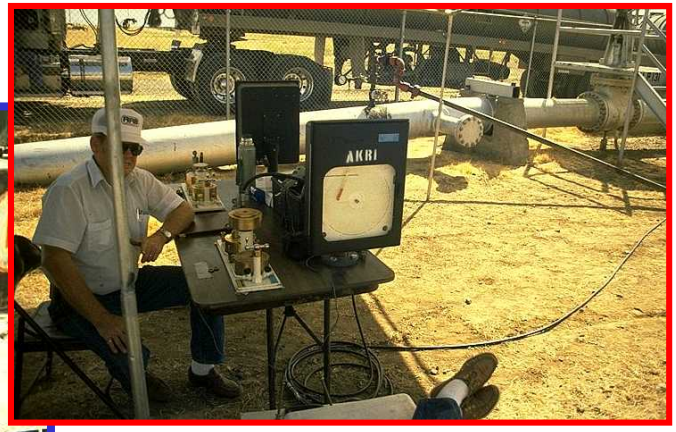
Office of the Assistant Secretary for Research and Technology

Pipeline Operation – MOP & Test

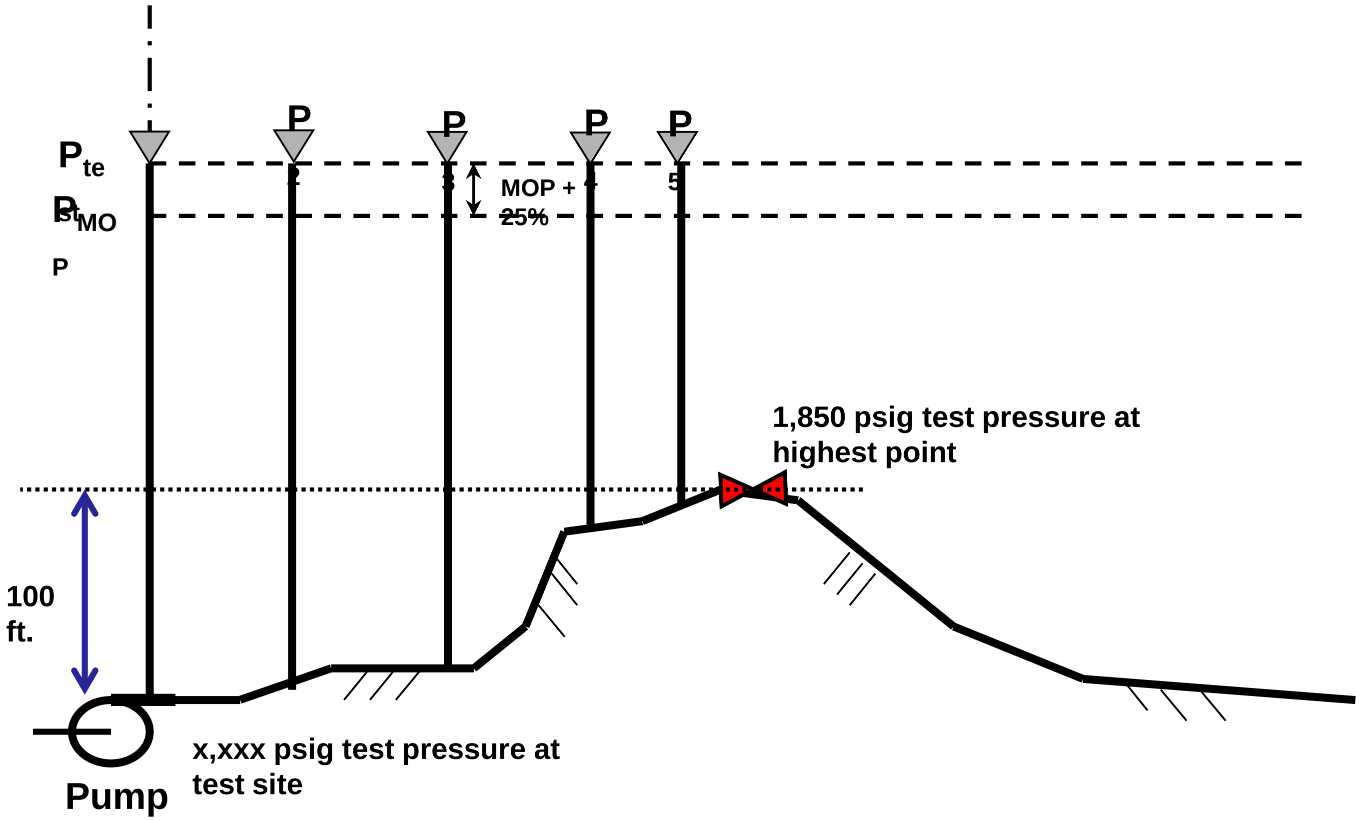


U.S. Department of Transportation
Office of the Assistant Secretary for
Research and Technology

Hydrostatic Testing



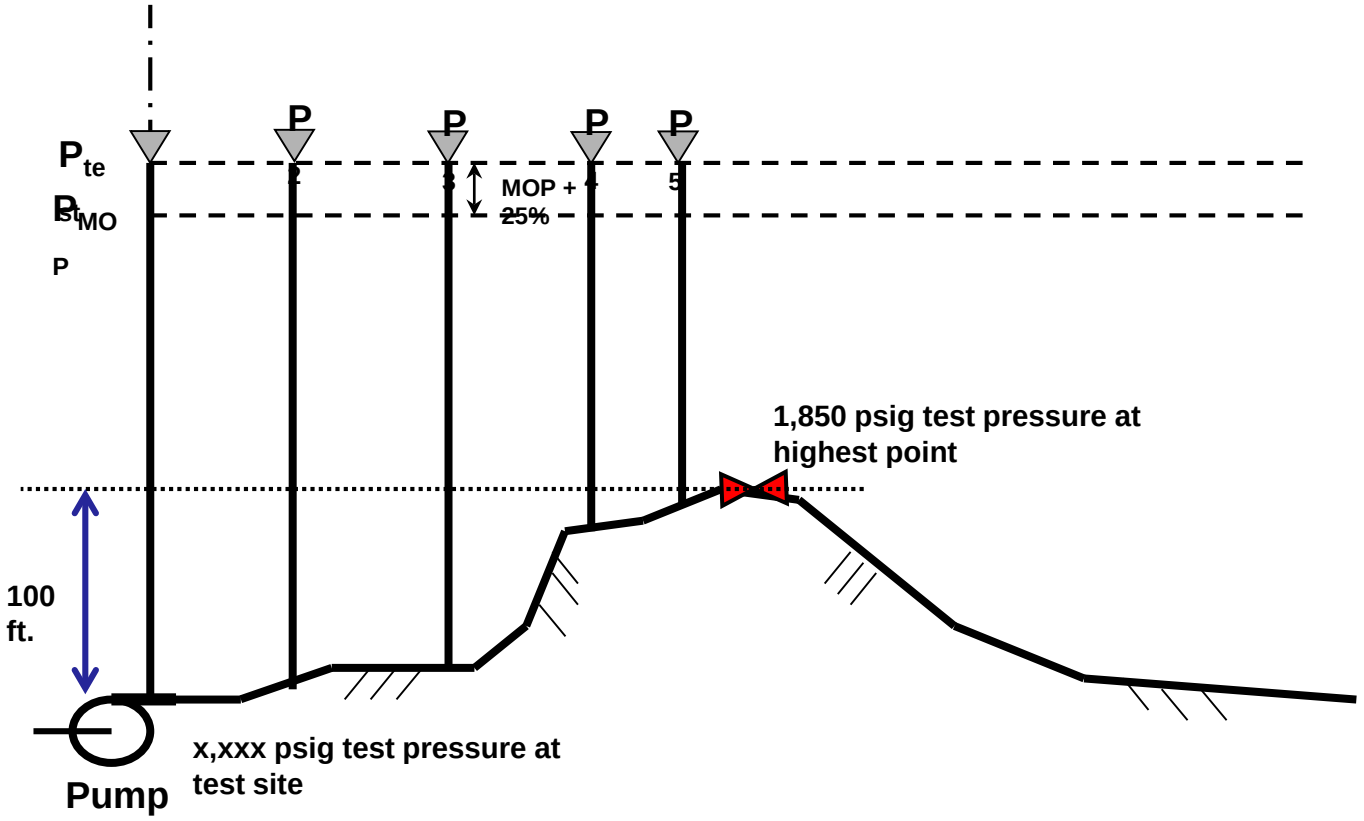
Hydrostatic Testing – Elevation Differences



What should the test pressure be at the test site to read 1,850 psig at the highest point?

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Hydrostatic Testing – Elevation Differences



100 foot elevation difference – (100ft x .433 psi = 43.3 psig) Therefore test site must read 1,893.3 psig

Pressure Testing

Maximum Operating Pressure

49 CFR 195

Hazardous Liquid Pipelines

§195.406 Maximum Operating Pressure

(a)Except for surges, pressure cannot exceed any of the following:

(a)(1) design pressure of pipe.

(a)(2) design pressure of component.

(a)(3) 80% of test pressure from Subpart E.

(a)(4) 80% of factory test for components if exempt.

(a)(5) 80% of highest pressure or other test.

(b) Pressures may not exceed 110 percent of above. - Controls/protective equipment required.

Design Pressure of Pipe

Ref. 195.106, Internal design pressure.

$$P = (2\ St/D) \times E \times F$$

P = Internal design pressure.

S = Yield strength.

t = Nominal wall thickness.

D = Nominal outside diameter.

E = Seam joint factor.

F = A design factor of 0.72, 0.60 on platforms, 0.54 cold expansion pipe that is heated.

If any factors unknown, refer to 195.106(b)-(e).

Components

Design pressure of component.

If not tested (exempt under 195.305, single component replacement), then 80% of factory test or rating.

Pressure Test

Use 80% of Subpart E test. Pressure must be at least 125% of MOP and held for at least 4 continuous hours (195.304) – if visually inspected during test.

[underground lines need an additional 4 hours of test at 110% MOP]

-or-

For older lines not tested under Subpart E (see §§195.302(b)(1) and (b)(2)(i)), 80% of documented test pressure or highest operating pressure held for 4 or more continuous hours.

MOP Determination (example calculation # 1)

Given:

-You have a 14” O.D. hazardous liquid pipeline built in 1998
-Pipe is ASTM A671 Electric-fusion welded, X-42 SMYS
-Nominal wall thickness is 0.375 inch
-Pipeline is onshore, on land, not subject to cold expansion
-Valves and fittings are ANSI 600 rated (year 1998)
-Line was hydro-tested in 1998 in accordance with Subpart E to 1,375 psig

Question 1 – What is the MOP ?
Question 2 – What is the Limiting Factor?

MOP Determination (example calculation # 1)

Design: $\frac{2 \times 42{,}000 \times 0.375}{14} \times 1.0 \times 0.72 = 1{,}620$ psig

Test: $\frac{1{,}375}{1.25} = 1{,}100$ psig

Fittings: ANSI 600 = 1,480 psig

Answer 1: MOP is lowest of Design, Test, Components = **1,100 psig**

Answer 2: The limiting factor is: **Test Pressure**

MOP Determination (example calculation # 2)

Given:

-You have a 14” O.D. hazardous liquid pipeline built in 1965
-Pipe is ASTM A671 Electric-fusion welded, X-42 SMYS
-Nominal wall thickness is 0.375 inch
-Pipeline is onshore, on land, not subject to cold expansion
-Valves and fittings are ANSI 600 rated (year 1965)
-Line was never hydro-tested in accordance with Subpart E
-Records adequately demonstrate that the line operated for 6 continuous hours at 1,200 psig.

Question 1 – What is the MOP ?
Question 2 – What is the Limiting Factor?

MOP Determination (example calculation # 2)

Design: $\frac{2 \times 42{,}000 \times 0.375}{14} \times 1.0 \times 0.72 = 1{,}620$ psig

Test: Never tested @ Subpart E, so = 0 psig

Fittings: ANSI 600 = 1,440 psig

Answer 1: [For a new pipeline, say year 2014, the MOP would be 0 psig; this line would need to be tested in accordance with Subpart E to establish a MOP]

BUT

Since this is a "grandfathered" line [195.302(b)(1)(i)] we take the 1,200 psig that it operated at, for at least 4 continuous hours, and can use 80% of that (1,200 x 0.8) to establish a MOP = **960 psig**

Answer 2: The limiting factor is: **Operating Pressure**

Records - Traceable, Verifiable, Complete

Verification of Records for per PHMSAADB 2012-06

- ✓ **Review and verify records for MOP.**
- ✓ **Gas Transmission Annual Report will require reporting of total miles and miles with adequate records.**
- ✓ **No requirement for hazardous liquids but provides specifics on what are adequate records.**

Traceable

Linked to original information.

-Pipe mill records.

-Purchase requisitions.

-As built documents.

Review for transcription errors.

Transcribed documents verified with supporting documents.

Verifiable

- ✓Information confirmed by other complementary, separate documents.
- ✓Contract specification for pressure test with charts or logs.
- ✓Purchase order with pipe specifications and metallurgical test.
- ✓Affidavit prepared and signed at time of test or inspection by individual familiar with test or inspection.

Complete

- ✓Records with a signature, date or other marking.
- ✓Test record example-
  1. Segment tested
  2. Who conducted test
  3. Duration of test
  4. Test medium
  5. Temperature
  6. Pressure readings
  7. Elevation
- ✓Should be specifically linked to a pipe segment.

Subpart F
Operations and Maintenance

49 CFR 195

Hazardous Liquid Pipelines

§195.400 Scope

- This subpart prescribes minimum requirements for operating and maintaining pipeline systems constructed with steel pipe.

§195.401 General requirements

- (a) Cannot operate or maintain system at lower safety level required by 195.402 and this subpart.

- (b) Making repairs (amended Oct. 11, 2010)
  - (1) Non IM repairs – within reasonable time, however if immediate hazard, may not operate until unsafe condition is corrected.
  - IM repairs – correct according to 195.452(h).

  (2) IMP repairs – must correct conditions as prescribed in 195.452.

§195.401 General requirements

(c) Except as provided in §195.5, no operator may operate any part of any of the following pipelines unless it was designed and constructed as required by this part:

(1) An **interstate pipeline**, other than a low-stress pipeline, on which construction was begun after **March 31, 1970**, that transports hazardous liquid.
(2) An **interstate offshore gathering line**, other than a low-stress pipeline, on which construction was begun after **July 31, 1977**, that transports hazardous liquid.
(3) An **intrastate pipeline**, other than a low-stress pipeline, on which construction was begun after **October 20, 1985**, that transports hazardous liquid.
(4) A pipeline on which construction was begun after **July 11, 1991**, that transports **carbon dioxide**.
(5) A **low-stress pipeline** on which construction was begun after **August 10, 1994**.

§195.402- Procedural Manual

(a) Manual of written procedures required for normal operations and maintenance activities, and handling abnormal operations and emergencies.

- Reviewed once each calendar year, NTE 15 months.
- Prepared before initial operation, parts kept at locations where O&M activities are conducted.
- Administrator or certified state agency may issue Notice of Amendment.

§195.402- Procedural Manual

(c) Required procedures.

- Construction records, maps, operating history available as necessary for safe O&M.
- Accident investigation and reporting procedures.
- Operating, maintenance and repair procedures for Subpart F and H (corrosion control).
- Identification of immediate response areas.
- Analyzing accidents, minimizing hazards and recurrence of accidents.
- Start-up and shutdown of the pipeline.

§195.402- Procedural Manual

(c) Required procedures (continued)

- Pressure monitoring on start-up and shut-in if not fail safe.
- Monitor pressure, temperature, flow, other data if not fail safe.
- Abandonment of facilities, purging, sealing.
- Minimize accidental ignition.
- Liaison with fire, police, public officials.
- Periodically review work done by operator.
- Protect personnel in trenches from unsafe accumulations of vapor/gas.
- Control room management procedures.

§195.402- Procedural Manual

(d) Abnormal operation, procedures for safety.

- **When operating design limits are exceeded**:

-Must have procedures to: Respond to, Investigate & correct the cause of the problem.

-Listed AOCs operator must have procedures for:

- Unintended closure of valves or shutdowns
- Increase/decrease in pressure or flow (outside normal range)
- Loss of communications.
- Operation of any safety device.
- Any other malfunction, deviation, error, which could cause a hazard to persons or property.

§195.402- Procedural Manual

(d) Abnormal operation, procedures for safety.

- Check variations after abnormal operation ends.
- Correct variations in pressure, flow, controls.
- Notify responsible personnel.
- Periodically review response.

§195.402- Procedural Manual

(e) Emergencies – procedures for safety.

- Receive, identify, classify notices of events.
  - ❑Requiring immediate response by operator.
  - ❑Notices to fire, police, public officials and communicating to personnel for corrective action.

- Prompt and effective response to notices.
  - ❑Fire, explosion, accidental release, operational failure, natural disaster.

- Personnel, equipment, instruments, tools, material available as needed.

§195.402- Procedural Manual

(e) Emergencies – procedures for safety.

- Taking necessary action, shut down or reduce pressure to minimize volume of spill.
- Control of released liquid, including possible intentional ignition of flammable HVL.
- Minimize public exposure to injury and ignition.
  - ❑Assist with evacuation, traffic, other actions.
- Notify, coordinate with fire, police, public officials, preplanned and actual response to emergency.

§195.402- Procedural Manual

(e) Emergencies – procedures for safety.

- In HVL failure, use instruments to assess extent of vapor cloud and hazardous areas.
- Post accident review.
- Actions to be taken by controller during emergency, see §195.446.

(f) Instructions for recognizing/reporting safety related conditions.

195.402 Abandonment of Facilities.

(c)(10) To abandon

- Safe disconnection from pipeline system.
- Purge and ensure no combustible mixture remains.
- Seal at the ends (and other openings).
- Offshore – fill with water or inert material.

- Pipelines offshore or crossing navigable waterway, last operator files report to NPMS (§195.59)

§195.403 Emergency Response Training.

- Continuing training program.
  - Carry out procedures.
  - Know product characteristics.
  - Recognize conditions.
  - Take steps to control, minimize potential.
  - Knowledge of fire, extinguishers, fire control.
    - ❑ Include, if feasible, simulated emergency condition.

- Review once each calendar year NTE 15 months.
  - Performance, make changes to training, verify supervisors knowledge of emergency response for their area of responsibility.

§195.404 Maps and Records.

(1) Location and identification of the following pipeline facilities:

- (i) Breakout tanks.
- (ii) Pump stations.
- (iii) Scraper and sphere facilities.
- (iv) Pipeline valves.
- (v) Facilities to which §195.402(c)(9) applies.
- (vi) Rights-of-way.
- (vii) Safety devices to which §195.428 applies.

§195.404 Maps and Records.

(2) All crossings of public roads, railroads, rivers, buried utilities, and foreign pipelines.

(3) The maximum operating pressure of each pipeline.

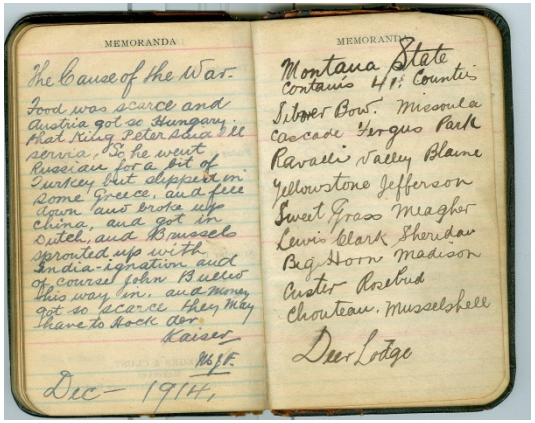
(4) The diameter, grade, type and nominal wall thickness of all pipe.

§195.404 Maps and Records.

(b) Each operator shall maintain for at least 3 years daily operating records that indicate-

(1) The discharge pressure at each pump station.

(2) Any emergency or abnormal operation to which the procedures under §195.402 apply.



U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

§195.404 Maps and Records.

(c) Each operator shall maintain the following records for the periods specified:

- (1) The date, location, and description of each repair made to pipe shall be maintained for the useful life of the pipe.
- (2) The date, location, and description of each repair made to parts of the pipeline other than pipe shall be maintained for at least 1 year.
- (3) A record of each inspection and test required by this subpart shall be maintained for at least 2 years or until the next inspection or test is performed, whichever is longer.

§195.408 Communications

(a) Each operator must have a communication system to provide for the transmission of information needed for the safe operation of its pipeline system.

(b)…must include:

- Monitoring operation data.
- Receiving notices.
- Two way voice for abnormal operations.
- Communications with fire, police, public officials during emergency, including natural disaster.

§195.410 Line Markers

(a) Except as provided in paragraph (b) of this section, each operator shall place and maintain line markers over each buried pipeline in accordance with the following:

(1) Markers must be located at each public road crossing, at each railroad crossing, and in sufficient number along the remainder of each buried line so that its location is accurately known.

"Line of Sight"

§195.410 Line Markers

(2) The marker must state at least the following on a background of sharply contrasting color:

- (i) The word "Warning," "Caution," or "Danger" followed by the words ``Petroleum (or the name of the hazardous liquid transported) Pipeline'', or ``Carbon Dioxide Pipeline,'' all of which, except for markers in heavily developed urban areas, must be in letters at least 1 inch (25 millimeters) high with an approximate stroke of 1/4 inch (6.4 millimeters).

- (ii) The name of the operator and a telephone number (including area code) where the operator can be reached at all times.

Typical Pipeline Marker

§195.410 Line Markers

- (b) Line markers are not required for buried pipelines located-
  - (1) Offshore or at crossings of or under waterways and other bodies of water; or
  - (2) In heavily developed urban areas such as downtown business centers where-
    - (i) The placement of markers is impracticable and would not serve the purpose for which markers are intended; and
    - (ii) The local government maintains current substructure records.

- (c) Each operator shall provide line marking at locations where the line is above ground in areas that are accessible to the public.

195.412 Inspection of ROWs, Navigable Waters

- Inspection of rights-of-way and crossings under navigable waters.
  - Inspect surface conditions 26 times per year, intervals NTE 3 weeks
  - Walking, driving, flying or other means.
  - Navigable waterway crossings inspections NTE 5 years.

§195.420 Valve Maintenance.

- Maintain valves necessary for safe operation of the pipeline system in good working order.
- Inspect mainline valves 2 times/year, NTE 7-1/2 months.
- Protect from unauthorized operation and vandalism.

§195.422 Pipeline Repairs

- Repairs must be made in a safe manner and to prevent damage to persons or property.

- May not use any pipe, valve, or fitting unless designed and constructed as required by this **part**.

§195.424 Pipe movement

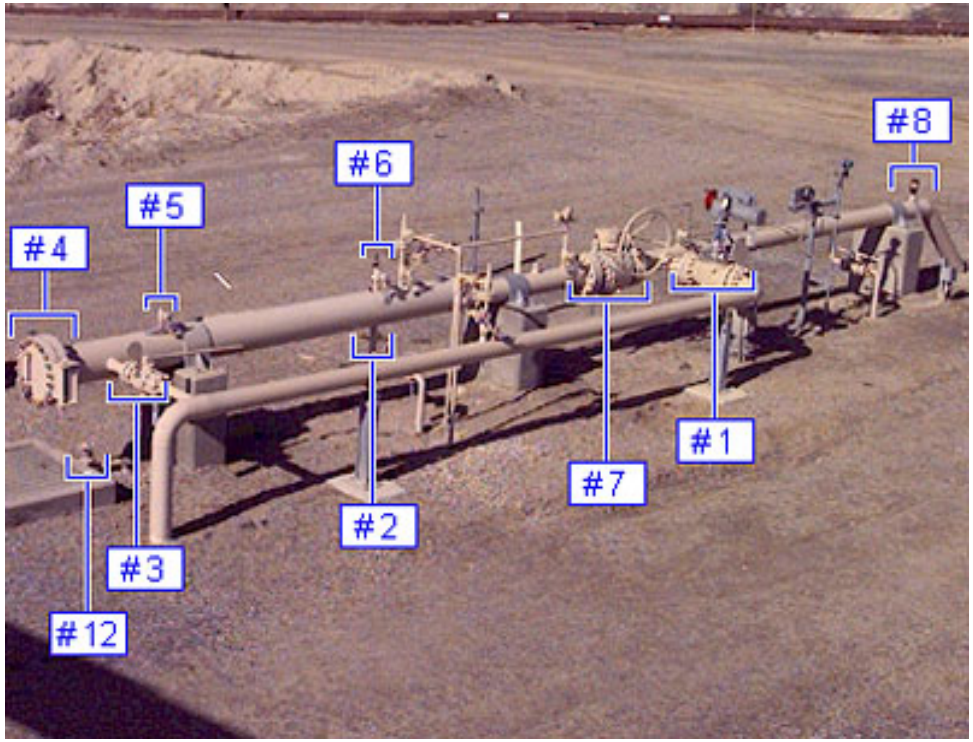
- May not move line pipe unless pressure in the line section reduced to no more than 50% MOP.

- May not move line containing HVLs in line joined by welding unless-
  - Impractical to empty line of liquids, procedures to protect public, warn and evacuate where necessary.
  - Reduce pressure.

- May not move lines not joined by welding only if impractical to empty, then take precautions as above, and reduce pressure and isolate.

§195.426 Scraper and Sphere Facilities

- Must have relief device on barrel.
- Must have pressure indicator or means to insert/remove if pressure not relieved.



§195.430 Firefighting Equipment

- Each operator shall maintain adequate firefighting equipment at each pump station and breakout tank area. The equipment must be-

  (a) In proper operating condition at all times.

  (b) Plainly marked so that its identity as firefighting equipment is clear.

  (c) Located so that it is easily accessible during a fire.

§195.434 Signs

- Each operator must maintain signs visible to the public around each pumping station and breakout tank area. Each sign must contain the name of the operator and a telephone number (including area code) where the operator can be reached at all times.

§195.436 Security of Facilities

- Each operator shall provide protection for each pumping station and breakout tank area and other exposed facility (such as scraper traps) from vandalism and unauthorized entry.

§195.438 Smoking or Open Flames

- Each operator shall prohibit smoking and open flames in each pump station area and each breakout tank area where there is a possibility of the leakage of a flammable hazardous liquid or of the presence of flammable vapors.

§195.442 Damage Prevention Program

- Must have a written program to prevent damage from excavation activities.
- Underground facility operators must belong to a one-call system.
- Respond within 48 hours, excluding Saturday, Sunday, legal federal and state holidays.

Excavation – State Law Definition

- "Excavation" means the use of tools, powered equipment, or explosives to move earth, rock, or other materials in order to penetrate or bore or drill into the earth, or to demolish any structure whether or not it is intended that the demolition will disturb the earth.

- " Excavation" includes such agricultural operations as the installation of drain tile, but excludes agricultural operations such as tilling that do not penetrate the earth to a depth of more than twelve inches.

Excavation – State Law Definition

- “Excavation" excludes any activity by a governmental entity which does not penetrate the earth to a depth of more than twelve inches.

- "Excavation" excludes any underground mining operations that do not involve disturbance to the earth’s surface.

Underground Facility

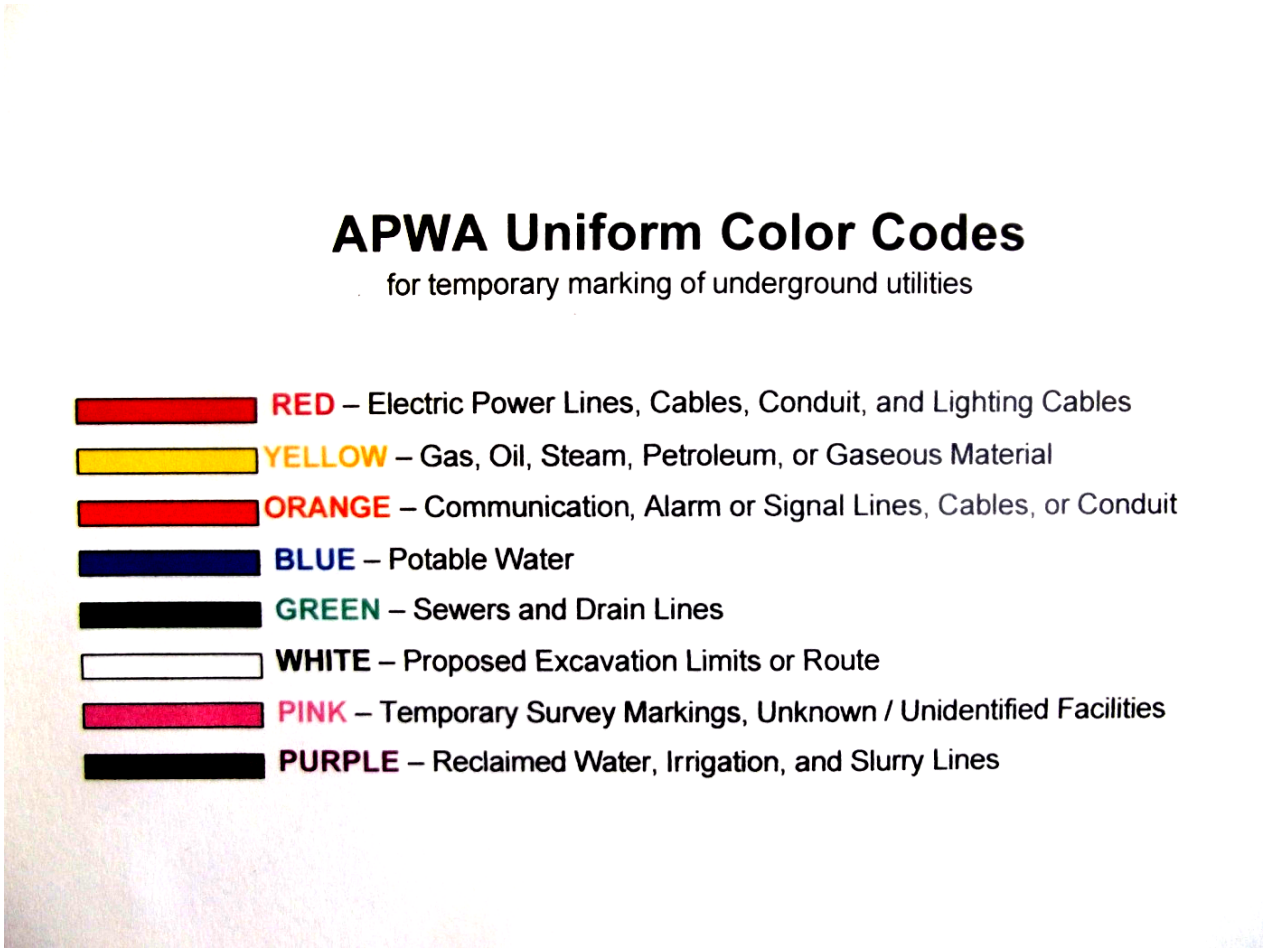
- "Underground utility facility" means any item buried or placed below the surface of the earth or submerged under water for use in connection with the storage or conveyance of water or sewage; electronic; telephonic; or telegraphic communications; television signals; electricity; crude oil; petroleum products; artificial or liquefied petroleum; natural gas; coal; steam; hot water; or other substances; except that it does not include private septic systems in a one family or two family dwelling not connected to any other system.

- State law definition.

§195.442 Damage Prevention Program

- Identify excavators.
- Notify public and excavators.
- Receive and record notice of excavation.
- Notify excavators of type marking.
- Mark system in excavation area.
- Inspect as frequently as needed.
- Dig Safely!!!

§195.442 Damage Prevention Program



Related Damage Prevention Activities

- Inspection of ROW, encroachment.
- Inspection of pipelines.
- Pipeline Markers / Signs.

Common Ground Alliance (CGA)

- In 1999, PHMSA published the Common Ground Study of One-Call Systems and Damage Prevention Best Practices. The purpose of the Common Ground Study was to identify and validate existing best practices performed in connection with preventing damage to underground facilities.

- The best practices contain validated experiences gained that can be further examined and evaluated for possible consideration and incorporation into state and private stakeholder underground facility damage prevention programs.

CGA™
Common Ground Alliance

Subpart H - Corrosion Control

49 CFR 195

Hazardous Liquid Pipelines

What Is Corrosion?

- The Deterioration of a Material, Usually a Metal, that Results from a Reaction with its Environment.

- Galvanic Corrosion of a Metal Occurs because of an Electrical Contact with a More Noble (Positive) Metal or Non-metallic Conductor in a Corrosive Electrolyte.

Corrosion

Is the rusting of pipe.

Cathodic Protection Basics – Galvanic Series of Metals

Active or Anodic

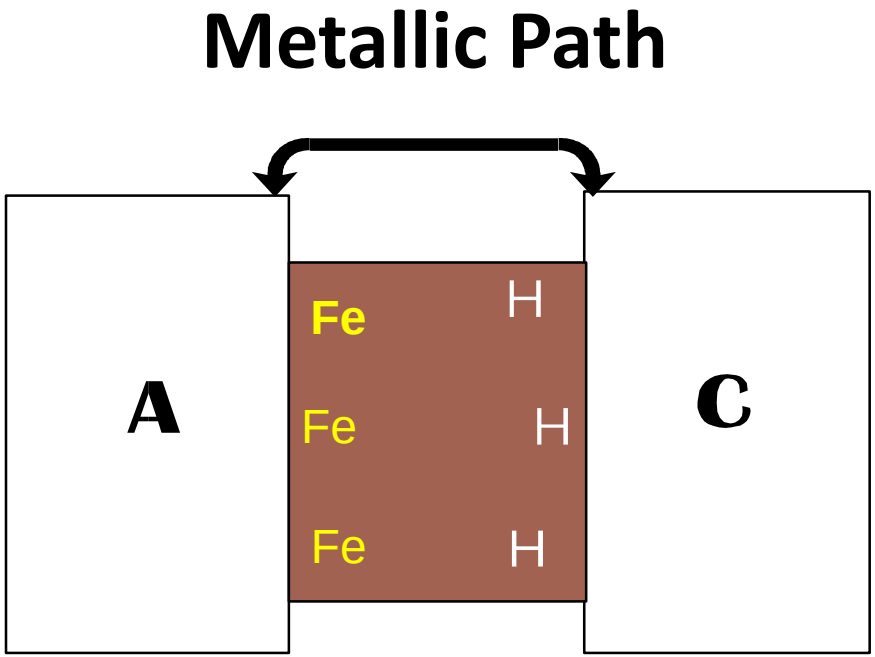
Metal	Volts
Magnesium	-1.75
Zinc	-1.1
Aluminum	-1.05
Mild steel (clean & shiny)	-0.5 to -0.8
Cast Iron	-0.5
Lead	-0.5
Mild steel (rusty)	-0.2 to -0.5
Copper, brass, bronze	-0.2
Silver	0.0
Gold	+0.1
Carbon	+0.3

Noble or Cathodic

Corrosion Basics

For corrosion to occur four elements have to be present.

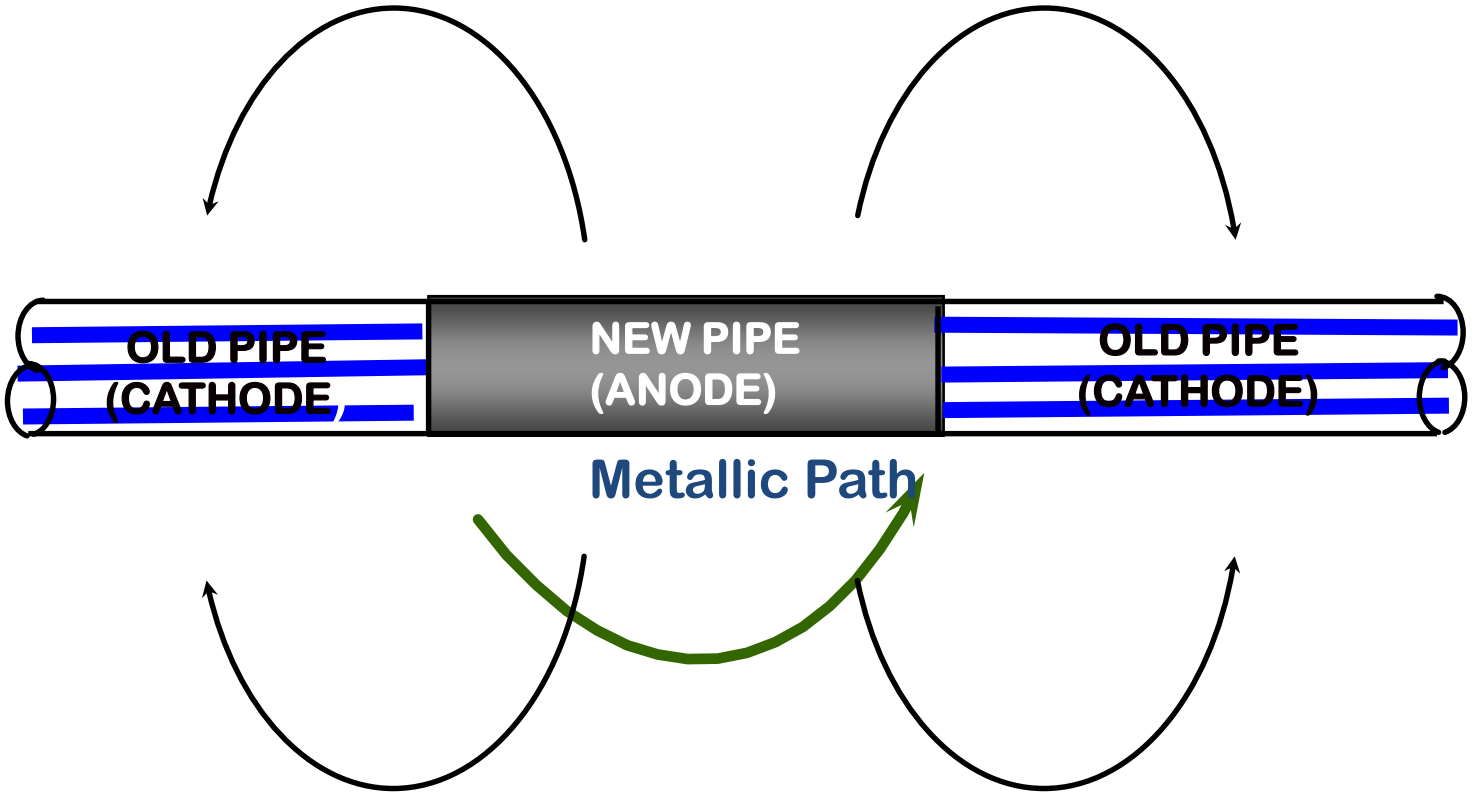
- Anode
- Metallic path
- Cathode
- Electrolyte (soil)



External Corrosion on Pipelines

- Dissimilar Metals
  - steel/copper, old/new pipe
- Dissimilar Soils
  - pH, In/Out Concrete
- Differential Aeration
  -bottom or compacted

Corrosion on Pipelines



Dissimilar Metals

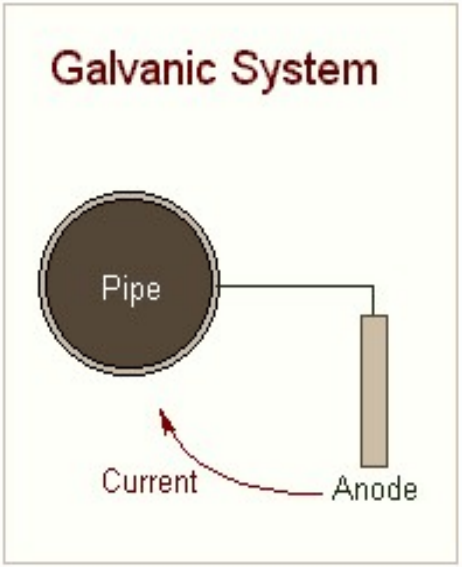
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

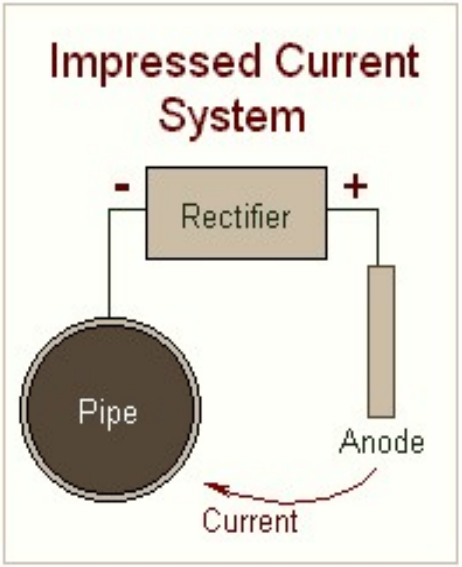
What Is Cathodic Protection?

The Decrease of Corrosion of a Metal by Forcing Current to Flow to the Metal from a Solution (Electrolyte).

Cathodic Protection Methods

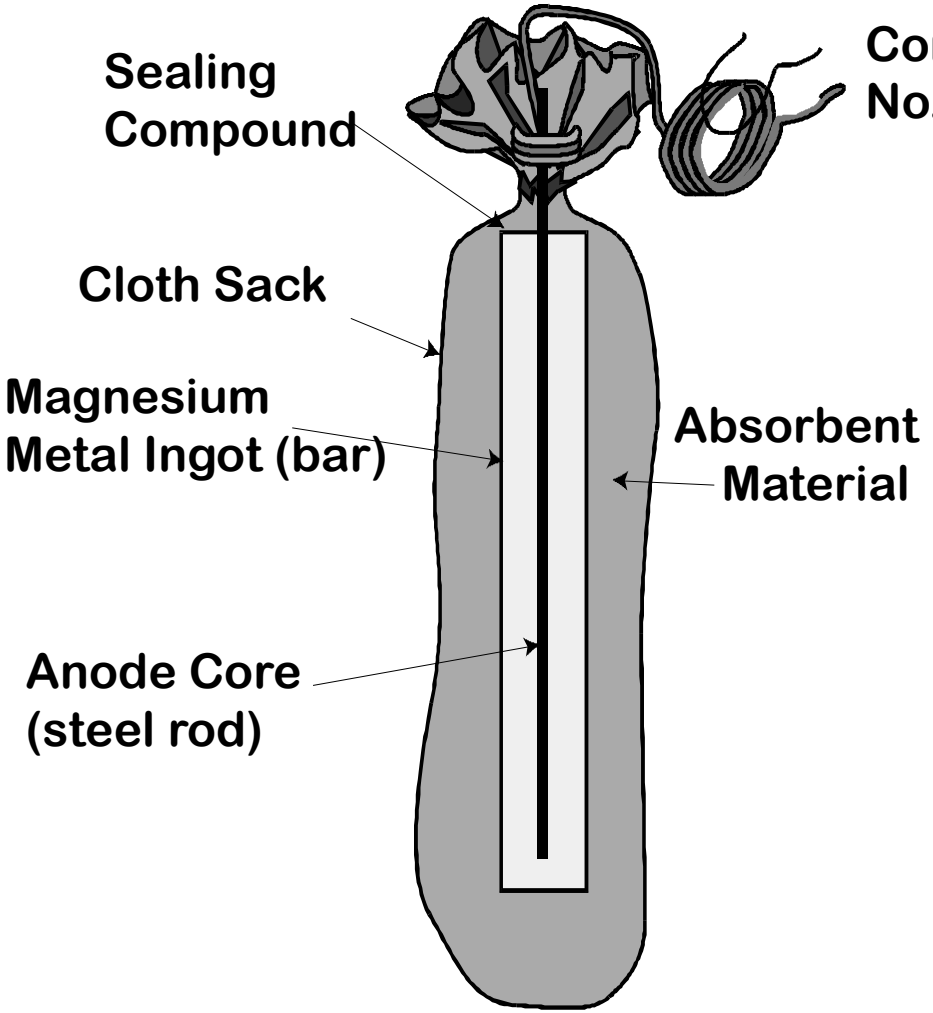
- Galvanic Sacrificial Anodes
- Impressed Current Systems





* Properly Designed & Installed

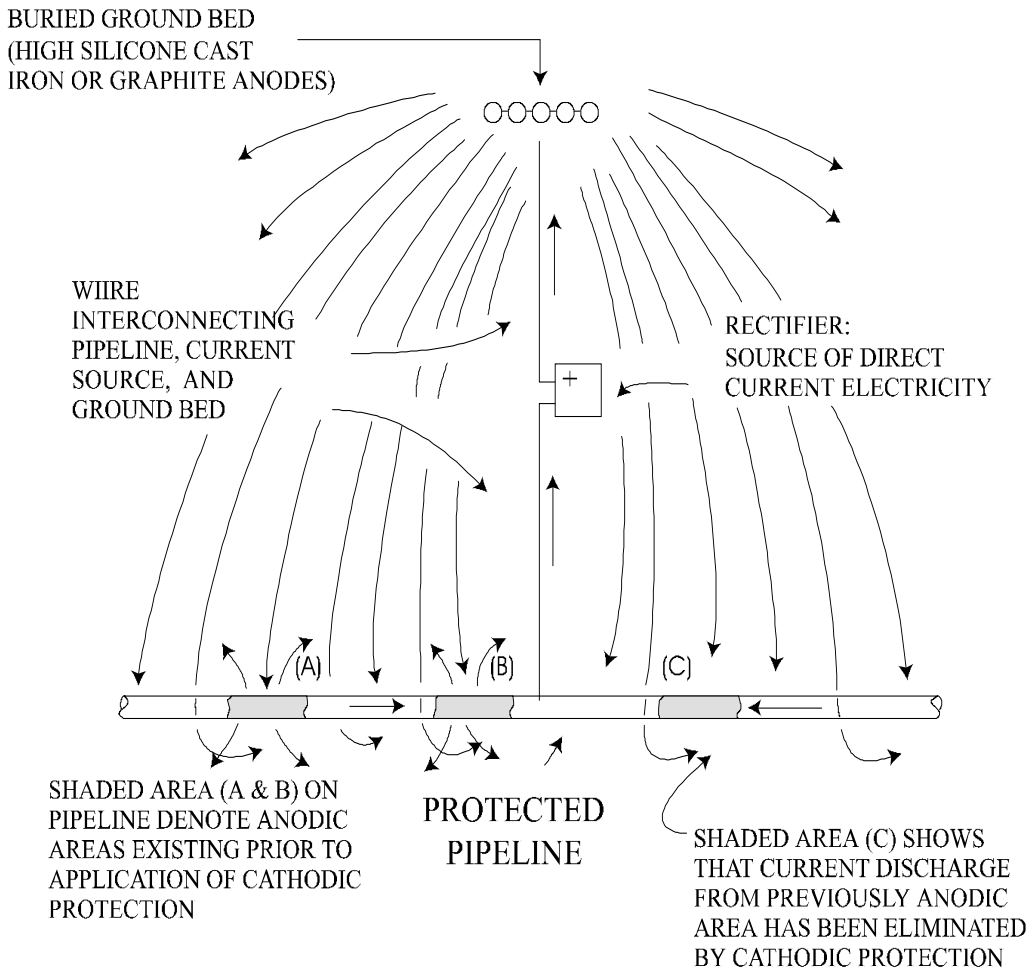
Galvanic Anode (sacrificial)



Rectifier

An electrical device that changes alternating current (a.c.) into direct current (d.c.). This current is then impressed through a ground bed of anodes onto an underground metallic piping system to protect it against corrosion.

Rectifier Operation



§195.551 What do the regulations in this subpart (Subpart H) cover?

- This subpart prescribes minimum requirements for protecting steel pipelines against corrosion.

§195.553 What special definitions apply to this subpart?

- *Active corrosion* means continuing corrosion which, unless controlled, could result in a condition that is detrimental to public safety or the environment.

- *Buried* means covered or in contact with soil.

§195.553 What special definitions apply to this subpart?

- *Electrical survey* means a series of closely spaced pipe-to-soil readings over a pipeline that are subsequently analyzed to identify locations where a corrosive current is leaving the pipeline. (close interval survey)

- *Pipeline environment* includes soil resistivity (high or low), soil moisture (wet or dry), soil contaminants that may promote corrosive activity, and other known conditions that could affect the probability of active corrosion.

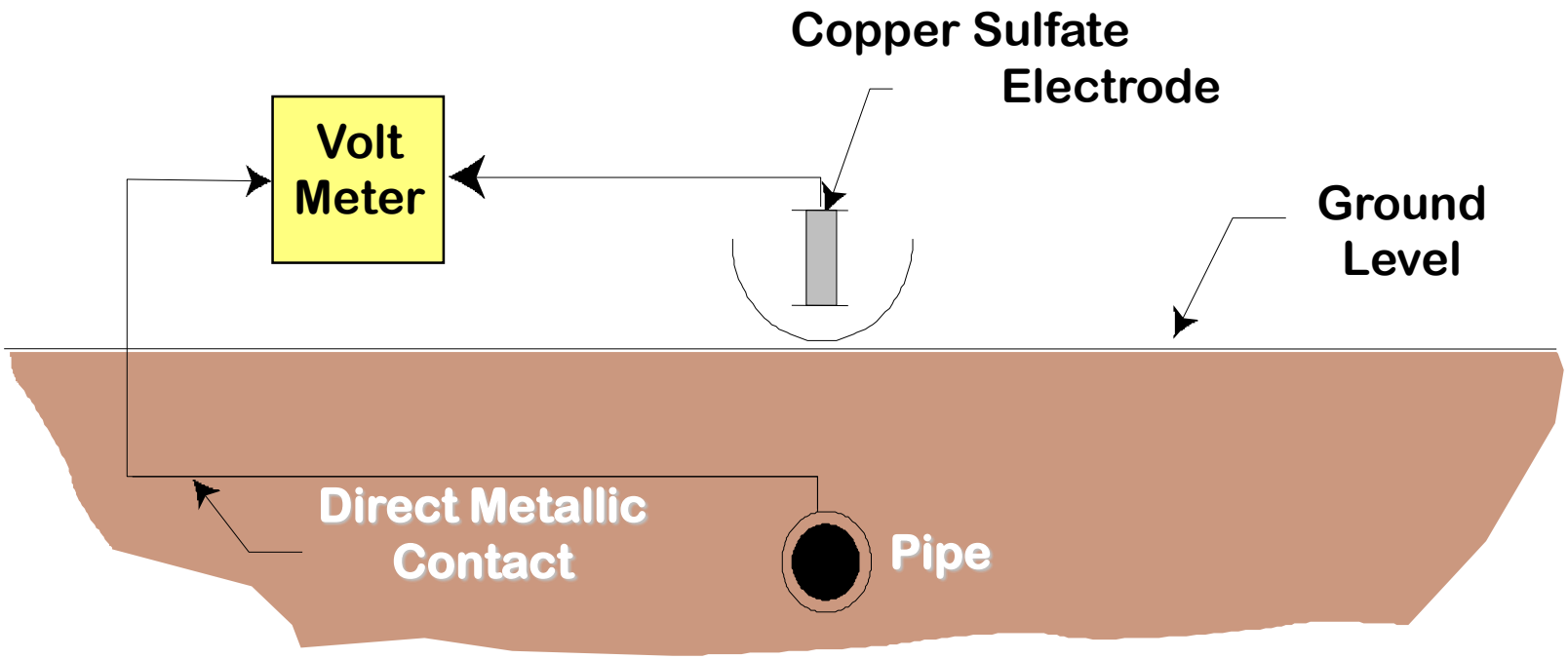
C. P. Measurements

- Pipe-to-Soil Potentials
- Soil Resistivity (soil resistance to current flow)
- Soil Ph (soil acidity or alkalinity)
- Others

Pipe-to-Soil Potential

The potential difference between a buried metallic structure of piping system and the soil surface. The difference is measured using a voltmeter with a half cell reference electrode in contact with the soil.

Pipe-To-Soil Potential



1. Investigate corrosive conditions.
2. Evaluate the extent of cathodic protection.

U.S. Department of Transportation
Office of the Assistant Secretary for
Research and Technology

Half-Cell

A tubular device which has a copper rod immersed in saturated copper sulfate solution.

§195.555 What are the qualifications for supervisors?

- You must require and verify that supervisors maintain a thorough knowledge of that portion of the corrosion control procedure established under §195.402(c)(3) for which they are responsible for insuring compliance.

§195.557 Which pipelines must have coating for external corrosion control?

- If constructed, relocated, replaced or changed after applicable date in §195.401(c).

- Or converted under §195.5 and has a coating or is relocated, changed or replaced.

- The pipeline must have an external coating for external corrosion control.

§195.559 What coating material may I use for external corrosion control?

Coating material for external corrosion control under §195.557 must--

(a) Be designed to mitigate corrosion of the buried or submerged pipeline.

(b) Have sufficient adhesion to the metal surface to prevent under film migration of moisture;

(c) Be sufficiently ductile to resist cracking;

(d) Have enough strength to resist damage due to handling and soil stress;

(e) Support any supplemental cathodic protection; and

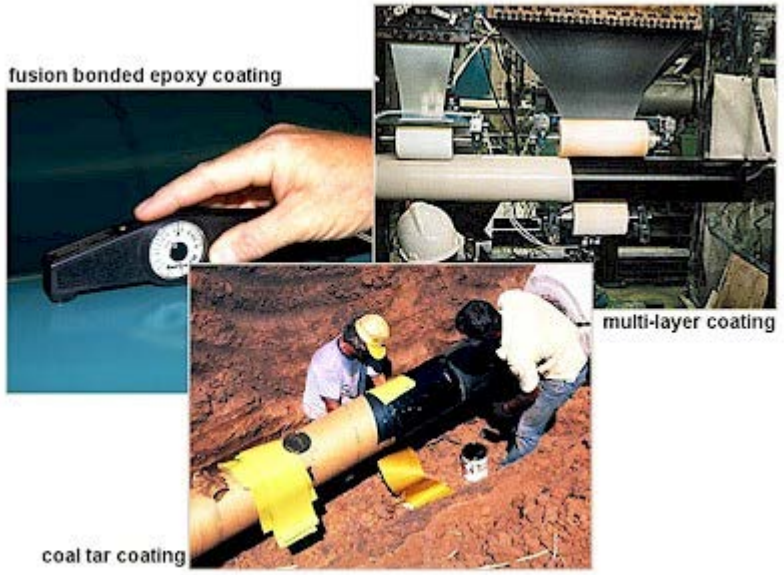
(f) If the coating is an insulating type, have low moisture absorption and provide high electrical resistance.

§195.561 When must I inspect pipe coating used for external corrosion control?

- (a) You must inspect all external pipe coating required by §195.557 just prior to lowering the pipe into the ditch or submerging the pipe.

- (b) You must repair any coating damage discovered.

Coatings


fusion bonded epoxy coating
multi-layer coating
coal tar coating

§195.563 Which pipelines must have cathodic protection?

- If constructed, relocated, replaced, changed after dates in §195.401(c), then must have cathodic protection.
- Cathodic protection must be in operation within 1 year.
- Converted pipelines same requirement.
- All other pipelines with effective coating must have cathodic protection.

§195.567 Test leads

- All pipelines under CP required by this subpart must have test leads.

- Leads must be installed:
  - Frequent intervals to indicate adequacy of CP.
  - So backfill will not stress or break lead.
  - Prevent stress on pipe
  - Insulated from conduit, if in conduit.
  - Coat connection to pipe with compatible insulating material.
- Leads must be maintained.

§195.569 Do I have to examine exposed portions of buried pipelines?

- Whenever you have knowledge that any portion of a buried pipeline is exposed, you must examine the exposed portion for evidence of external corrosion if the pipe is bare, or if the coating is deteriorated. If you find external corrosion requiring corrective action under §195.585, you must investigate circumferentially and longitudinally beyond the exposed portion (by visual examination, indirect method, or both) to determine whether additional corrosion requiring remedial action exists in the vicinity of the exposed portion.

§195.569 Do I have to examine exposed portions of buried pipelines?

§195.571 Criteria for CP

- §195.571 What criteria must I use to determine the adequacy of cathodic protection?
- NACE SP 0169, paragraph 6.2 and 6.3.

Two Main C. P. Criteria

1. -850 mv. Pipe-to-Soil Potential

2. 100 mv. Polarization Decay

C. P. Criteria (-850 mv)

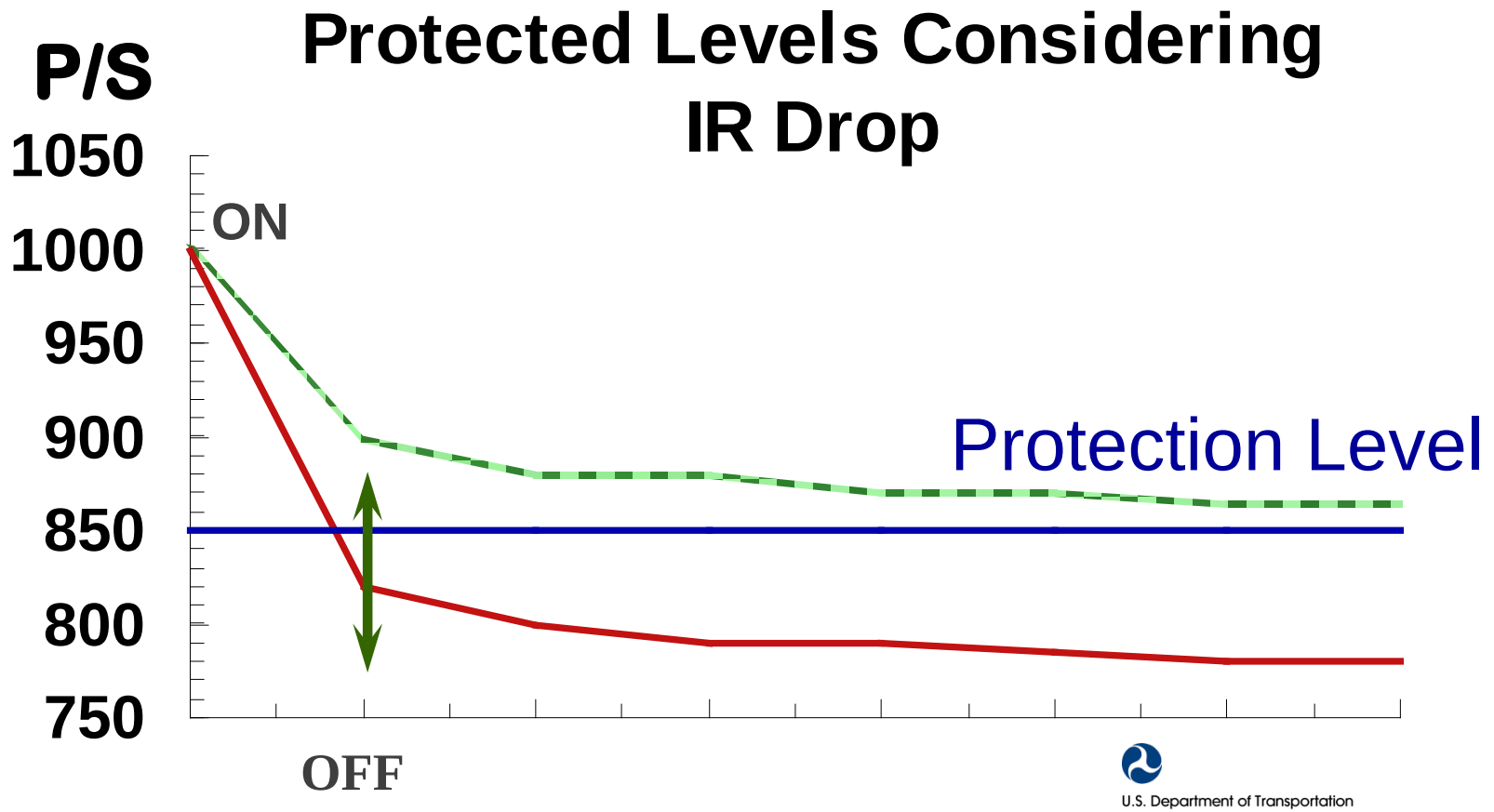
- -850 mv.
- Measured with Current Applied
- Consider IR Drop
- Cu/CuSO4 Reference Electrode

IR Drop ~ Major Contributors

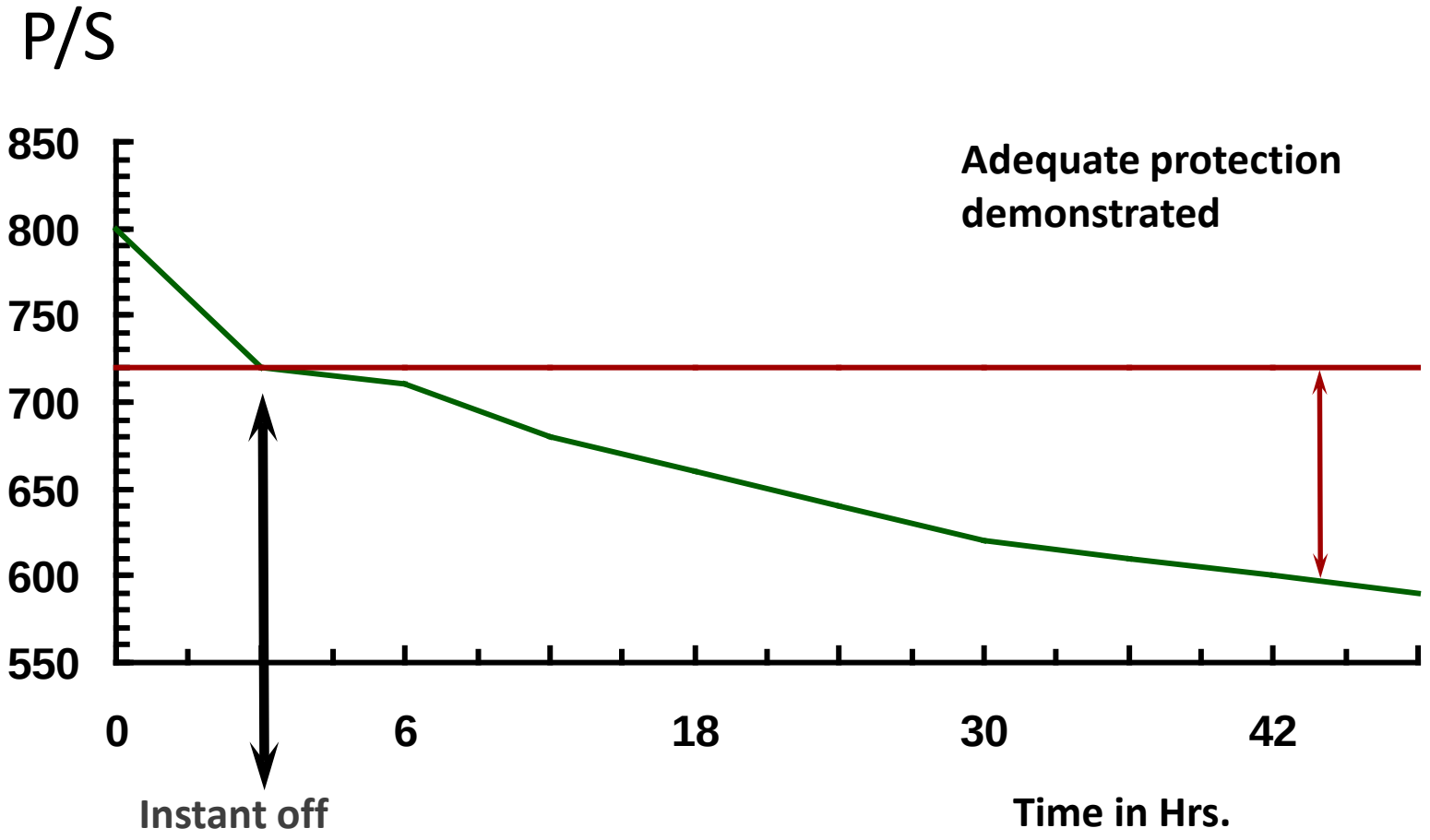
- Contact between the reference cell and the soil.
- Electrolyte (soil)
- Polarization at the pipe coating / soil interface

Accounting for IR Drop (Current Interrupter)

Cathodic Protection Criteria (-850 mv)



C. P. Criteria (100 MV Polarization Decay)



§195.573 What must I do to monitor external corrosion control?

- Test cathodic protected pipeline once each calendar year NTE 15 months.
- If impractical for short sections of protected bare or ineffectively coated pipeline, once every 3 years, NTE 39 months.
- Within 2 years of cathodic protection installation, determine circumstances for CI survey (NACE SP 0169 10.1.13)

§195.573 What must I do to monitor external corrosion control?

- Unprotected pipe.
  - Determine active corrosion by electrical survey, or other means including leak repair, inspection monitoring, exposed pipe records and environment.
  - At least once every 3 calendar years, but with intervals not exceeding 39 months.

§195.573 What must I do to monitor external corrosion control?

- Rectifiers, reverse current switch, diode, bond whose failure jeopardizes protection-
  - At least six times each calendar year, but with intervals not exceeding 2-½ months.

- Other interference bonds – At least once each calendar year, but with intervals not exceeding 15 months.

§195.573 What must I do to monitor external corrosion control?

- Corrective action – must correct deficiencies as required by §195.410(b).
  - Reasonable time or if immediate hazard stop operation until corrected.
  - If pipeline is in IM program, correct as required by §195.452(h).

§195.575 – Isolation…

- Isolate all lines unless interconnected and all protected.
- Install insulators where isolation is necessary.
- Inspect to assure isolation is adequate.

§195.575 – Isolation…

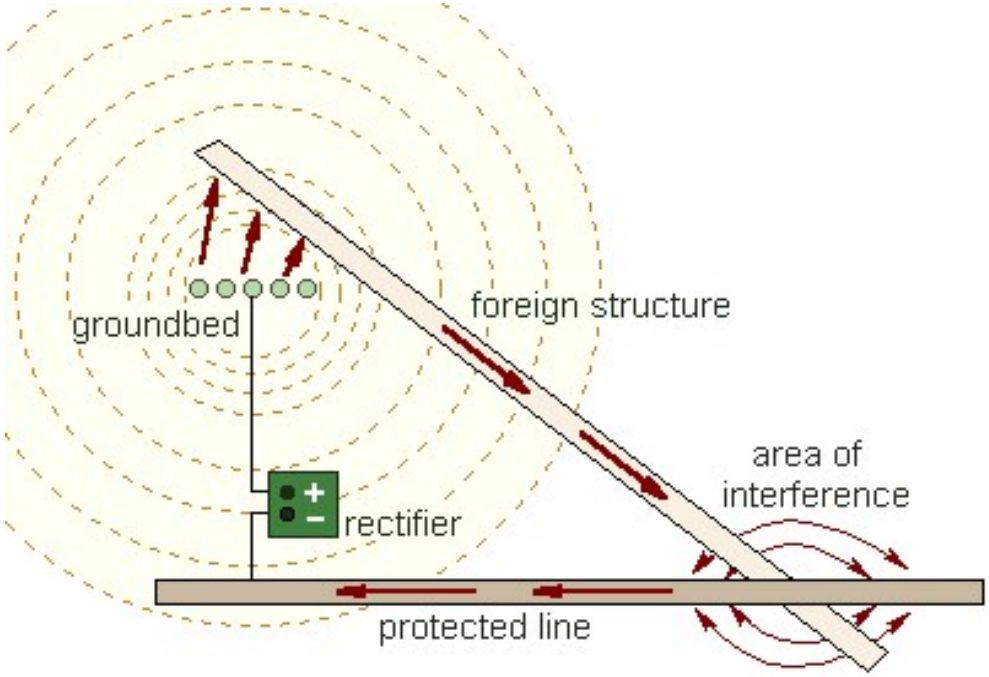
- In combustible atmosphere, take precautions to prevent arcing.

- Protect from fault currents or lightning in areas near electrical transmission tower facilities or areas with unusual risk for lightning.

§195.577 What must I do to alleviate interference currents?

- Identify, test for and minimize effect.

- Design and install impressed current or anode systems to minimize effects on adjacent metallic structures.



§195.579 What must I do to mitigate internal corrosion?

- If product would corrode pipeline, investigate corrosive effect and take adequate steps to mitigate.
- Inhibitors.
  - Use sufficient quantity.
  - Use coupons or monitoring equipment.
  - Examine twice each calendar year, NTE 7-1/2 months.

§195.579 What must I do to mitigate internal corrosion?

- Inspect removed pipe. If internal corrosion requiring corrective action is found, investigate circumferentially and longitudinally beyond the removed pipe (by visual examination, indirect method, or both) to determine whether additional corrosion requiring remedial action exists in the vicinity of the removed pipe.

§195.581 – Atmospheric corrosion

- Clean and coat each pipeline or portion exposed to atmosphere.

- Coating must be suitable for prevention of atmospheric corrosion.

§195.581 – Atmospheric corrosion

- Except offshore splash zone or soil-to-air interface, coating not needed if demonstrated by test, examination or experience that corrosion is only light surface oxide or will not affect safe operation before next scheduled inspection.

§195.583 What must I do to monitor atmospheric corrosion control?

- Onshore - At least once every 3 calendar years, but with intervals not exceeding 39 months
- Close attention to soil-to-air interface, thermal insulation, disbonded coatings, supports, spans over water
- If found, provide protection.

§195.585 What must I do to correct corroded pipe?

- General Corrosion.
  - Wall thickness < required for MOP, replace, unless
    - ❑ Reduce MOP or
    - ❑ Repair by method that can restore serviceability.

- Localize corrosion pitting.
  - Repair or replace if leak might result, unless reduce MOP based on wall thickness.

§195.589 What corrosion control information do I have to maintain?

- Records or maps.
  - CP pipelines.
  - CP facilities, including anodes installed after January 28, 2002.
  - Structures bonded to CP systems.

- Records of anodes need not show distances.

- All tests, inspections, reviews, etc., for at least 5 years except records for §195.569, §195.573(a) and (b), and §195.579(b)(3) and (c) for as long as pipeline is in service.

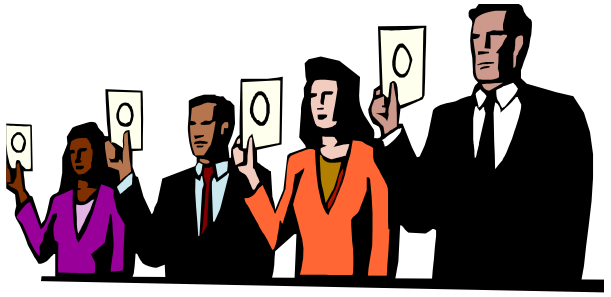
49 CFR § 195 Subpart G

Operator Qualification (OQ)

How the OQ process might work

Federal Pipeline Act

DOT issued OQ regulations



Apply 4-part test to determine covered tasks

Review field activities

Determine which tasks are OQ related

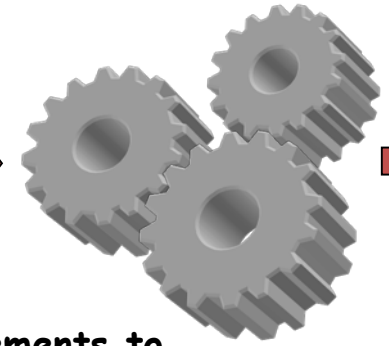
Develop list of covered tasks

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

How the OQ process might work

Review procedures



Three elements to evaluation process

Develop performance checklists (1)

Develop Knowledge Quiz (2)

Develop AOC Quiz (3)

Conduct evaluations

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

§195.501 Scope

- (a) This subpart prescribes the minimum requirements for operator qualification of individuals performing covered tasks on a pipeline facility.

§195.501 Scope

Covered Task

- Section (b) is the 4-part test.

- The task must meet **ALL** 4 parts of the test to be a covered task.

- Anyone performing a covered task on a pipeline facility subject to Part 195 must be under your OQ program.
  - Company employees
  - Contractor personnel

§195.501 Scope

§195.501 (b) For the purpose of this subpart, a covered task is an activity, identified by the operator, that:

(1) Is performed on a pipeline facility;

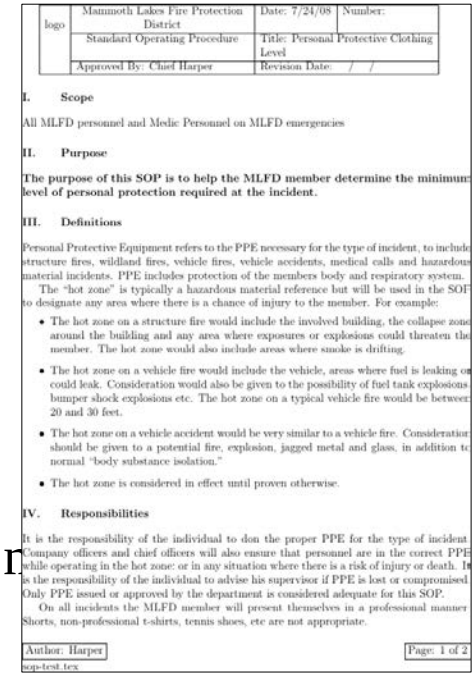
(2) Is an operations or maintenance task;

(3) Is performed as a requirement of this part; and

(4) Affects the operation or integrity of the pipeline.

§195.501 Scope

- *Covered task*



logo	Mammoth Lakes Fire Protection District	Date: 7/24/08	Number:
	Standard Operating Procedure	Title: Personal Protective Clothing Level	
	Approved By: Chief Harper	Revision Date: / /	

I. Scope

All MLFD personnel and Medic Personnel on MLFD emergencies

II. Purpose

The purpose of this SOP is to help the MLFD member determine the minimum level of personal protection required at the incident.

III. Definitions

Personal Protective Equipment refers to the PPE necessary for the type of incident, to include structure fires, wildland fires, vehicle fires, vehicle accidents, medical calls and hazardous material incidents. PPE includes protection of the members body and respiratory system.

The "hot zone" is typically a hazardous material reference but will be used in the SOP to designate any area where there is a chance of injury to the member. For example:

- The hot zone on a structure fire would include the involved building, the collapse zone around the building and any area where exposures or explosions could threaten the member. The hot zone would also include areas where smoke is drifting.
- The hot zone on a vehicle fire would include the vehicle, areas where fuel is leaking or could leak. Consideration would also be given to the possibility of fuel tank explosions, bumper shock explosions etc. The hot zone on a typical vehicle fire would be between 20 and 30 feet.
- The hot zone on a vehicle accident would be very similar to a vehicle fire. Consideration should be given to a potential fire, explosion, jagged metal and glass, in addition to normal "body substance isolation."
- The hot zone is considered in effect until proven otherwise.

IV. Responsibilities

It is the responsibility of the individual to don the proper PPE for the type of incident. Company officers and chief officers will also ensure that personnel are in the correct PPE while operating in the hot zone: or in any situation where there is a risk of injury or death. It is the responsibility of the individual to advise his supervisor if PPE is lost or compromised. Only PPE issued or approved by the department is considered adequate for this SOP.

On all incidents the MLFD member will present themselves in a professional manner. Shorts, non-professional t-shirts, tennis shoes, etc are not appropriate.

Author: Harper — Page: 1 of 2

sop-test.tex

=

=

Company:	Field Location/Address:
Date:	System Information:
Number of Company Employees Under OQ Program at This Location:	
Number of Contractor Personnel Under OQ Program at This Location:	
Inspection Team:	Company Personnel in Interview/Phone Numbers:

Area Inspected	Results Acceptable? Yes	No	N/A	N/I
1. Field/job supervisor responsibilities				
a. Is knowledgeable of OQ program responsibilities	☐	☐	☐	☐
b. Conducts frequent observation of covered task performance	☐	☐	☐	☐
c. Knows required actions to take when individual's performance of covered task may have contributed to incident/accident	☐	☐	☐	☐
d. Knows factors to consider and required actions to take when individual is identified that may no longer be qualified to perform covered task	☐	☐	☐	☐
e. Conducts verification of qualification status of individuals per OQ program requirements for employees and contractors	☐	☐	☐	☐
f. Ensures establishment of direct observation and control of unqualified individuals	☐	☐	☐	☐
g. Establishes span of control for unqualified individuals appropriate to task known, company policy	☐	☐	☐	☐
2. Procedures for performance of covered tasks				
a. Procedures are present at field location for covered task performance	☐	☐	☐	☐
b. Procedures used are same (content, date revised) as approved O&M manual	☐	☐	☐	☐
c. Contractor procedures are approved by operator for use	☐	☐	☐	☐
d. Individuals are observed adhering to procedure when performing CTs	☐	☐	☐	☐
e. Proper tools, techniques, processes employed per procedure	☐	☐	☐	☐
3. Abnormal operating conditions				
a. Individuals performing covered tasks know how to recognize AOCs	☐	☐	☐	☐
b. Individuals performing covered tasks know how to react to AOCs	☐	☐	☐	☐
4. Management of change				

O&M procedure

Field activity

Evaluation

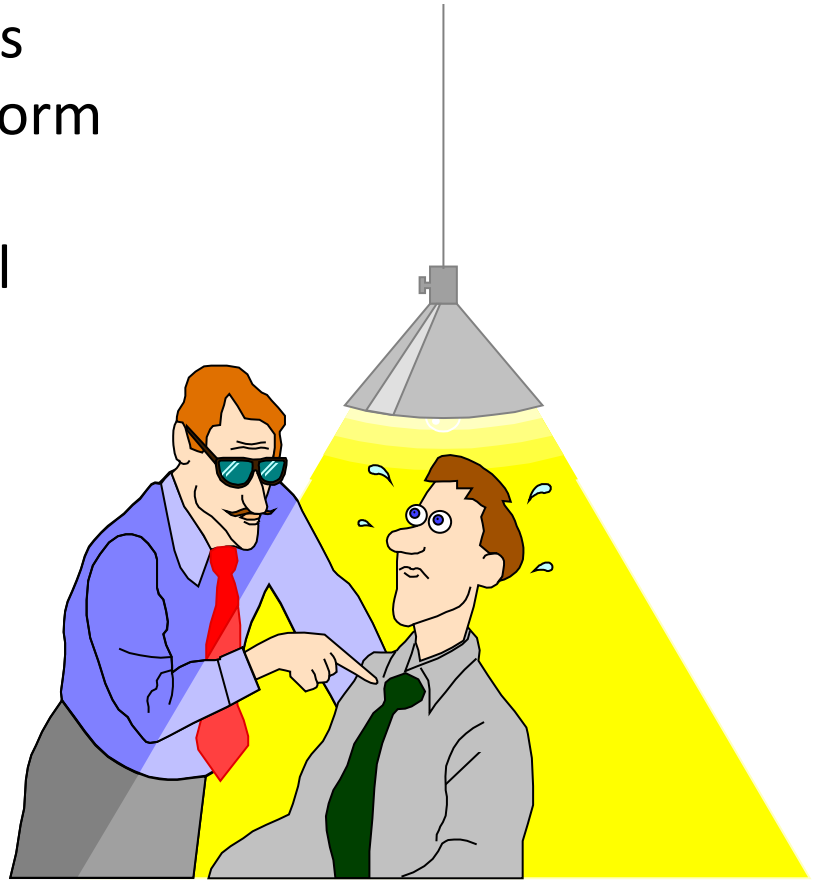
§195.503 Definitions

- *Abnormal operating condition* - an indication that design limits have been exceeded, a malfunction of a component, a deviation from normal operations, or presents a hazard to persons or the environment.

- *Evaluation* – a documented process to determine a person's ability to perform a covered task. Methods may include:
  - Written exam
  - Oral exam
  - Work performance history
  - Observation on the job/OJT/simulation

§195.503 Definitions

- *Qualified* – an individual that has been evaluated and (1) can perform assigned covered task and (2) recognize and react to abnormal operating conditions



§195.505 Qualification program

The OQ program must include the following seven elements:

- Identity of covered tasks
- Means of qualifying individuals
- Allow non-qualified individuals to be observed and directed
- Evaluate performance after incident
- Evaluate qualification
- Communicate changes
- Identify qualification interval

§195.505 Qualification program

- After December 16, 2004, provide training, as appropriate, to ensure that individuals performing covered tasks have the necessary knowledge and skills to perform the tasks in a manner that ensures the safe operation of pipeline facilities.

- After December 16, 2004, notify the Administrator or a state agency participating under 49 U.S.C. Chapter 601 if the operator significantly modifies the program after the Administrator or state agency has verified that it complies with this section.

§195.501 Scope.

Close Enough Construction Company – Covered Task (CT) List							
CT #	Code Sec.	Task Descrip.	Four Part Test				Cov. Task?
			Perform On P/L?	O&M Task?	Req. by 195?	Affects Integrity?	
1	195.416	Ext.Cor. P-Soil	Yes	Yes	Yes	Yes	Yes
2	195.418	Int. Cor, Monitor	Yes	Yes	Yes	Yes	Yes
3	195.116	Valve Insp.	Yes	Yes	Yes	Yes	Yes
4	195.100	Design P/L	No	No	Yes	Yes	No

§195.507 Recordkeeping

- Maintain records that demonstrate compliance

- Records shall include:
  - Identification of qualified individuals
  - Identification of covered tasks qualified to perform
  - Date(s) of current qualifications
  - Qualification method

- Records supporting individual's current qualifications, and

- Records of prior qualifications & individual's not longer performing covered task, for at least 5 years

§195.509 General

If your pipeline company existed before **October 26, 1999** (the effective date) you must have a written

OQ program dated

April 27, 2001 or sooner.

§195.505 Qualification Program.

Operators must have and follow a Written Qualification Program. The program must include provisions to:

- Identify covered tasks.
- Ensure qualification of individuals.
- Allow not qualified individuals to perform covered tasks if directed and observed by a Qualified Individual (QI) - in that task.
- Evaluate performance after incident.

§195.505 Qualification Program.

- Evaluate qualification if reason to believe individual no longer qualified for a task.
- Communicate changes on covered tasks.
- Identify qualification intervals.
- Provide training as appropriate to ensure proper knowledge & skills.
- Notify PHMSA if significant changes.
  - Electronic mail to InformationResourcesManager@dot.gov
  - Or by mail to ATTN: Information Resources Manager DOT/PHMSA/OPS, East Building, 2nd Floor, E22-321, New Jersey Avenue SE, Washington, DC 20590

(revised per Amdt. 195-100, March 31, 2015, 80FR12762)

Covered Task (example)

Covered Task #	30
Title	Pipeline Repair Install split sleeve
Regulation	49 CFR 195.422
Task Description	This task is a part of general maintenance and repair activities that are involved in safeguarding and prudent operation of a pipeline system. Elements of this task may include: -Sandblasting to remove coating -Perform Ultrasound -Chain & jack split sleeves on pipe -Weld side seams -Weld ends -Coat repair area

Covered Task (example)

Covered Task #	30
Abnormal Operating Conditions (AOCs) And Appropriate Responses	The following AOCs could be encountered while performing this task: AOC – Excessive end gap on repair sleeve. Response – Refit sleeve, add more lacks & chains, tighten clamp. AOC – Pipe damage (dents, gouges). Response – Cut sleeve long enough to cover damaged area, or install another sleeve. AOC - Failure of pipe, leak discovered Response – Notify local 911 emergency personnel if appropriate, make company notifications, isolate leak, if safely possible properly trained.

Covered Task (example)

Covered Task #	30
Reevaluation Frequency Of Personnel Performing This Task	3 years – unless other criteria dictates (operational changes involving this task, an individual's ability to perform this task, accident history, etc.).
Span of Control: The ratio of Qualified vs. non-qualified Individuals allowed for this task	**1 : 2**

Covered Task (Reevaluation Frequency)

Matrix	
Critical **Complex** **<u>2 Years</u>**	**Critical** **Not Complex** **<u>3 years</u>**
Not Critical **Complex** **<u>3 years</u>**	**Not Critical** **Not Complex** **<u>4 Years</u>**

§195 Subpart G

- *Span of Control* – The Span of Control ratio indicates the number of non-qualified individuals who can perform a covered task under the direction and observation of a qualified individual.

OQ

???

Non - OQ

OQ Guidance Material

- ***Not referenced in Part 195***

RECOMMENDED PRACTICE FOR PIPELINE OPERATOR QUALIFICATION (OQ)

API Recommended Practice 1161

Second Edition, April 2012

- Offers an Industry-Developed Covered Task List based on Subject Matter Expert (SME) Consensus

Covered Task

Scraper and Sphere Launching Operations.

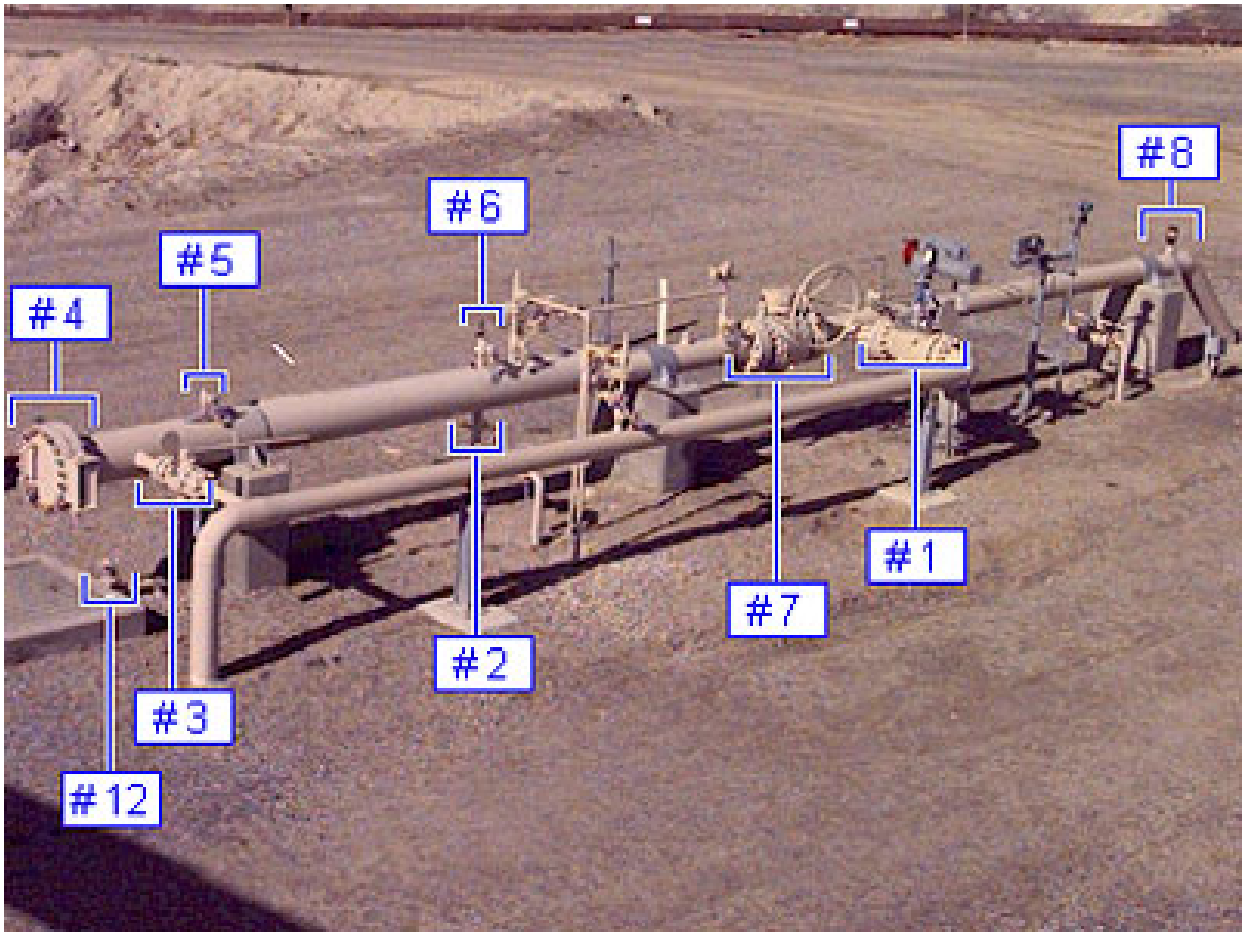
Elements of this task may include:

- Check valves to ensure trap is isolated from line pressure.
- Open vent to check / blow-down if trap is pressurized.

- Inspect trap pressure gauges prior to opening closure.
- Insert pig in trap.

- Operate valves (using proper valve sequencing) to pressurize pipeline facilities to run pig.
- Monitor pig run.

SCRAPER (PIG) TRAP



Sample Checklist Launch a Pig

Page 1 of 5

Effective Date: 5/17/2007	MPR-4208 – Revision 0 – 11/23/2004 Lockout Tagout Policy - Revision 6 - 10/17/2006	Version Number: 1.0

INDIVIDUAL IDENTIFICATION

Employee ☐ Contractor ☐

NAME (Please Print): _____

SIGNATURE: _____ DATE: _____

TITLE or CONTRACTING COMPANY NAME: _____

ID NUMBER: _____ LOCATION: _____

TYPE OF QUALIFICATION

☐ Initial Evaluation ☐ Reevaluation ☐ Administrative

☐ Post-Accident Evaluation ☐ Reasonable Cause Evaluation

QUALIFICATION METHOD

☐ Job Performance* ☐ On-The -Job Training Performance*

*QUALIFIED INDIVIDUAL: _____

Required if neither the individual nor the evaluator is not currently qualified to perform this task and the task is being performed on a DOT jurisdictional pipeline.

☐ Task Simulation ☐ Verification of 3rd Party Certification

QUALIFICATION RESULTS

☐ Individual has met the evaluation criteria contained on this evaluation checklist and is, therefore, judged capable of carrying out this covered task.

☐ Individual has not met the evaluation criteria contained on this evaluation checklist. Items not marked as satisfactory on the checklist should be reviewed and practiced before a retest is scheduled.

Comments: _____

_____

_____

EVALUATOR IDENTIFICATION

NAME (Please Print): _____

SIGNATURE: _____ DATE: _____

EVALUATOR ID: _____

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Sample Checklist Launch a Pig

Page 2 of 5

Effective Date: 5/17/2007	MPR-4208 – Revision 0 – 11/23/2004 Lockout Tagout Policy - Revision 6 - 10/17/2006	Version Number: 1.0

Abnormal Operating Conditions & Knowledge Evaluation

Individual must identify all applicable AOCs and the appropriate response for each from memory.

Description	Acceptable Response	Qualification Results
Fire or explosion due to a release of hydrocarbon	▪ Make appropriate notifications *AND* ▪ If authorized, activate emergency shutdown and response	Satisfactory ☐ Unsatisfactory ☐
Malfunction of a pipeline component during the course of performing a covered task	▪ Make appropriate notifications *AND* ▪ If authorized, initiate emergency shutdown/ isolation of pipeline facility and/or component	Satisfactory ☐ Unsatisfactory ☐
Physical damage of a pipeline facility or component	▪ Make appropriate notifications	Satisfactory ☐ Unsatisfactory ☐
Leak or unintended release of hydrocarbon from a pipeline component	▪ Make appropriate notifications *OR* ▪ If authorized, initiate emergency shutdown/ isolation of pipeline facility and/or component	Satisfactory ☐ Unsatisfactory ☐

Individual should provide concise, accurate answers that demonstrate their knowledge of the principles and practices related to this covered task.

Item	Question	Critical Content for Acceptable Answer	Qualification Results
1.0	What is the Company's policy regarding pressure relief of scraper launching and receiving traps?	▪ A manually operated valve capable of relieving the pressure of all scraper launching and receiving traps must be present on the line. ▪ A pressure indicator must be installed on the trap to show that all pressure has been relieved prior to opening the trap.	Satisfactory ☐ Unsatisfactory ☐
2.0	Why must special care be taken when launching profiles tools?	Special attention should be given to profile tools to prevent folding the cups forward and damaging the profile plates during launching:	Satisfactory ☐ Unsatisfactory ☐

Plan Pigging Tool Run

Step	Action	Qualification Results
1.0	Identifies all valves that must be operated.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
2.0	Establishes a sequence for opening and closing valves that will ensure uninterrupted flow.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

Checklist Launch a Pig

Page 3 of 5

Performance steps 1 thru 29 taken directly from the operator's O&M procedures

Effective Date: 5/17/2007	MPR-4208 – Revision 0 – 11/23/2004 Lockout Tagout Policy - Revision 6 - 10/17/2006	Version Number: 1.0

Step	Action	Qualification Results
3.0	Prepares the pigging tool for launching.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
4.0	Checks for equipment that protrudes into the line, such as corrosion coupons. ➢Schedules the retraction of such devices prior to launching the pigging tool.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
5.0	Ensures that all mainline valves between the sending and receiving trap are fully open.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

Prepare The Trap

Step	Action	Qualification Results
6.0	Ensures that the trap bypass valve is fully open.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
7.0	Closes the trap isolation and block valves.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
8.0	Completes lockout procedures for trap valves in accordance with CPPL Lockout Tagout Policy.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
9.0	Ensures that the trap is depressurized and drained. ➢Cracks open the drain and/or vent valve until the pressure gauge reads zero. ➢Closes the drain and/or vent valve and monitors the pressure-indicating device to confirm valve integrity and ensure that the trap does not re-pressurize. ➢Reopens the drain and/or vent valve. ***WARNING**: Does not proceed if pressure cannot be removed from the trap.*	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
10.0	Monitors the sump level to ensure that the station does not lock out on high sump level.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
11.0	Inserts a dipstick through the vent valve to the bottom of the trap barrel to ensure that the trap is completely drained.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
12.0	Opens the closure door on the trap. ***WARNING**: Does not stand in front of closure door during opening. Stands on the side opposite the door hinge.*	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Sample Checklist Launch a Pig

Page 4 of 5

Step	Action	Qualification Results
20.0	Slowly opens the mainline trap valve to full open position. ➢Ensures that the kicker valve is fully open once pressure is equalized.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
21.0	Reduces discharge pressure or, if possible, operates just a booster pump to minimize "shock" to the pig at launch.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
22.0	Slowly pinches the bypass valve until the differential is great enough to launch the pig from the trap.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

Launch Pigging Tool

Step	Action	Qualification Results
23.0	Opens the trap block valve when the trap is filled.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
24.0	Pinches down on the trap bypass valve until the pigging tool passes through the trap block valve.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
25.0	Opens the trap bypass valve to the full open position.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

Resume Normal Operations After Pigging Tool Launch

Step	Action	Qualification Results
26.0	Sets the trap isolation and block valves in their respective normal operating positions.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
27.0	Ensures that the receiving trap and the receiver pig sig, if applicable, at the receiving location are set up to receive the tool.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
28.0	Advises the Control Center of the time the pigging tool went into the line, if applicable.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
29.0	Re-verifies that the valve configuration and other equipment at the trap are correctly set before leaving the site.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Sample Checklist Launch a Pig

Page 5 of 5

Effective Date: 5/17/2007	MPR-4208 – Revision 0 – 11/23/2004 Lockout Tagout Policy - Revision 6 - 10/17/2006	Version Number: 1.0

Insert And Prepare To Launch Pigging Tool

Step	Action	Qualification Results
13.0	Installs bonding cable to pig before inserting. ➢Ensures that the drive cups are past the inlet line and firmly inserted in the reducer. ➢Removes bonding cable.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
14.0	Checks the O-ring or gasket on the closure to ensure it is undamaged. ***NOTE**: Replaces the O-ring with a properly sized one if any defects are observed or suspected.* ➢Wipes machined faces with a clean rag and lubricates the O-ring with a thin film of lubricant.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
15.0	Shuts the trap door and secures the closure. ➢Uses tools authorized by the manufacturer to secure closure. ***WARNING**: Does not hammer on the trap door or closure, unless specifically allowed by the vendor. Does not over tighten.*	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
16.0	Prepares to launch the pigging tool. ➢Closes the drain valve and/or vent valve, if applicable. ➢Ensures that the pig sig is reset to register the passage of the pigging tool, if applicable.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
17.0	Opens the launch valve to slowly fill the trap with liquid in order to prevent damaging the pig or from pushing it back into the trap. ***NOTES:*** ▪ *For internal inspection tools in HVL systems, uses nitrogen to equalize the scraper trap barrel prior to opening any isolation valves so the pigging tool will not be subjected to cold temperatures.* ▪ *If the pigging tool is a profile tool used to verify an in-line inspection tool can pass through the pipeline, a soft launch may be required to keep from folding the cups back on the profile tool.* ➢Monitors all joints for leaks as the trap is pressurized. ***CAUTION**: If a leak is discovered, shuts the isolation valves, drains the trap, and makes appropriate repairs.*	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐
18.0	Notifies the Control Center that launching is imminent.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

Launch Profile Tool

Step	Action	Qualification Results
19.0	Partially opens the mainline trap and kicker valves to slowly equalize the pressure of the trap and the mainline.	Satisfactory ☐ Unsatisfactory ☐ Not Applicable ☐

Covered Task

- Covered Tasks include operational & maintenance activities.
- It does **not** include activities associated with **new construction** or activities on a **non-jurisdictional pipeline.**
- The activities associated with the tie-in of a new pipeline onto a jurisdictional pipeline is considered to be a covered task and subject to OQ.

Questions?

*You may be here**

*You want to be here**

Public Awareness

49 CFR 195

Hazardous Liquid Pipelines

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Public Awareness Program (overview)
Subpart F ~ §195.440

- The Public Awareness Program regulation was implemented in 2006 to address the "3rd party dig in" component associated with accidents

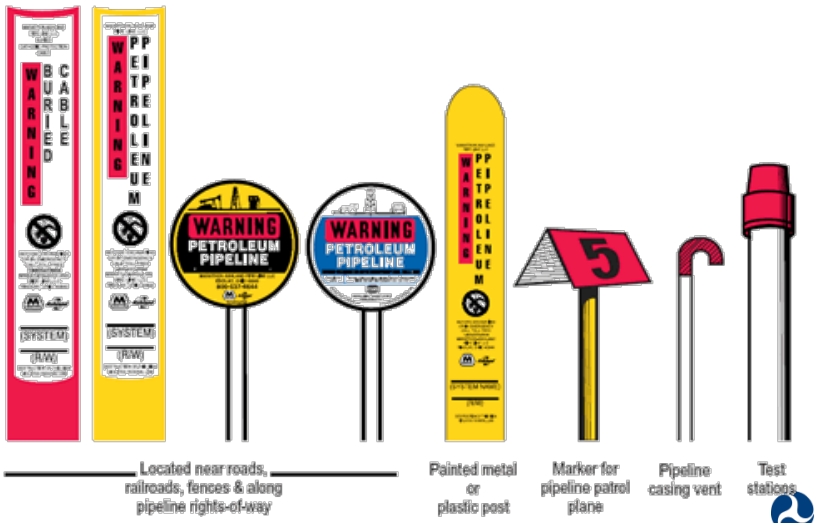
- It is a major program in that it requires its own written plan. It also has its own DOT program inspection forms.

- The Public Awareness Program was developed to reduce pipeline damage from dig-ins by requiring operators to educate and communicate with the public, excavators, officials, etc.

- The program basically accomplishes this by requiring memberships in One-Call programs, public meetings, newspaper notifications, mail-outs, etc., making the public aware of the dangers.

Public Awareness

- Operators must develop and implement a written continuing education program that follows the guidance in API RP 1162.
  - Program must :
    - ❑ Educate the public.
    - ❑ Educate appropriate government organizations.
    - ❑ And excavators.



Public Education, API RP-1162

- The rule requires all pipeline operators to develop and implement public education programs that address the following stakeholder audiences:
  - Affected public.
  - Local officials.
  - Emergency responders.
  - Excavators/Contractors.
  - Land Developers.
  - One-Call Centers.

195.440 Public Awareness

- (a) Written plan that follows guidance in API RP 1162.
- (b) Follow general recommendations in 1162 and assess characteristics of operator's pipeline and product transported.
- (c) Follow baseline and supplemental requirements unless justify why not practicable.

195.440 Public Awareness

- (d) must educate on:
  - (1) use one call prior to excavation.
  - (2) hazards with unintended releases.
  - (3) physical indications of release.
  - (4) steps for public safety.
  - (5) procedures to report an event.

195.440 Public Awareness

- (e) activities to advise municipalities, school districts, businesses, and residents of pipeline facility locations.
- (f) comprehensive as necessary.
- (g) English and other languages commonly understood.
- (h) program had to be completed by June 20, 2006.
- (i) documentation and evaluation available for review.

Public Awareness

- Public Awareness Programs should help the public understand the steps that they can take to prevent and respond to pipeline emergencies.

- Would residents and public officials along a hazardous liquid line-
  - Know about the pipeline?
  - Have an awareness of damage prevention?
  - Know one-call requirements?
  - Know the pipeline location?
  - Be able to recognize a leak?
  - Know how to report an emergency?

Public Awareness

- Education must cover:
  - One-call notification system.
  - Hazards associated with pipeline releases.
  - Physical indications of a leak.
  - Steps to take for public safety.
  - Reporting procedures.
  - Activities to advise municipalities, schools, etc. of pipeline locations

Public Awareness

- The program and media must be comprehensive enough to reach all areas where the hazardous liquid line operates.

- Program must be in English and other languages if a significant concentration of non-English speaking population exists in Pipeline area.

- Documentation and periodic evaluations must be available for agency reviews

Public Awareness

- Operators must have a Damage Prevention Program.
- Operators must be members of One-Call systems
- Membership in a One-call system satisfies portions of these regulations.
- Damage prevention program must:
  - Include the identity of excavators in the area of your pipeline.
  - Notification of the public in the vicinity of the pipeline, and excavators of:

Pennsylvania 811

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Public Awareness

- The program's existence and purpose.
- How to learn location of underground pipelines prior to excavations.
- Provide a means of receiving and recording notification of planned excavation activities.
- If operator has buried pipelines in the area of proposed excavation, provide for notifications of persons who give notice of their intent to excavate of the type of temporary marking to be provided and how to identify the markings.

Public Awareness

- Provide for temporary marking of buried pipelines in the area of excavation, prior to the activity.
- Provide for inspection of the pipelines that could be damaged by the excavations in their vicinity.
- Inspections must be performed as often as necessary to ensure the integrity of the pipeline.
- In case of blasting, inspections must include leak surveys.

Program Overview

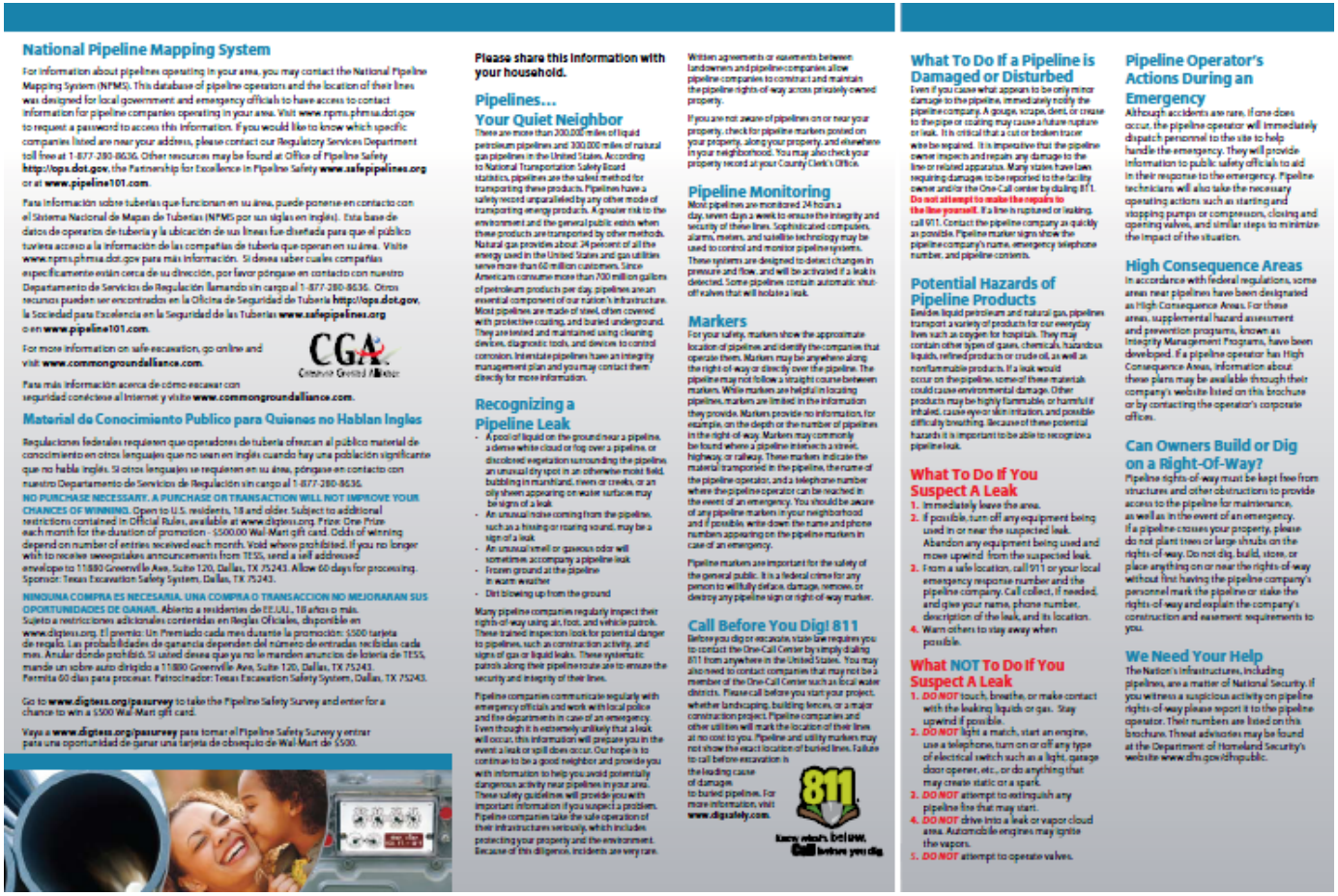
4 initiatives to meet the basic requirements of API RP 1162:

- MAIL-OUTS
  - Safety brochures mailed to stakeholders near regulated pipelines
- LIAISON TRAINING PROGRAMS
  - Educate and train emergency responders and excavators about pipeline safety procedures and product hazards
- NATIONWIDE 811 INITIATIVES
  - Participate in various efforts to promote “Call Before You Dig” state programs and 811
- DOCUMENTATION OF COMMUNICATIONS
  - Retaining records, lists, program evaluations, and other documentations involving communications to stakeholders

Printed Brochures

- Printed brochures are mailed to stakeholders near regulated pipeline :
  - 660 ft for Affected Public
  - 10 miles for Excavators, asset county
  - 20 miles for Emergency / Public Officials
  - 1000 ft for Schools
- Brochures are stakeholder specific and contain educational information on pipeline safety and damage prevention

Printed Brochures



National Pipeline Mapping System

For information about pipelines operating in your area, you may contact the National Pipeline Mapping System (NPMS). This database of pipeline operators and the location of their lines was designed for local government and emergency officials to have access to contact information for pipeline companies operating in your area. Visit **www.npms.phmsa.dot.gov** to request a password to access this information. If you would like to know which specific companies listed are near your address, please contact our Regulatory Services Department toll free at 1-877-280-8636. Other resources may be found at Office of Pipeline Safety **http://ops.dot.gov**, the Partnership for Excellence in Pipeline Safety **www.safepipelines.org** or at **www.pipeline101.com**.

Para información sobre tuberías que funcionan en su área, puede ponerse en contacto con el Sistema Nacional de Mapas de Tuberías (NPMS por sus siglas en Inglés). Esta base de datos de operarios de tubería y la ubicación de sus líneas fue diseñada para que el público tuviera acceso a la información de las compañías de tubería que operan en su área. Visite www.npms.phmsa.dot.gov para más información. Si desea saber cuales compañías específicamente están cerca de su dirección, por favor póngase en contacto con nuestro Departamento de Servicios de Regulación llamando sin cargo al 1-877-280-8636. Otros recursos pueden ser encontrados en la Oficina de Seguridad de Tubería **http://ops.dot.gov**, la Sociedad para Excelencia en la Seguridad de las Tuberías **www.safepipelines.org** o en **www.pipeline101.com**.

For more information on safe excavation, go online and visit **www.commongroundalliance.com**.

CGA Common Ground Alliance

Para más información acerca de cómo excavar con seguridad conéctese al Internet y visite **www.commongroundalliance.com**.

Material de Conocimiento Publico para Quienes no Hablan Ingles

Regulaciones federales requieren que operadores de tubería ofrezcan al público material de conocimiento en otros lenguajes que no sean en inglés cuando hay una población significante que no habla inglés. Si otros lenguajes se requieren en su área, póngase en contacto con nuestro Departamento de Servicios de Regulación sin cargo al 1-877-280-8636.

NO PURCHASE NECESSARY. A PURCHASE OR TRANSACTION WILL NOT IMPROVE YOUR CHANCES OF WINNING. Open to U.S. residents, 18 and older. Subject to additional restrictions contained in Official Rules, available at www.digtess.org. Prize: One Prize each month for the duration of promotion - $500.00 Wal-Mart gift card. Odds of winning depend on number of entries received each month. Void where prohibited. If you no longer wish to receive sweepstakes announcements from TESS, send a self addressed envelope to 11880 Greenville Ave, Suite 120, Dallas, TX 75243. Allow 60 days for processing. Sponsor: Texas Excavation Safety System, Dallas, TX 75243.

NINGUNA COMPRA ES NECESARIA. UNA COMPRA O TRANSACCION NO MEJORARAN SUS OPORTUNIDADES DE GANAR. Abierto a residentes de EE.UU., 18 años o más. Sujeto a restricciones adicionales contenidas en Reglas Oficiales, disponible en www.digtess.org. El premio: Un Premiado cada mes durante la promoción: $500 tarjeta de regalo. Las probabilidades de ganancia dependen del número de entradas recibidas cada mes. Anular donde prohibido. Si usted desea que ya no le manden anuncios de lotería de TESS, mande un sobre auto dirigido a 11880 Greenville Ave, Suite 120, Dallas, TX 75243. Permita 60 días para procesar. Patrocinador: Texas Excavation Safety System, Dallas, TX 75243.

Go to **www.digtess.org/pasurvey** to take the Pipeline Safety Survey and enter for a chance to win a $500 Wal-Mart gift card.

Vaya a **www.digtess.org/pasurvey** para tomar el Pipeline Safety Survey y entrar para una oportunidad de ganar una tarjeta de obsequio de Wal-Mart de $500.

Please share this information with your household.

Pipelines... Your Quiet Neighbor

There are more than 300,000 miles of liquid petroleum pipelines and 300,000 miles of natural gas pipelines in the United States. According to National Transportation Safety Board statistics, pipelines are the safest method for transporting these products. Pipelines have a safety record unparalleled by any other mode of transporting energy products. A greater risk to the environment and the general public exists when these products are transported by other methods. Natural gas provides about 24 percent of all the energy used in the United States and gas utilities serve more than 60 million customers. Since Americans consume more than 700 million gallons of petroleum products per day, pipelines are an essential component of our nation's infrastructure. Most pipelines are made of steel, often covered with protective coating, and buried underground. They are tested and maintained using cleaning devices, diagnostic tools, and devices to control corrosion. Interstate pipelines have an integrity management plan and you may contact them directly for more information.

Recognizing a Pipeline Leak

- A pool of liquid on the ground near a pipeline, a dense white cloud or fog over a pipeline, or discolored vegetation surrounding the pipeline, an unusual dry spot in an otherwise moist field, bubbling in marshland, rivers or creeks, or an oily sheen appearing on water surfaces may be signs of a leak.
- An unusual noise coming from the pipeline, such as a hissing or roaring sound, may be a sign of a leak.
- An unusual smell or gaseous odor will sometimes accompany a pipeline leak.
- Frozen ground at the pipeline in warm weather
- Dirt blowing up from the ground

Many pipeline companies regularly inspect their rights-of-way using air, foot, and vehicle patrols. These trained inspectors look for potential danger to pipelines, such as construction activity, and signs of gas or liquid leaks. These systematic patrols along their pipeline route are to ensure the security and integrity of their lines.

Pipeline companies communicate regularly with emergency officials and work with local police and fire departments in case of an emergency. Even though it is extremely unlikely that a leak will occur, this information will prepare you in the event a leak or spill does occur. Our hope is to continue to be a good neighbor and provide you with information to help you avoid potentially dangerous activity near pipelines in your area. These safety guidelines will provide you with important information if you suspect a problem. Pipeline companies take the safe operation of their infrastructures seriously, which includes protecting your property and the environment. Because of this diligence, incidents are very rare.

Written agreements or easements between landowners and pipeline companies allow pipeline companies to construct and maintain the pipeline rights-of-way across privately owned property.

If you are not aware of pipelines on or near your property, check for pipeline markers posted on your property, along your property, and elsewhere in your neighborhood. You may also check your property record at your County Clerk's Office.

Pipeline Monitoring

Most pipelines are monitored 24 hours a day, seven days a week to ensure the integrity and security of these lines. Sophisticated computers, alarms, meters, and satellite technology may be used to control and monitor pipeline systems. These systems are designed to detect changes in pressure and flow, and will be activated if a leak is detected. Some pipelines contain automatic shut-off valves that will isolate a leak.

Markers

For your safety, markers show the approximate location of pipelines and identify the companies that operate them. Markers may be anywhere along the right-of-way or directly over the pipeline. The pipeline may not follow a straight course between markers. While markers are helpful in locating pipelines, markers are limited in the information they provide. Markers provide no information, for example, on the depth or the number of pipelines in the right-of-way. Markers may commonly be found where a pipeline intersects a street, highway, or railway. These markers indicate the material transported in the pipeline, the name of the pipeline operator, and a telephone number where the pipeline operator can be reached in the event of an emergency. You should be aware of any pipeline markers in your neighborhood and if possible, write down the name and phone numbers appearing on the pipeline markers in case of an emergency.

Pipeline markers are important for the safety of the general public. It is a federal crime for any person to willfully deface, damage, remove, or destroy any pipeline sign or right-of-way marker.

Call Before You Dig! 811

Before you dig or excavate, state law requires you to contact the One-Call Center by simply dialing 811 from anywhere in the United States. You may also need to contact companies that may not be a member of the One-Call Center such as local water districts. Please call before you start your project, whether landscaping, building fences, or a major construction project. Pipeline companies and other utilities will mark the location of their lines at no cost to you. Pipeline and utility markers may not show the exact location of buried lines. Failure to call before excavation is the leading cause of damages to buried pipelines. For more information, visit **www.digsafely.com**.

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

What To Do If a Pipeline is Damaged or Disturbed

Even if you cause what appears to be only minor damage to the pipeline, immediately notify the pipeline company. A gouge, scrape, dent, or crease to the pipe or coating may cause a future rupture or leak. It is critical that a cut or broken tracer wire be repaired. It is imperative that the pipeline owner inspects and repairs any damage to the line or related apparatus. Many states have laws requiring damages to be reported to the facility owner and/or the One-Call center by dialing 811. **Do not attempt to make the repairs to the line yourself.** If a line is ruptured or leaking, call 911. Contact the pipeline company as quickly as possible. Pipeline marker signs show the pipeline company's name, emergency telephone number, and pipeline contents.

Potential Hazards of Pipeline Products

Besides liquid petroleum and natural gas, pipelines transport a variety of products for our everyday lives such as oxygen for hospitals. They may contain other types of gases, chemicals, hazardous liquids, refined products or crude oil, as well as nonflammable products. If a leak would occur on the pipeline, some of these materials could cause environmental damage. Other products may be highly flammable or harmful if inhaled, cause eye or skin irritation, and possible difficulty breathing. Because of these potential hazards it is important to be able to recognize a pipeline leak.

What To Do If You Suspect A Leak

1. Immediately leave the area.
2. If possible, turn off any equipment being used in or near the suspected leak. Abandon any equipment being used and move upwind from the suspected leak.
3. From a safe location, call 911 or your local emergency response number and the pipeline company. Call collect, if needed, and give your name, phone number, description of the leak, and its location.
4. Warn others to stay away when possible.

What NOT To Do If You Suspect A Leak

1. **DO NOT** touch, breathe, or make contact with the leaking liquids or gas. Stay upwind if possible.
2. **DO NOT** light a match, start an engine, use a telephone, turn on or off any type of electrical switch such as a light, garage door opener, etc., or do anything that may create static or a spark.
3. **DO NOT** attempt to extinguish any pipeline fire that may start.
4. **DO NOT** drive into a leak or vapor cloud area. Automobile engines may ignite the vapors.
5. **DO NOT** attempt to operate valves.

Pipeline Operator's Actions During an Emergency

Although accidents are rare, if one does occur, the pipeline operator will immediately dispatch personnel to the site to help handle the emergency. They will provide information to public safety officials to aid in their response to the emergency. Pipeline technicians will also take the necessary operating actions such as starting and stopping pumps or compressors, closing and opening valves, and similar steps to minimize the impact of the situation.

High Consequence Areas

In accordance with federal regulations, some areas near pipelines have been designated as High Consequence Areas. For these areas, supplemental hazard assessment and prevention programs, known as Integrity Management Programs, have been developed. If a pipeline operator has High Consequence Areas, information about these plans may be available through their company's website listed on this brochure or by contacting the operator's corporate offices.

Can Owners Build or Dig on a Right-Of-Way?

Pipeline rights-of-way must be kept free from structures and other obstructions to provide access to the pipeline for maintenance, as well as in the event of an emergency. If a pipeline crosses your property, please do not plant trees or large shrubs on the rights-of-way. Do not dig, build, store, or place anything on or near the rights-of-way without first having the pipeline company's personnel mark the pipeline or stake the rights-of-way and explain the company's construction and easement requirements to you.

We Need Your Help

The Nation's infrastructures, including pipelines, are a matter of National Security. If you witness a suspicious activity on pipeline rights-of-way please report it to the pipeline operator. Their numbers are listed on this brochure. Threat advisories may be found at the Department of Homeland Security's website www.dhs.gov/xthreats.

Printed Brochures - Surveys

- Each mail-out usually has a bounce back card for the public to respond
- Survey answers help measure program effectiveness
- Only 1-2% of bounce back cards are returned

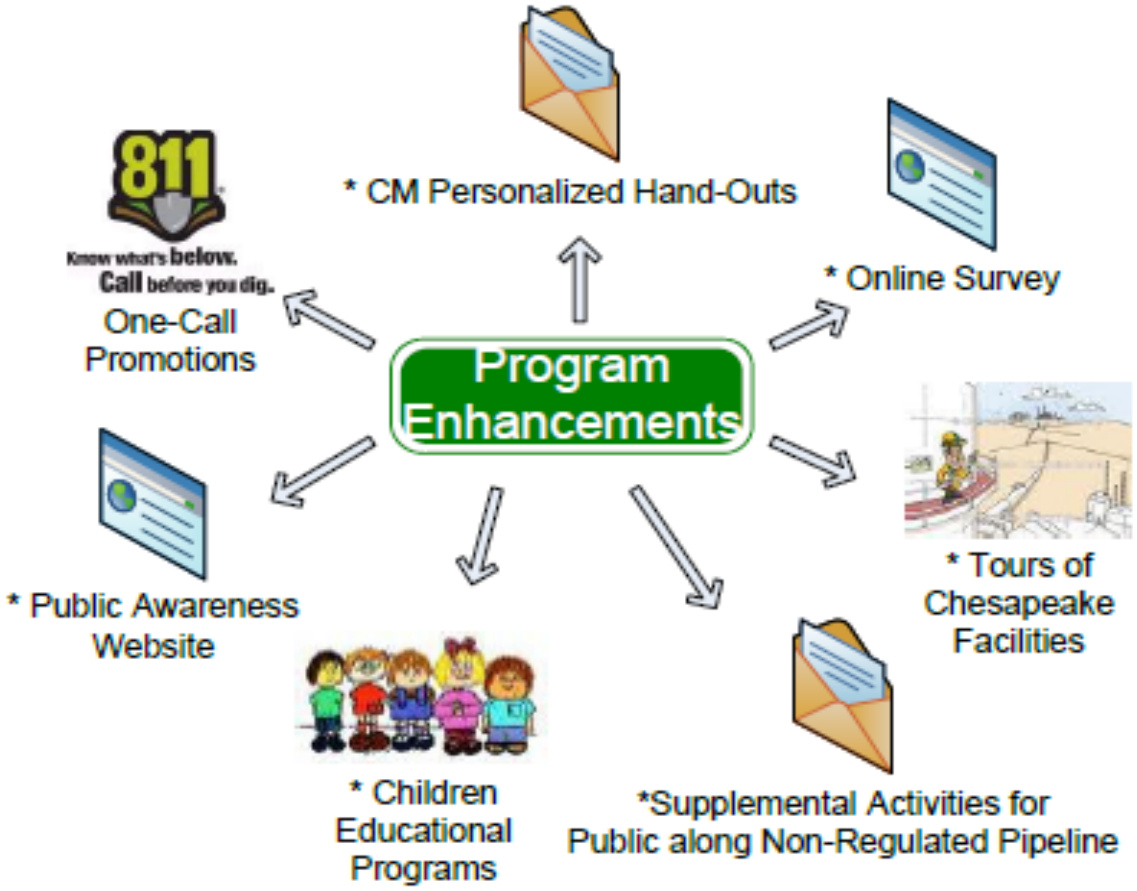
Liaison Programs

- Emergency Responder and Excavator training
- Collaborative training/meal programs using third party contractor in conjunction with state's one-call program
- Meetings held annually in counties with regulated pipelines
- Check with operators for times and locations

Liaison Programs

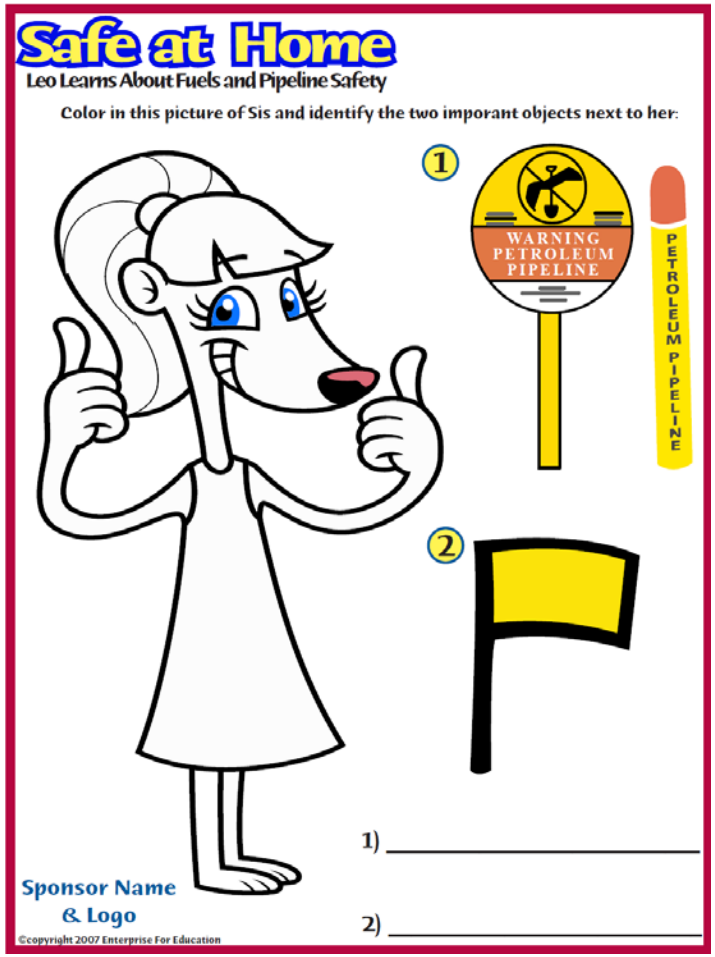
- Emergency Responder training focuses on how to identify a potential leak and how to prepare for a pipeline emergency.
- Excavator training focuses on the importance of calling the state's one-call to line locate and what to do if a line strike occurs.

Examples of Program Enhancements (Supplements)



Examples of Program Enhancements

Examples of Program Enhancements



Public Awareness Involvement

Breakout Tanks

EPA/DOT Jurisdictional Boundaries
& Required Inspections

Images Provided by Thomas M Lael

§195.1(c) Breakout Tanks

§195.1(c) Breakout tanks subject to this part must comply with requirements that apply specifically to breakout tanks and, to the extent applicable, with requirements that apply to pipeline systems and pipeline facilities. If a conflict exists between a requirement that applies specifically to breakout tanks and a requirement that applies to pipeline systems or pipeline facilities, the requirement that applies specifically to breakout tanks prevails.

Anhydrous ammonia breakout tanks need not comply with §§195.132(b), 195.205(b), **195.242 (c) and (d),** 195.264 (b) and (e), 195.307, 195.428 (c) and (d), and 195.432 (b) and (c).

§195.2 Definitions

Breakout tank - means a tank used to:

(a) relieve surges in a hazardous liquid pipeline system **or**

(b) receive and store hazardous liquid transported by a pipeline for reinjection and continued transportation by pipeline.

API referenced documents

What is the difference between a standard, a specification, recommended practice and a publication?

- **Standard, Specification, or Code** – An operator would be expected to comply with the provisions.
- **Recommended Practice** – An operator would be expected to follow the provisions unless the operator notes in their procedural manual the reasons why all or certain provisions are not necessary for safety.
- **Publication** – These provisions provide guidelines, safety practices, and precautions for the operator's review and consideration for inclusion into their procedural manuals.

§195.132 Design and construction of aboveground breakout tanks

(a) Each aboveground breakout tank must be designed to withstand the internal pressure produced by the hazardous liquid to be stored therein and by anticipated external loads.

- Continued -

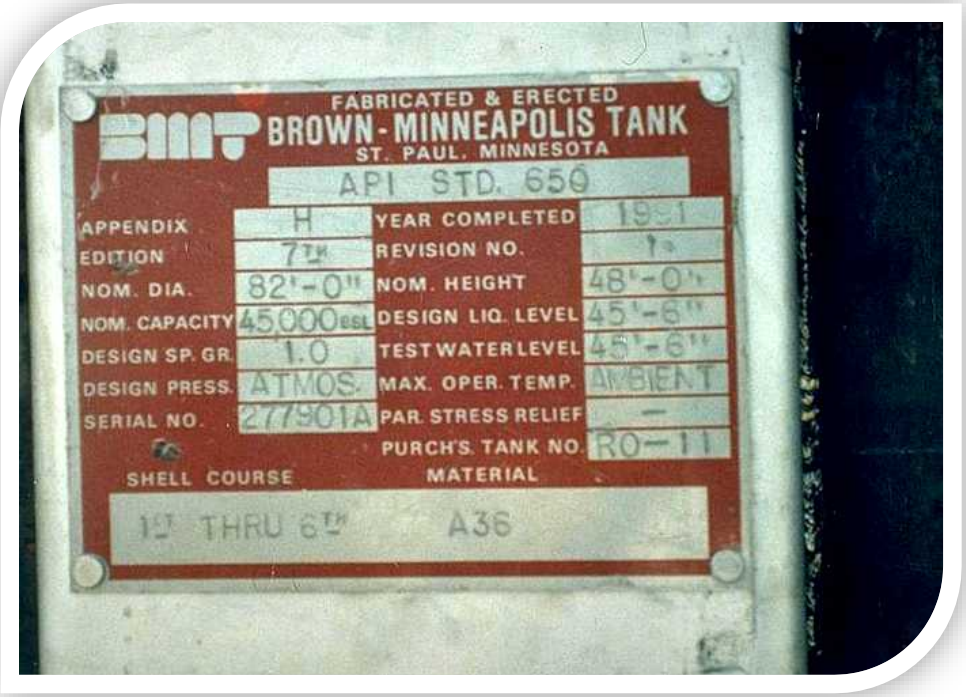
U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

§195.132 Design and construction of aboveground breakout tanks

(b) For aboveground breakout tanks first placed in service after October 2, 2000, compliance with paragraph (a) of this section requires one of the following:

§195.205 Repair, alteration, and reconstruction of aboveground breakout tanks that have been in service

(a) Aboveground breakout tanks that have been repaired, altered, or reconstructed and returned to service must be capable of withstanding the internal pressure produced by the hazardous liquid to be stored therein and by anticipated external loads.



§195.205 Repair, alteration, and reconstruction of aboveground breakout tanks that have been in service

(b) After October 2, 2000, compliance with paragraph (a) of this section requires the following for the tank specified:

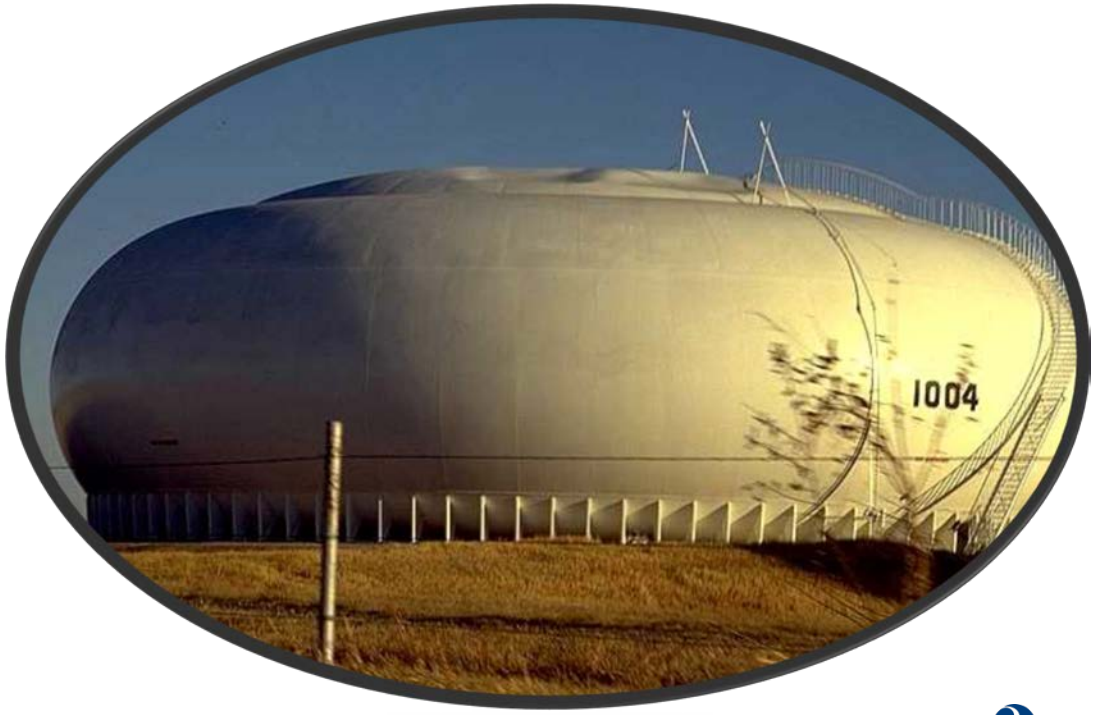
(1) For tanks designed for approximately atmospheric pressure constructed of carbon and low alloy steel, welded or riveted, and non-refrigerated and tanks built to API Standard 650 or its predecessor Standard 12C,
repair, alteration and reconstruction must be in accordance with API Standard 653.

§195.205 Repair, alteration, and reconstruction of aboveground breakout tanks that have been in service

(b)(2) For tanks built to API Specification 12F or API Standard 620, the repair, alteration and reconstruction must be in accordance with the design, welding, examination, and material requirements of those respective standards.

§195.205 Repair, alteration, and reconstruction of aboveground breakout tanks that have been in service

(b)(3) For high pressure tanks built to API Standard 2510, repairs, alterations and reconstruction must be in accordance with API 510.



§195.264 Impoundment, protection against entry, normal/emergency venting or pressure/vacuum relief for aboveground breakout tanks

(a) A means must be provided for containing hazardous liquids in the event of spillage or failure of an aboveground breakout tank.

(b) After October 2, 2000, compliance with paragraph (a) of this section requires the following for the aboveground breakout tanks specified:

(1) For tanks built to –

API Specification 12F,

API Standard 620, or

API Standard 650 (or its predecessor Standard 12C)

§195.264 Impoundment, protection against entry, normal/emergency venting or pressure/vacuum relief for aboveground breakout tanks

. . . . the installation of impoundment must be in accordance with the following sections of NFPA 30:

(i) Impoundment around a breakout tank must be installed in accordance with section 22.11.2; and

(ii) Impoundment by drainage to a remote impounding area must be installed in accordance with section 22.11.1.

(Amdt. No 195-99, 80 FR 168, January 5. 2015)

§195.264 Impoundment, protection against entry, normal/emergency venting or pressure/vacuum relief for aboveground breakout tanks

(2) For tanks built to API Std 2510, ….impoundment must be … in accordance with section 5 or 11 of API Std 2510.

(c) Aboveground breakout tank areas must be adequately protected against unauthorized entry.

§195.264 Impoundment, protection against entry, normal/emergency venting or pressure/vacuum relief for aboveground breakout tanks

(d) Normal/emergency relief venting must be provided for each atmospheric pressure breakout tank. Pressure/vacuum relieving devices must be provided for each low-pressure and high-pressure breakout tank.

§195.264 Impoundment, protection against entry, normal/emergency venting or pressure/vacuum relief for aboveground breakout tanks

(e) For normal/emergency relief venting and pressure/vacuum-relieving devices installed on aboveground breakout tanks after October 2, 2000, compliance with paragraph (d) of this section requires the following for the tanks specified:

- Tanks built to API Specification 12 F must be per Section 4, Appendices B & C of API Spec 12F.
- Tanks built to API Standard 650 (or 12C) must be in accordance with API Standard 2000.
- Tanks built to API Standard 620 must be per Section 9 of API Standard 620 and also API Standard 2000.

§195.307 Pressure testing aboveground breakout tanks

Generally, the API Specification that a tank was built to, includes a section instructing on testing of the tank. There are a few exceptions, where other specifications are referenced.

Tanks must be tested in accordance with the referenced specification listed in the See API Standards. The edition used must be that referenced in 195.3.

- For API Specification 12F, ‘‘Specification for Shop Welded Tanks for Storage of Production Liquids.’’ Tanks first placed in service after Oct. 2, 2000, test per Sec. 5.3 of that specification.

§195.307 Pressure testing aboveground breakout tanks

- For API Standard 620, ‘‘Design and Construction of Large, Welded, Low-Pressure Storage Tank.’’ tanks first placed in service after Oct. 2, 2000, test per Section 7.18 of that specification.

- For API Standard 650, ‘‘Welded Steel Tanks for Oil Storage.’’ tanks first placed in service after Oct. 2, 2000, test per Sections 7.3.5 & 7.3.6 of that specification.

(revised per Amdt. 195-100, March 31, 2015, 80FR12762)

§195.307 Pressure testing aboveground breakout tanks

- For aboveground atmospheric pressure breakout tanks constructed of carbon and low alloy steel, welded or riveted, and non-refrigerated and tanks built to API Std. 650 or its predecessor Std. 12 C that are returned to service after Oct. 2. 2000, the necessity for hydrostatic testing of repair, alteration, and reconstruction is covered in section 12.3 of API Std. 653

- For tanks built to API Std. 2510, and first placed in service after Oct. 2, 2000, pressure testing must be in accordance with ASME B&PV Code, Sec. VIII, Division 1 or 2.

(revised per Amdt. 195-100, March 31, 2015, 80FR12762)

§195.405- Protection against ignition and safe access/egress involving floating roofs

(a) After October 2, 2000 protection provided against ignition arising out of static electricity, lightning, and stray current during operation and maintenance …….must be in accordance with API Recommended Practice 2003.

Unless the operator notes in their procedural manual why compliance with all or certain provisions of API RP 2003 is not necessary for the safety of a particular breakout tank.

- Continued -

§195.405- Protection against ignition and safe access/egress involving floating roofs

(b) The hazards associated with access/egress onto floating roofs of in-service breakout tanks…….are addressed in API Publication 2026.

After October 2, 2000 the operator must review and consider ……inclusion of aspects of API Publication 2026 into their procedural manual.

§195.428 – Overpressure safety devices and overfill protection systems

(c) Tanks constructed or significantly altered to API Standard 2510 after October 2, 2000 must have an overfill system installed according to section 7.1.2 of API 2510.

(revised per Amdt. 195-100, March 31, 2015, 80FR12762)

Other tanks with 600 or more gallons of storage capacity that are constructed or significantly altered after October 2, 2000 must have an overfill system installed according to API RP 2350. Or need not comply if operator notes in their procedural manual why compliance is not necessary for the safety of the tank.

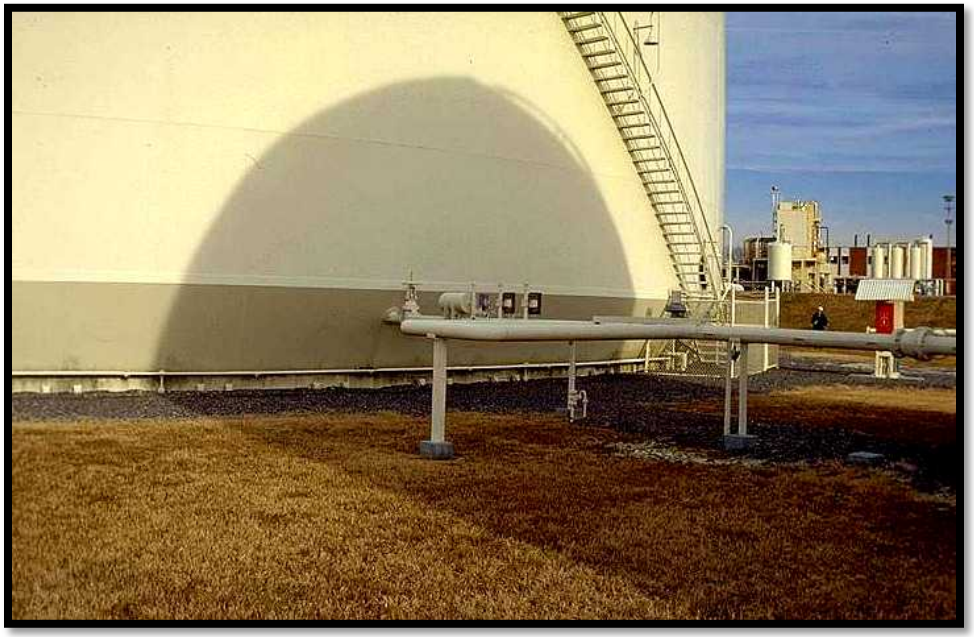
(d) After October 2, 2000 the requirements of paragraph (a) and (b) of this section apply…..

§195.428 – Overpressure safety devices and overfill protection systems

- Relief valves on pressure breakout tanks with HVLs, test at intervals NTE 5 years.
- Inspection and testing applies to overfill protection systems.
- Breakout tanks, overfill protection according to API Standard 2510 or API RP 2350.

§195.432 Inspection of in-service breakout tanks

(a) Except for breakout tanks under paragraphs (b) and (c) of this section, each operator shall at intervals not exceeding 15 months but at least once each calendar year, inspect each in-service breakout tank.



§195.432 Inspection of in-service breakout tanks

(b) Each operator must inspect the physical integrity of in-service and low-pressure steel aboveground breakout tanks according to API Standard 653. However, ……. The bottom integrity may be assessed according to a plan included in the operations and maintenance manual ……

§195.432 Inspection of in-service breakout tanks

(c) Each operator shall inspect the physical integrity of in-service steel aboveground breakout tanks built to API Standard 2510 according to section 6 of API Std 510.

(d) The intervals of inspections ……..in paragraphs (b) and (c) of this section begin on May 3, 1999 or on the operator's last recorded date of the inspection, whichever is earlier.

§195.565 How do I install cathodic protection on breakout tanks?

After October 2, 2000, when you install cathodic protection to protect the bottom of a breakout tank of more than 500 barrels capacity built to –

API Specification 12F

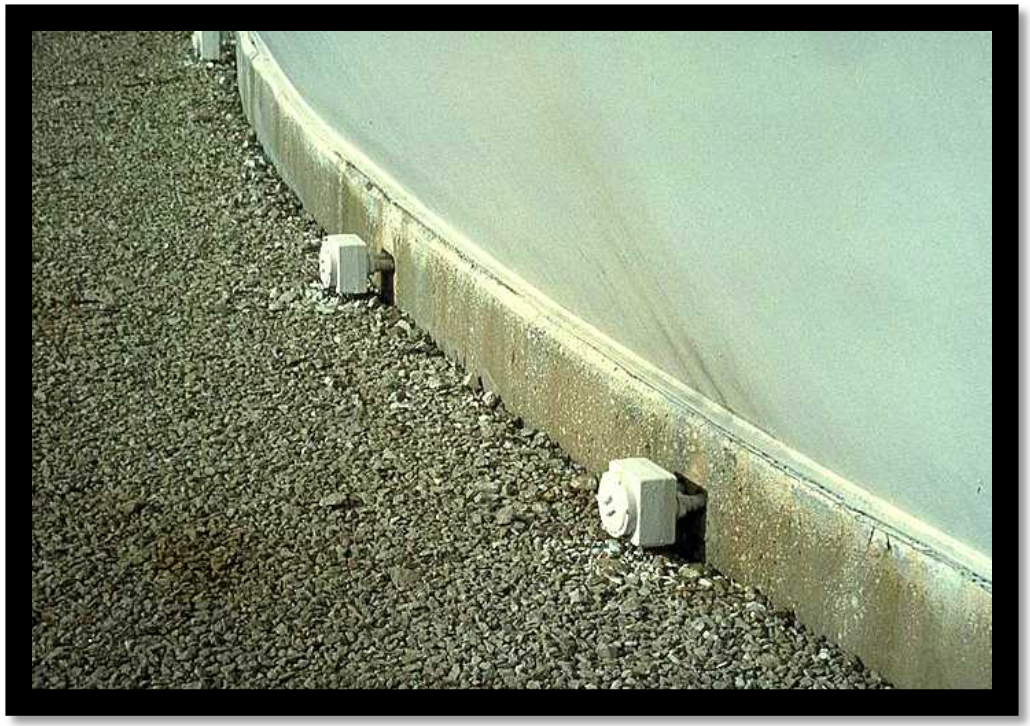
API Standard 620, or

API Standard 650 (or 12C)

you must install the system in accordance with API RP 651.

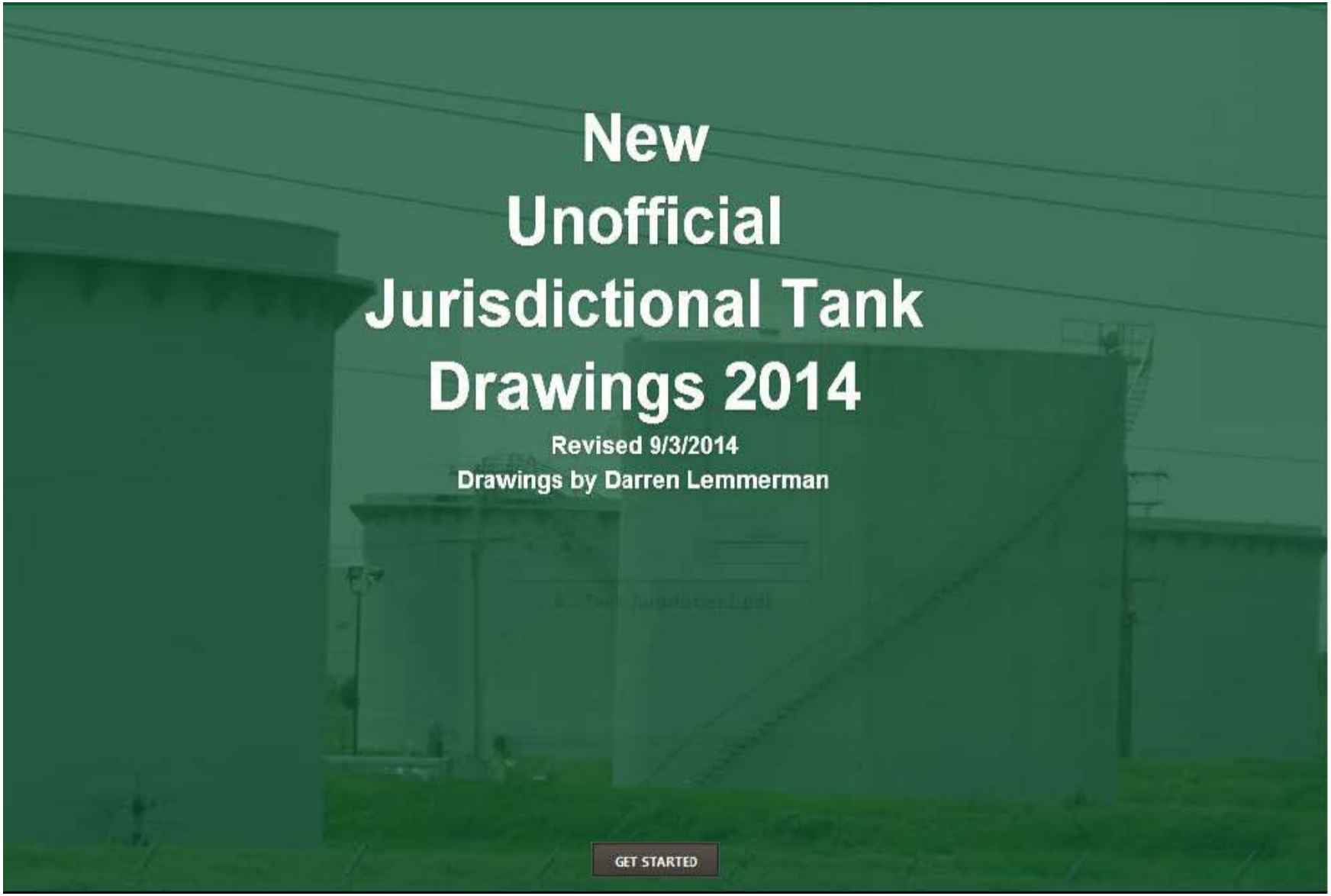
§195.565 How do I install cathodic protection on breakout tanks?

However, ….you need not comply with API RP 651 if you note in your procedural manual why compliance with all or certain provisions of API RP 651 is not necessary for safety.



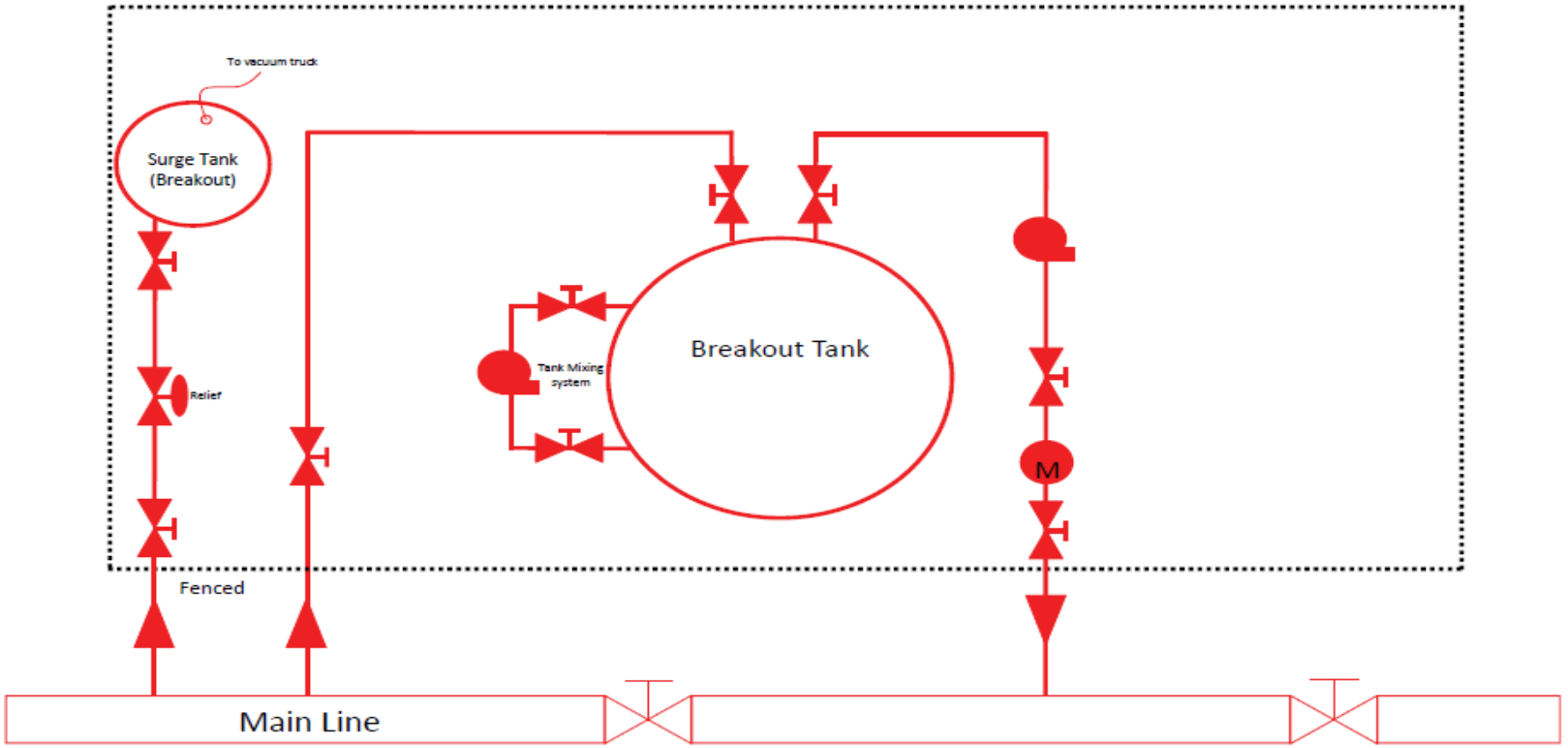
§195.573 What must I do to monitor external corrosion control?

(d) Breakout tanks. You must inspect each cathodic protection system ……..are in accordance with API RP 651. However, this inspection is not required if you note in your procedural manual why compliance with all or certain provisions of API RP 651 is not necessary for safety.



U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



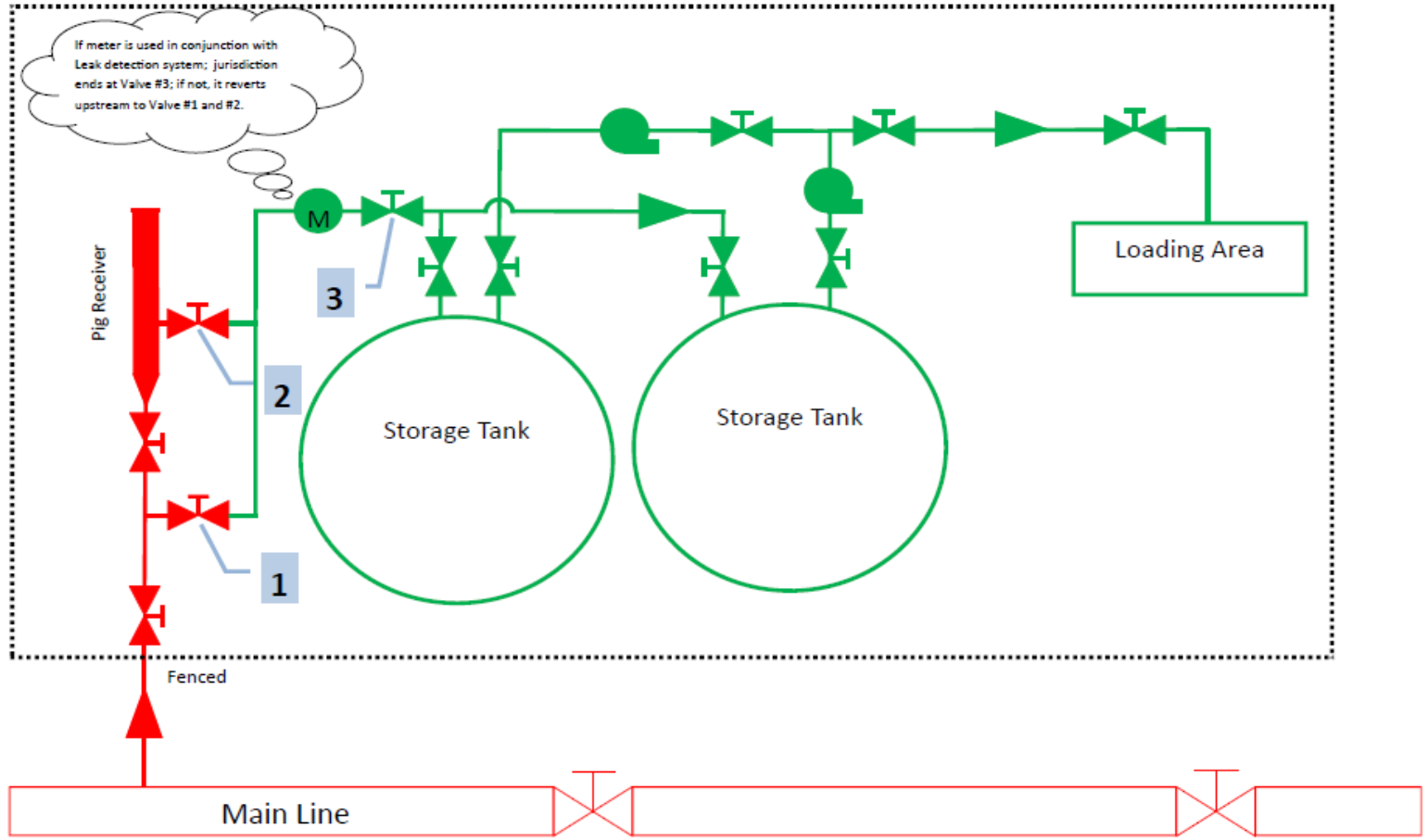
Flow
Valve
Pump
M
Meter

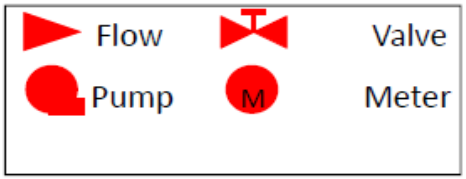
Jurisdiction

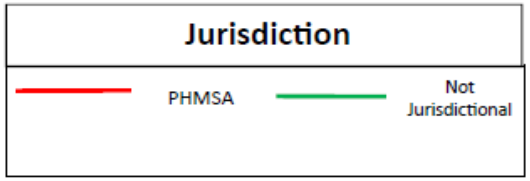
PHMSA

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

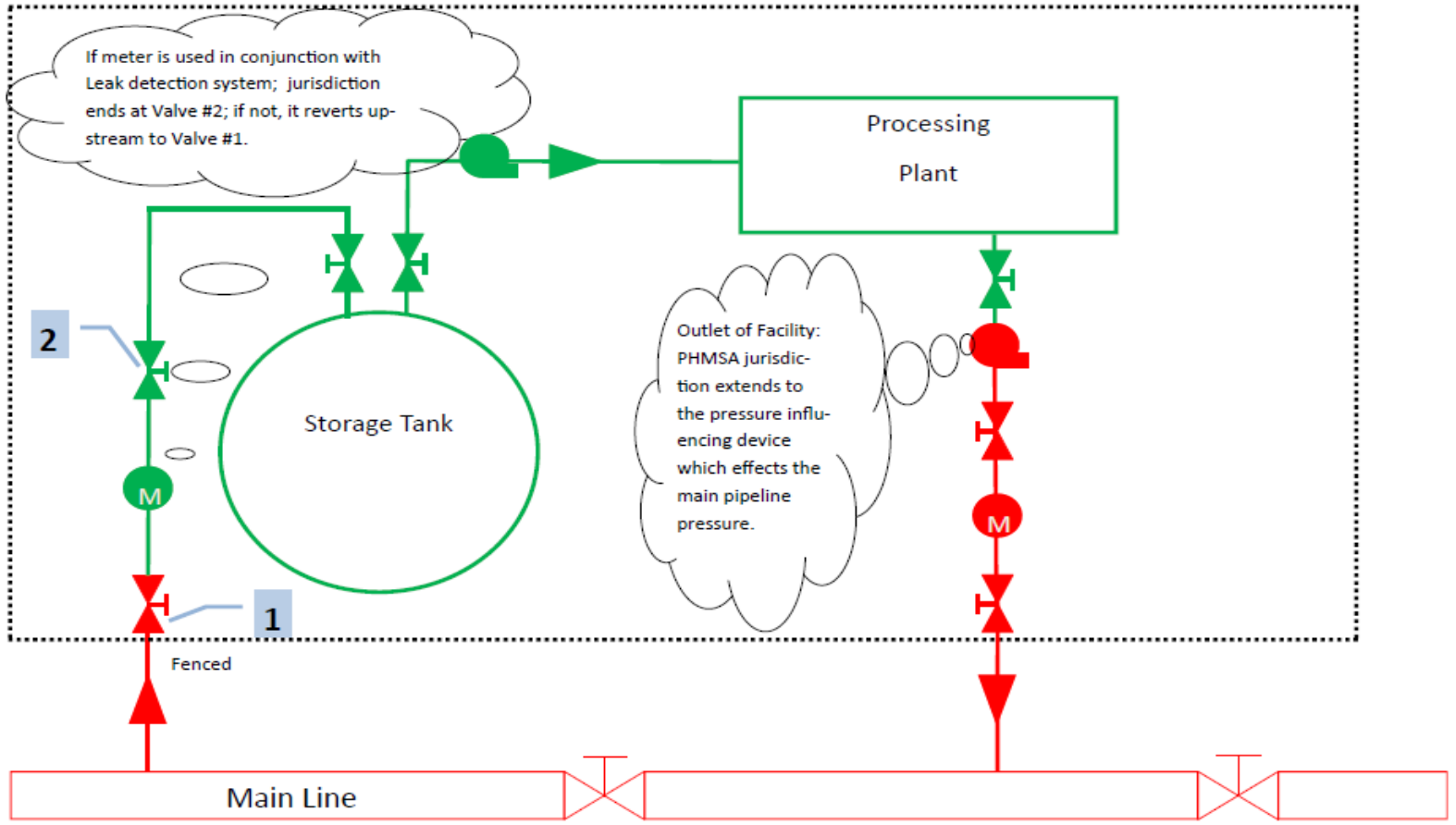






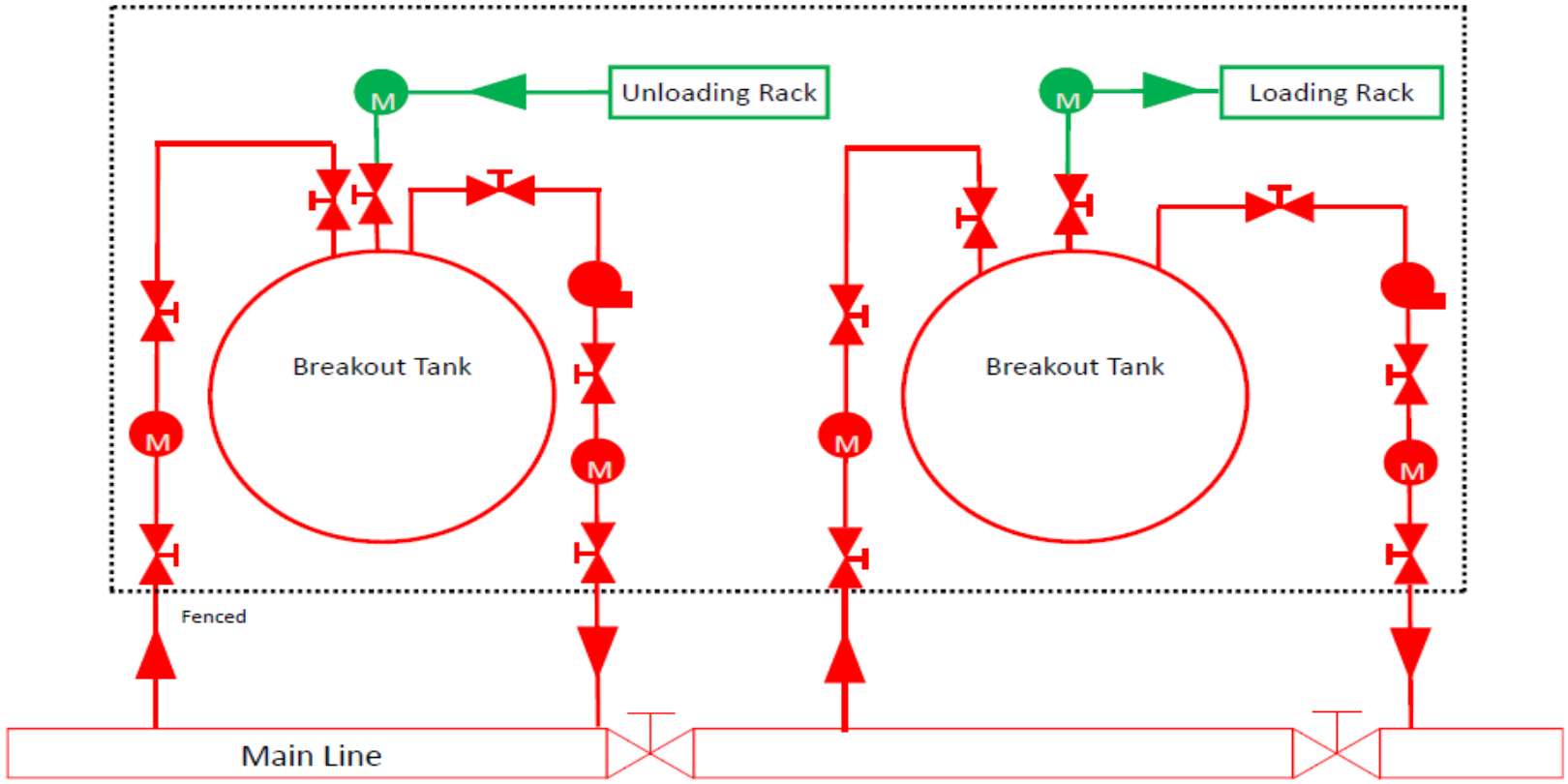
U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



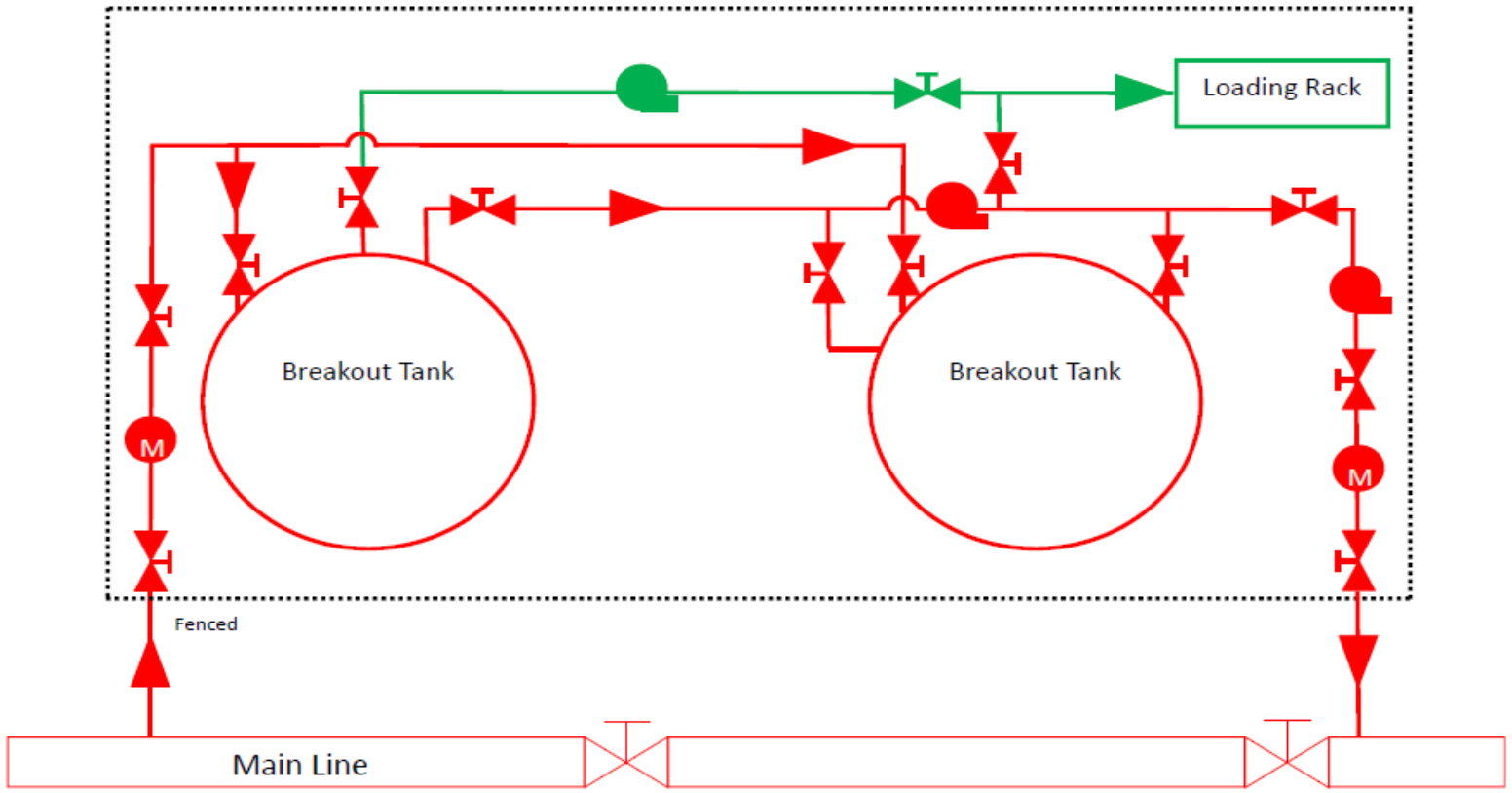
Flow
Valve
Pump
M
Meter

Jurisdiction

PHMSA
Not Jurisdictional

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



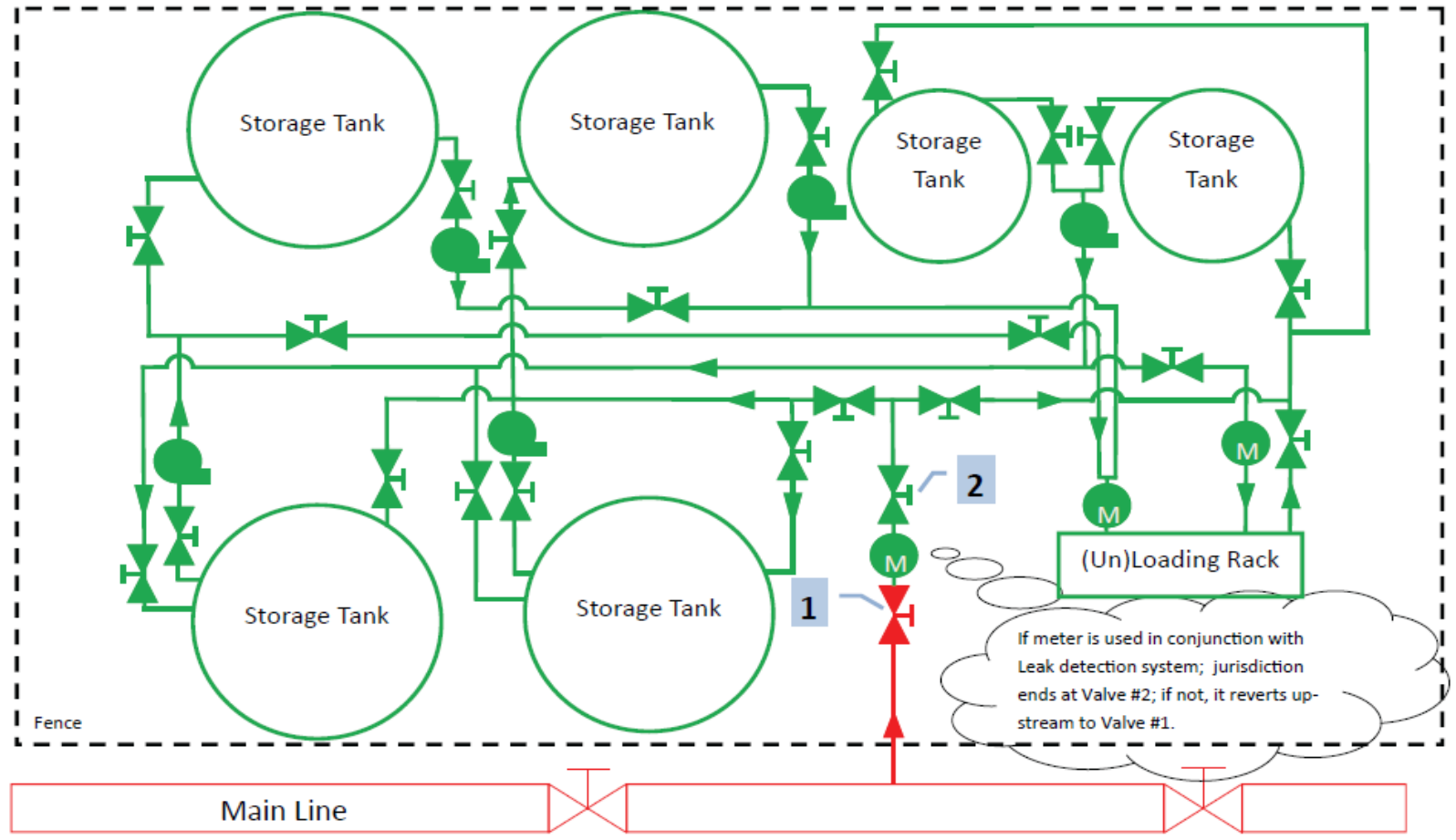
Flow
Valve
Pump
M
Meter

Jurisdiction

PHMSA
Not Jurisdictional

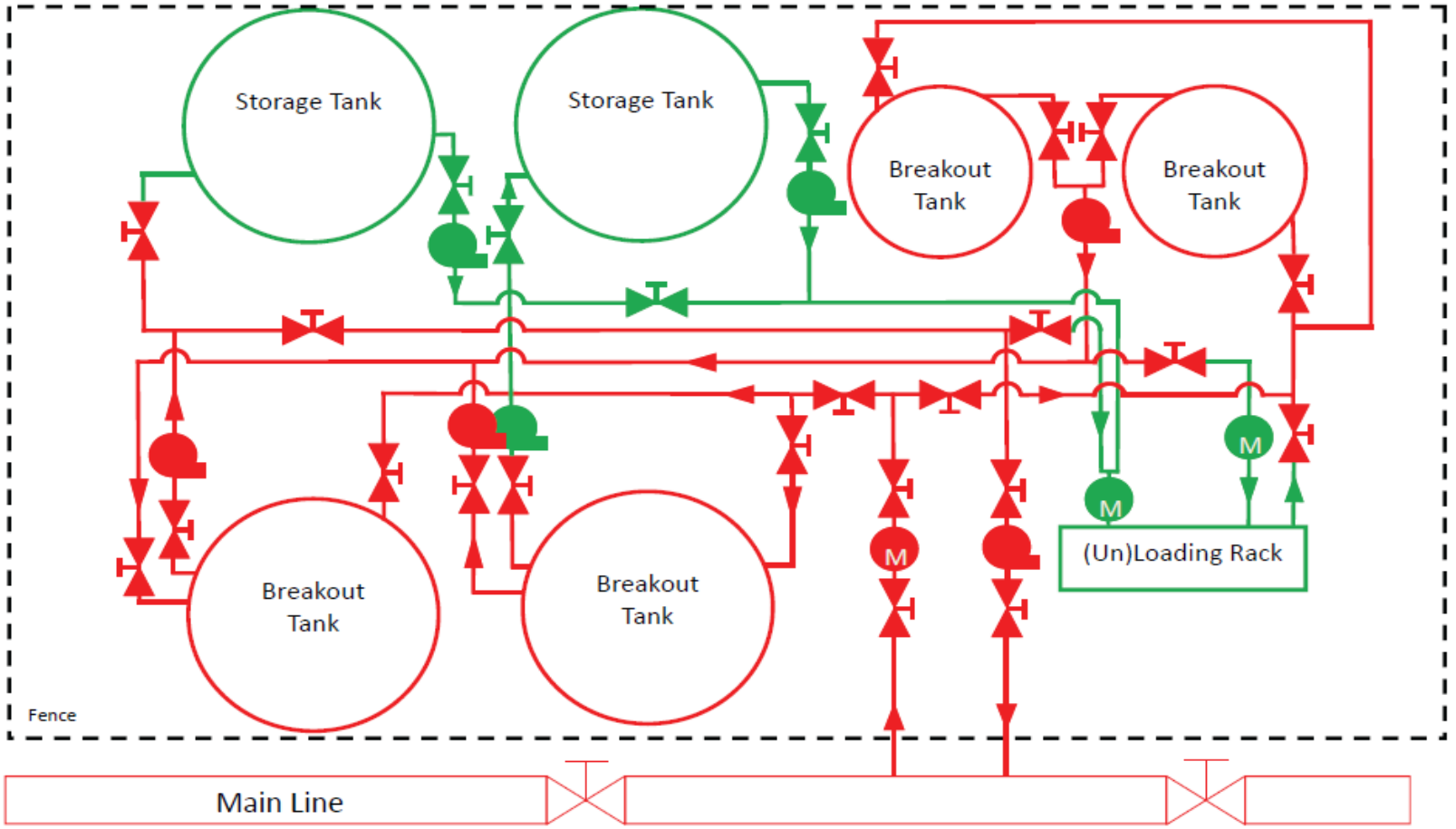
U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



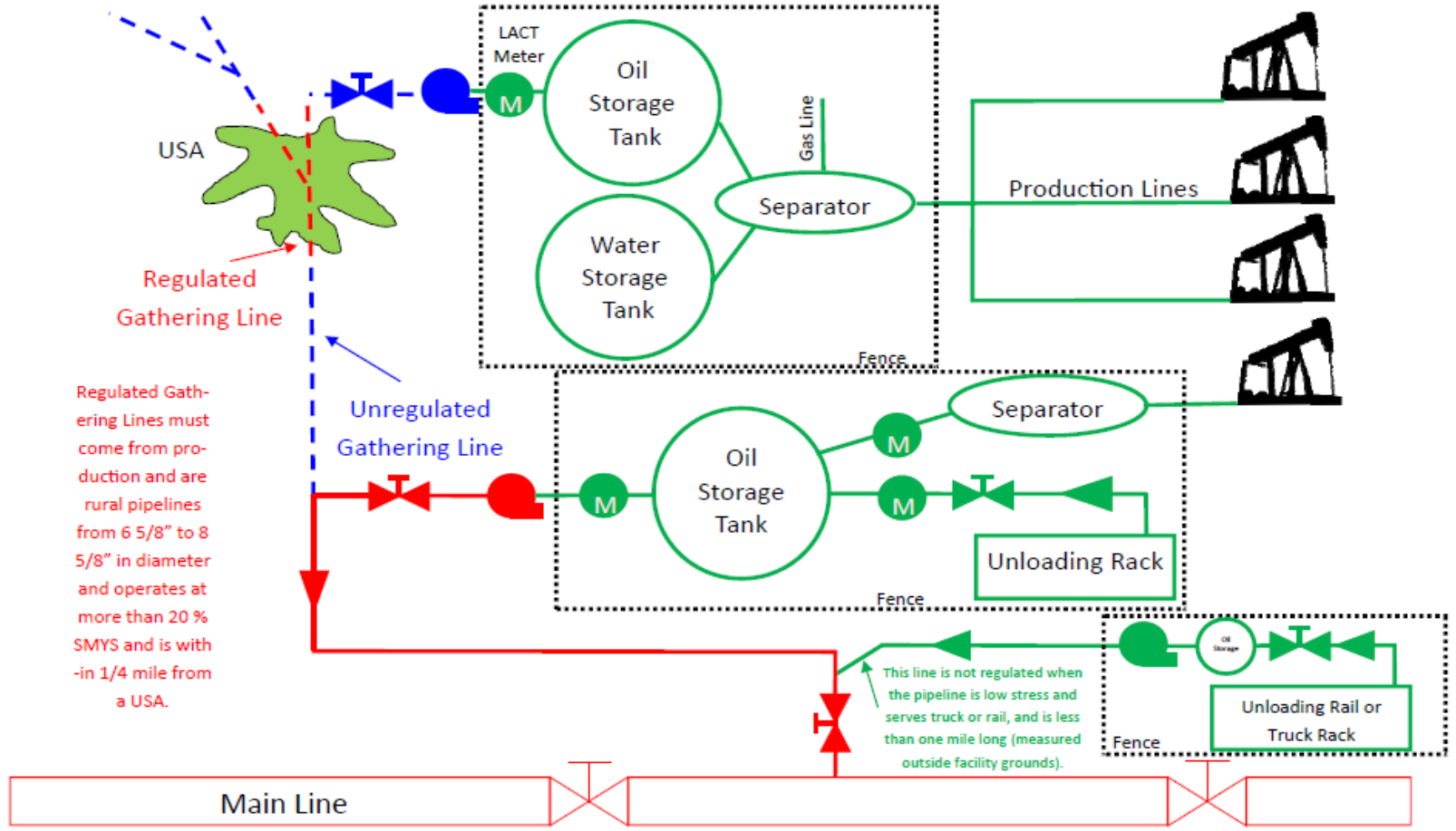
Flow
Valve
Pump
M
Meter

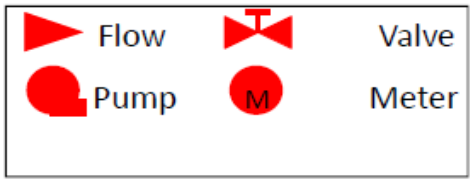
Jurisdiction

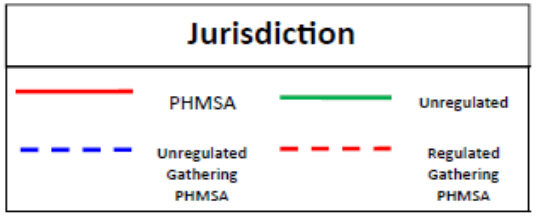
PHMSA
Not Jurisdictional

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

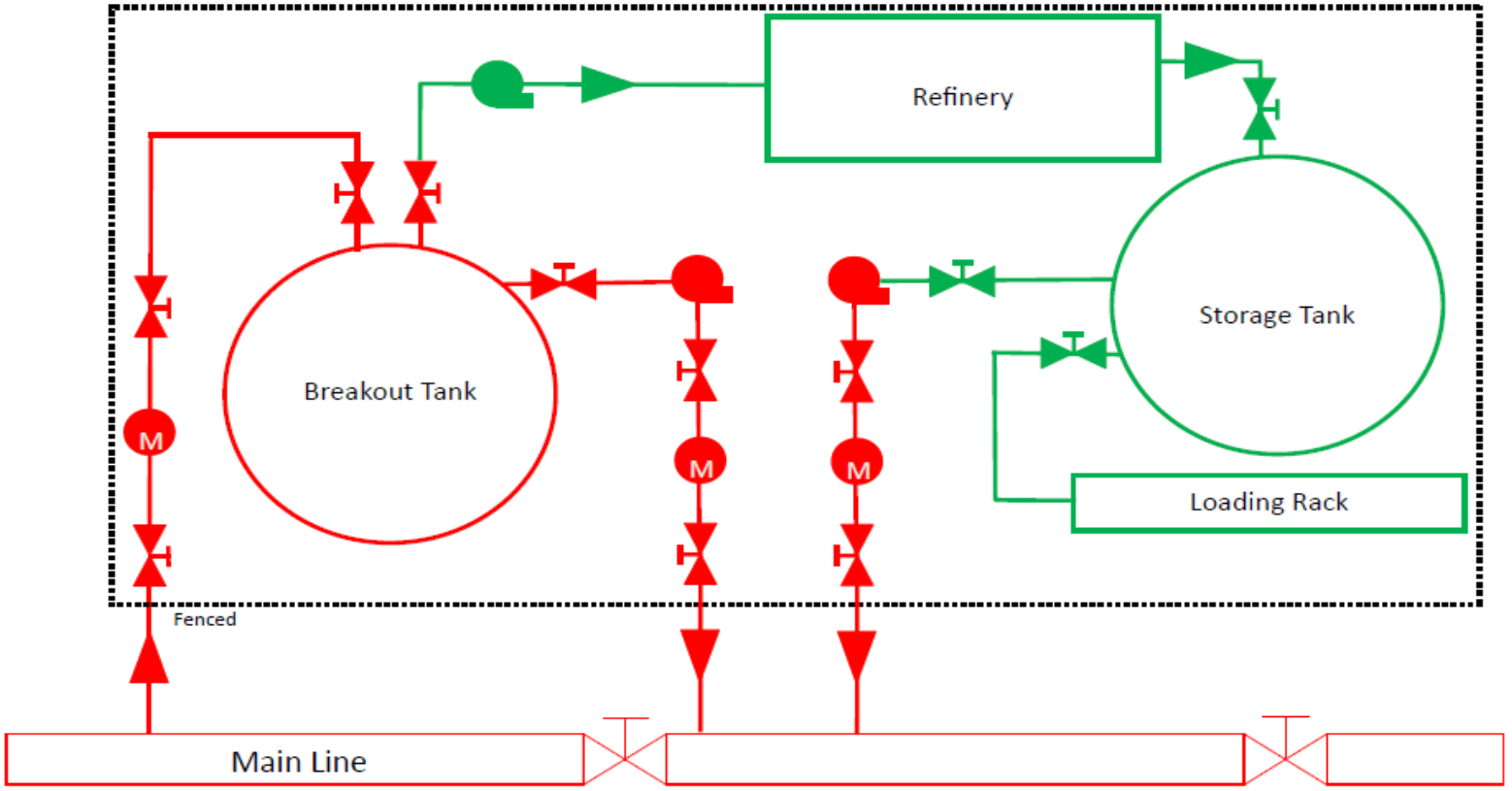






U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



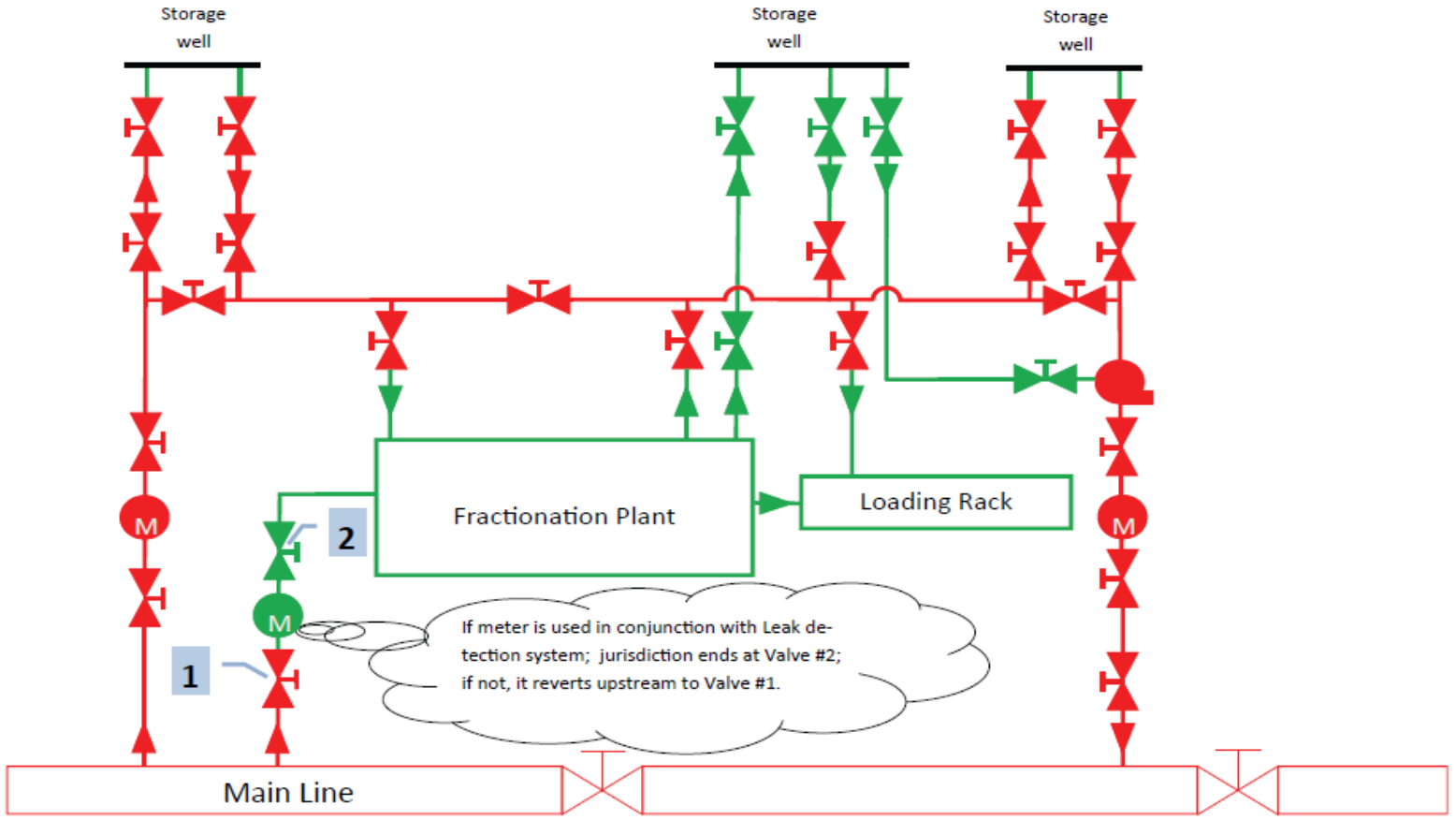
Flow
Valve
Pump
M
Meter

Jurisdiction

PHMSA
Not Jurisdictional

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology



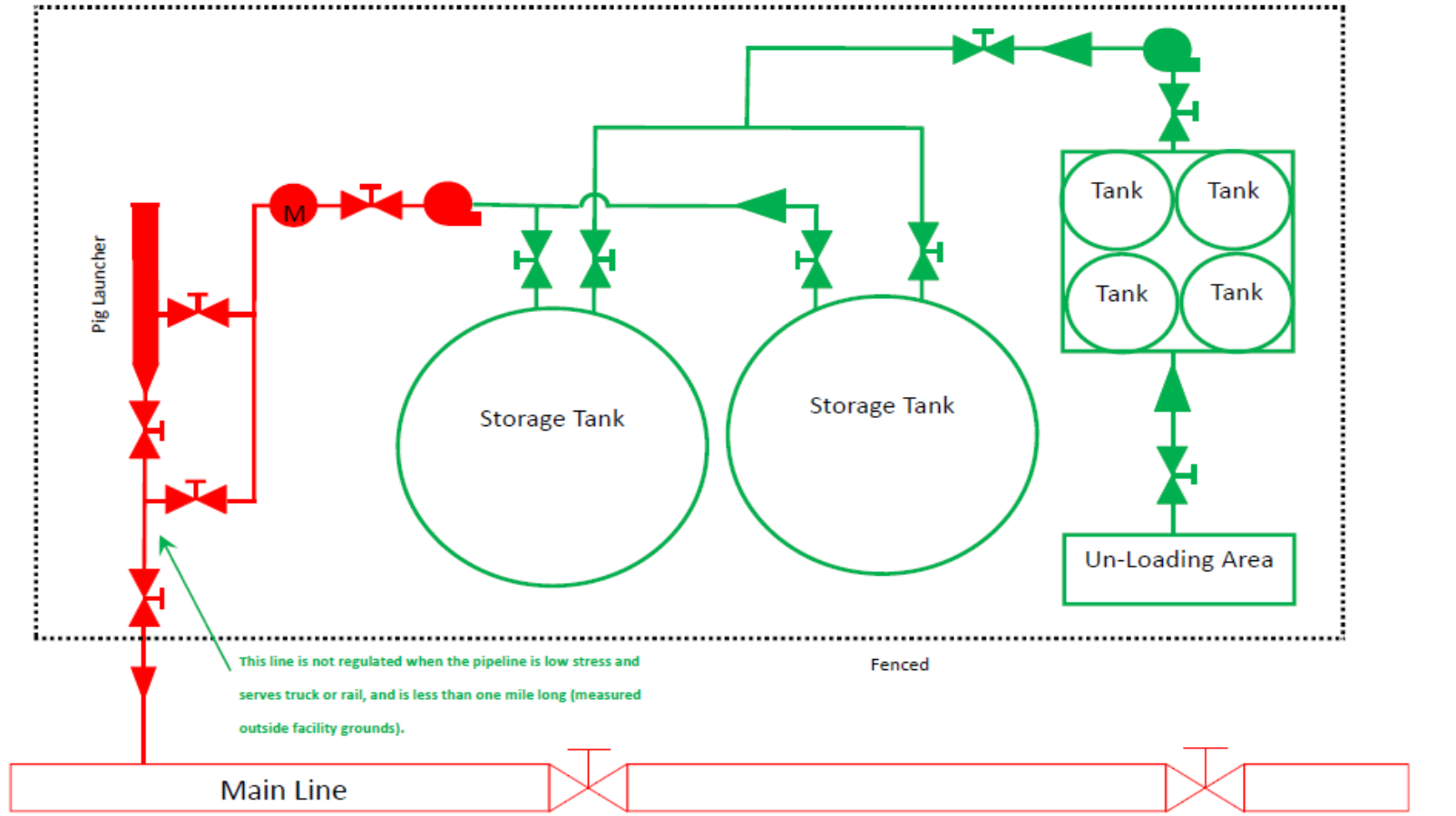
Flow
Valve
Pump
M
Meter

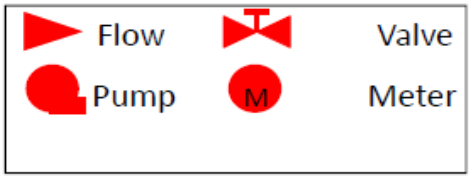
Jurisdiction

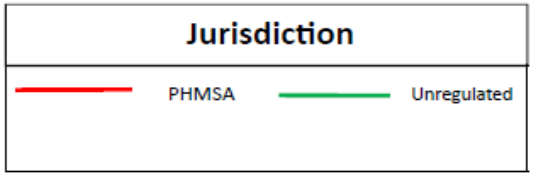
PHMSA
Not Jurisdictional

U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology







U.S. Department of Transportation

Office of the Assistant Secretary for Research and Technology

Breakout Tanks

Integrity Management Programs

PHMSA Integrity Management Programs

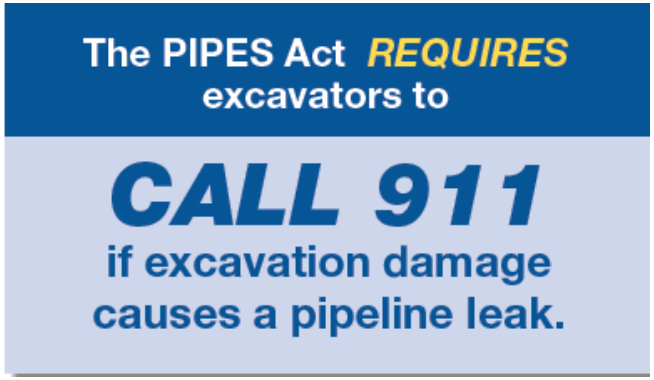
- Hazardous Liquid Integrity Management
  (Liquid IMP, 2000)

- Transmission Integrity Management
  (Gas IMP or TIMP, 2003)

- Distribution Integrity Management
  (DIMP, 2009)

PHMSA Integrity Management Programs

- "The purpose of these programs is to enhance safety by identifying and reducing pipeline integrity risks."
- Basic premise – "safety is improved by identifying risks and taking actions to address them"
- Operator (Owner) driven



IMP =“Process”- Driven Programs

- Formal Written Program
- Management Commitment & Support
- Defined Roles & Responsibilities
- Use of Industry Standards
- Long-term vs. Short-term
- Monitoring Progress & Effectiveness
- Periodic Formal Evaluation & Review
- Management of Change
- Continuous Improvement

Liquid IMP

- The Liquid IM Rule specifies how pipeline operators must identify, prioritize, assess, evaluate, repair and validate the integrity of hazardous liquid pipelines that could, in the event of a leak or failure, affect High Consequence Areas (HCAs) within the United States. Liquid HCAs include: population areas; areas containing drinking water and ecological resources that are unusually sensitive to environmental damage; and commercially navigable waterways.

Bellingham, WA Explosion

Yellowstone River, MT Oil Spill

Gas Transmission IMP (TIMP)

- The Gas IM Rule specifies how pipeline operators must identify, prioritize, assess, evaluate, repair and validate the integrity of gas transmission pipelines that could, in the event of a leak or failure, affect High Consequence Areas (HCAs) within the United States. HCAs include certain populated and occupied areas.

San Bruno, CA Explosion

Gas Distribution IMP (DIMP)

- Significant differences in system design and local conditions affecting distribution pipeline safety preclude applying the same tools and management practices as were used for gas transmission pipeline systems. Therefore, PHMSA took a slightly different approach for distribution integrity management.

- Less specific requirements, more knowledge of operating and maintenance history of system.

Virginia House Explosion

Liquid IMP High Consequence Areas

- Commercially navigable waterway which, means a waterway where a substantial likelihood of commercial navigation exists.
- High population area: 50,000 or more people, population density of at least 1,000 per sq. mi.
- Other population area: concentrated population – city, town, village, residential, commercial – defined by Census Bureau.
- Unusually Sensitive Area.

Elements of Integrity Management

- Knowledge of Pipeline System(s)
- Identify Threats affecting Each System
- Evaluate and Rank Risks
- Identify and Implement Measures to Address Risks (Prevention and Mitigation)
- Measure Performance, Monitor Results, and Evaluate Effectiveness
- Periodically Evaluate and Improve Program
- Report Results

Threat and Risk Identification

As applied in the Integrity Management Rules, risk assessment:

- is a process that identifies location specific threats and/or conditions that could lead to a pipeline failure
- provides an understanding of the likelihood and consequences of a threat
- allows data to be integrated from multiple sources to get a complete picture of the risk to pipeline integrity
- is used to prioritize the assessment of covered segments and to identify preventive and mitigative measures
- is one part of the overall risk management program

Threat Identification

Nine Identified Threats:

1. External Corrosion
2. Internal Corrosion
3. Stress Corrosion Cracking
4. Manufacturing Related Defects
5. Welding/Fabrication Related Defects
6. Equipment Failures
7. Third Party/Mechanical Damage
8. Incorrect Operations
9. Weather Related and Outside Force

Risk Ranking

Risk = Likelihood X Consequence

3 x 3 Risk Matrix

LIKELIHOOD				
	Likely	Medium Risk	High Risk	Extreme Risk
	Unlikely	Low Risk	Medium Risk	High Risk
	Highly Unlikely	Insignificant Risk	Low Risk	Medium Risk
		Slightly Harmful	Harmful	Extremely Harmful
		CONSEQUENCES		

Preventive and Mitigative Measures

- Conduct risk analysis to identify additional actions to enhance public safety and the environment:
  - Damage prevention best practices.
  - Better monitoring of CP.
  - Shorter inspection intervals.
  - EFRDs.
  - Modify pressure monitoring and leak detection.
  - Additional training for personnel on response.
  - Drills with local emergency responders.
  - Management controls.

Prevention vs. Mitigation

- "Prevention" – taking measures to completely eliminate a threat.

  Example – replacing steel pipe with plastic pipe will eliminate corrosion threat.

- "Mitigation" – taking measures to reduce the likelihood of a threat or minimize its consequence.

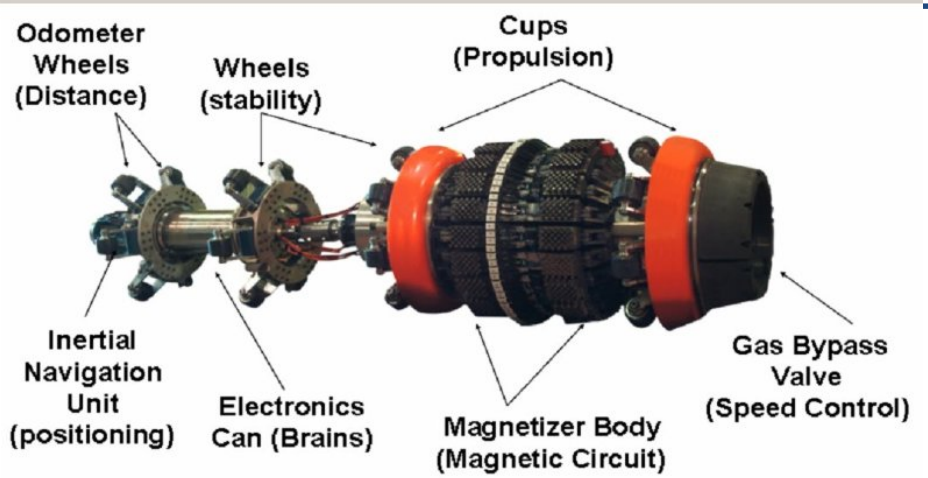
  Example – installing additional markers on right-of-way to reduce threat of third-party damage

Approved Assessment Methods

- In-Line Inspection
- Hydrostatic Testing
- Direct Assessment for Corrosion Threats
  - ECDA (external corrosion direct assessment)
  - ICDA (internal corrosion direct assessment)
- Other if Approved by PHMSA

* Assessment method must be capable of detecting the suspected threat

IMP Assessments



Internal Inspection Tools

- (1) Geometry Internal inspection tools for detecting changes to ovality, e.g., bends, dents, buckles or wrinkles, due to construction flaws or soil movement, or other outside force damage.

- (2) Metal Loss Tools (Ultrasonic and Magnetic Flux Leakage) for determining pipe wall anomalies, e.g., wall loss due to corrosion.

- (3) Crack Detection Tools for detecting cracks and crack-like features, e.g., stress corrosion cracking (SCC), fatigue cracks, narrow axial corrosion, toe cracks, hook cracks, etc.

Conducting IMP Assessments

- Prioritize Segments based on Perceived Risk
- Select Assessment Method based on Perceived Threat
- Conduct Baseline Assessment
- Identify and Evaluate Anomalies Discovered
  - Immediate Repair
  - One-Year Conditions
  - Monitored Conditions
- Establish Timeframe for Re-assessment per Code Requirements
  - 5-year, 7-year, 10-year

Addressing Integrity Issues

- Evaluate all anomalous conditions and remediate those that could reduce a pipeline's integrity
- Repair, replace, or remove from service
- Implement temporary pressure reduction
- Implement long-term pressure reduction
- Discovery of a condition occurs when an operator has adequate information

Measure Program Effectiveness

- An operator's program must include methods to measure whether the program is effective in assessing and evaluating the integrity of each pipeline segment and in protecting the high consequence areas.
  - Performance measures- reduce volume or number of spills.
  - Audits.
  - Operational events.
  - Risk reduction.
  - Track community outreach.

Performance Measures

- Selected Activities – monitor activities the operator has implemented.

- Deterioration – trends that indicate integrity is weakening despite preventive measures.

- Failure measures – Leak history, incident response, product loss. Indicators to show progress towards fewer spills and damage.

Performance Measure Examples

- Reduce volume from unintended releases by a percentage, with goal of zero.
- Reduce number of unintended releases, ultimate goal of zero.
- Track effectiveness of community outreach.
- Summary of integrity improvements compared to IM program.
- Internal and external audits.
- Measure operational events – relief activation, valve closures, SCADA outages.
- Measure to demonstrate reduction in risk.

Required IMP Records

- Written plan.
- Documents to support decisions and analyses, modifications, determinations, actions taken.
- Identifying new HCAs.
- Processes used in evaluation, determinations, integrating information.

Integrity Management Programs Conclusion

- In a nutshell, Integrity Management is taking measures in advance to “keep the product in the pipe.”

Enforcement Process

Compliance, Federal & State Waivers and Interpretations

Regulatory Compliance

- **What did the operator do (or not do) that is required by the regulations?**

- Record keeping is the main component to prove compliance.

- OPS/state personnel will verify compliance with field inspections.

Part 190—Pipeline Safety Programs and Rulemaking Procedures

§190.1 Purpose and scope.

- (a) This part prescribes procedures used by the Pipeline and Hazardous Materials Safety Administration in carrying out duties regarding pipeline safety under 49 U.S.C. 60101 et seq. (the pipeline safety laws) and 33 U.S.C. 1321 (the water pollution control laws).

- (b) This subpart defines certain terms and prescribes procedures that are applicable to each proceeding described in this part.

Enforcement Process

- §190.203 Inspections.
- Letters of concern (non-enforceable).
- §190.205 Warning letters.
- §190.207 Notice of probable violation.
- §190.208 Response options.
- §190.211 Hearing.
- §190.213 Final order.

Subpart B - Enforcement

§190.203 Inspections

- Upon presentation of credentials agents of PHMSA may enter, inspect, and examine records and properties of an operator.

§190.203 Inspections

- Inspections conducted by
  - Scheduling by Regional Director
  - Complaints
  - Information from previous inspections
  - Report from state agency
  - Pipeline accident
  - As deemed appropriate by the Administrator

§190.203 Inspections

- PHMSA can request additional
  - Tests
  - Information
  - Records

Enforcement Actions

- §190.206 Amendment of plans or procedures

  - If PHMSA finds an operators plans or procedures are inadequate, they may issue a NOA (Notice of Amendment).

  - The operator has 30 days following receipt of the notice to submit written comments, revised procedures, or request a hearing.

Enforcement Actions

- §190.207 Notice of probable violation
  - States regulation and violation
  - Provides notice of response options
  - May propose civil penalty
  - May require remedial action required

Enforcement Actions

- §190.208 Response options
  - Pay penalty, implement remedial action, close case
  - Submit explanations
  - Request hearing

- §190.211 Hearing

- §190.213 Final order
  - States findings, penalty, required actions

§190.291 Criminal penalties generally

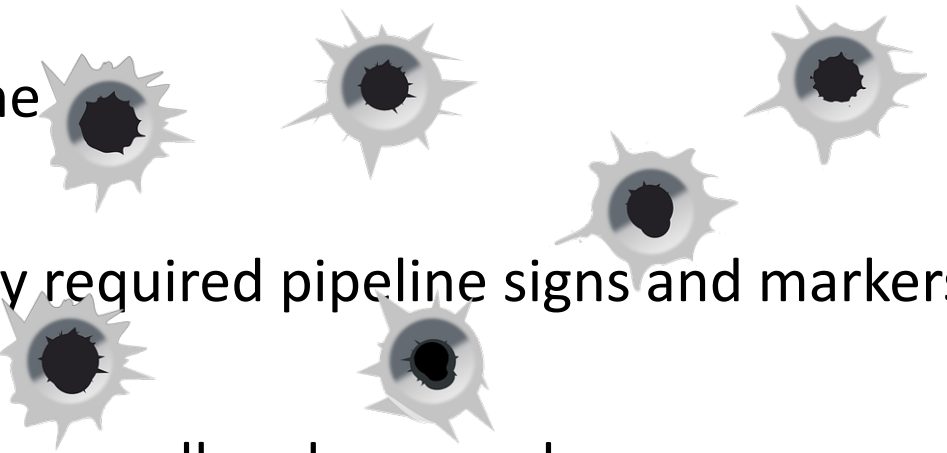
- Knowingly/willfully violate regulations (**Shell Case**)
- Injure or destroy pipeline
- Deface, damage, destroy required pipeline signs and markers
- Excavating before using one call and causes damage…

Enforcement Actions

- §190.233 Corrective action orders
  - Issued if pipeline hazardous to life, property, or environment

§190.291 Criminal penalties generally

- Knowingly/willfully violate regulations
- Injure or destroy pipeline
- Deface, damage, destroy required pipeline signs and markers
- Excavating before using one call and causes damage…



Subpart C – Criminal Enforcement

- The pipeline safety regulations also specify conditions under which criminal penalties may be pursued.

- Any person who willfully and knowingly violates a provision of the pipeline safety regulations will, upon conviction, be subject to a fine, imprisonment for not more than five years, or both, for each offense.

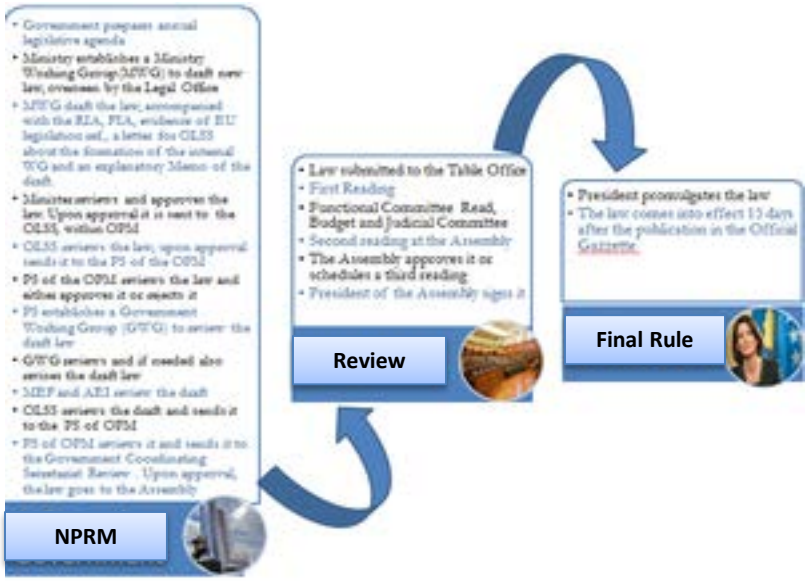
Subpart C – Criminal Enforcement

- Any person who willfully and knowingly injures or destroys, or attempts to injure or destroy, any interstate transmission facility, any interstate pipeline facility, or any intrastate pipeline facility will, upon conviction, be subject to a fine, imprisonment for a term not to exceed 20 years, or both, for each offense.

- Any person who willfully and knowingly defaces, damages, removes, or destroys any pipeline sign, right-of-way marker, or marine buoy will, upon conviction, be subject to a fine, imprisonment for a term not to exceed 1 year, or both, for each offense.

Subpart D - Procedures for Adoption of Rules

- This subpart prescribes general rulemaking procedures for the issue, amendment, and repeal of Pipeline Safety Program regulations of the Pipeline and Hazardous Materials Safety Administration of the Department of Transportation.



Subpart D - Procedures for Adoption of Rules

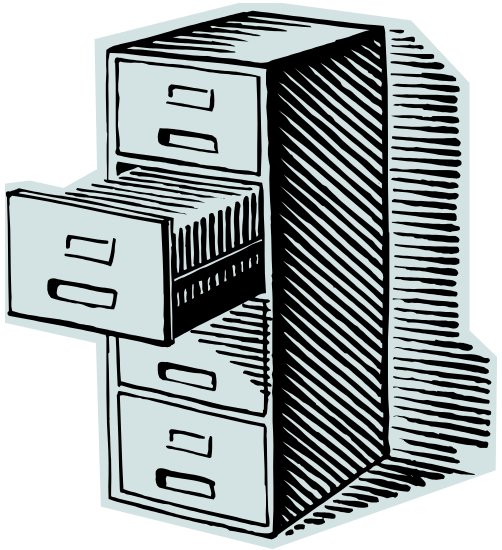
- Adoption of Rules
  - Create docket
  - Publish ANPRM, NPRM, or SNPRM
  - Comment period
  - Final rule

Guideline to Recordkeeping

- Records required by:
  - §195.404 Maps and Records.
  - Numerous references in 195 to additional records.
  - Current focus on records includes:
    - ❑ Hydrostatic test records.
    - ❑ Water crossings.
    - ❑ Emergency Plan availability.

Record Types

- Must keep written or electronic records
- Able to prove compliance
- Show corrective action
- Verify tests and work done
- Maps of system



Plans, The Big Picture

- O&M Plans.
- Emergency Plans.
- OQ Plan.
- Integrity management plan.
- Public safety awareness plan.

Records Needed

- Material information.
- Design parameters.
- Welding and joining.
- Construction specifications.
- Construction inspection.
- Testing of facilities.

Still More Records

- Facility locations.
- Corrosion control procedures.
- Records of cathodic protection system.
- Testing of cathodic protection.
- Rectifier inspections.

And More Records

- Right-of-way and navigable waterway crossings.
- Valve inspections.
- Integrity management.
- Public awareness and education.

~~Interpretation Request~~ Special Permits

- §190.341 Is an order by which PHMSA waives compliance with one or more of the regulations.
  - Interpretations apply only to the specific issue and company making the request
  - Interpretations can be used for general guidance for similar situations

Special Permit Request

- Operators may request special permit for regulations in Parts 191, 192, 193, 195 and 199 (§190.341)
- Submitted to appropriate federal or state agency
- States granting waivers must give OPS written notice of waiver
- OPS has 60 days to object and disapprove
- State may request a hearing, OPS makes final determination

PHMSA Inspections

- Breakout Tank Inspection Form.
- Collection Site Procedures Inspection Form – Alcohol.
- Collection Site Procedures Inspection Form – Drugs.
- Drug and Alcohol - Self Assessment Form.
- Field Inspection - Alcohol Abuse.
- Field Inspection - Anti Drug.
- Public Awareness Program Effectiveness Inspection Form.

PHMSA Inspections

- Operator Qualification.
- Integrity Management.
- Standard Inspection Report of a Liquid Pipeline Carrier.
- Evaluation Report of Liquid Pipeline Construction.
- Pipeline Failure Investigation Report.
- Control Room Management.

Part 195 Cases Closed - Jan 2013 to Dec 2015

# Closed		Civil Penalties
Subpart B - Reporting	22	$ 218,500
Subpart C - Design	11	$19,000
Subpart D - Construction	52	
Subpart E - Testing	8	
Subpart F – O & M	470	
§195.402 - Manuals	133	$1,571,200

Part 195 Cases Closed - Jan 2013 to Dec 2015

# Closed		Civil Penalties
§195.406 - MOP	13	$189,500
§195.420 - Valves	10	$76,700
§195.440 – Public Awareness	132	$40,000
§195.446 – Control Room Management	64	$82,100
§195.452 - IMP	56	$537,900
Subpart G - OQ	15	$185,825
Subpart H - Corrosion	67	$514,000
All Part 195 Closed Cases	711	$4,202,100

Enforcement Process

Electronic Pipeline Safety Resources

Welcome to the Digital Age

For

Pipeline Safety

PHMSA Goes Digital

- The “One Rule” adopted on Nov. 26, 2010. Amdt. 191-21.
  - One rule covers a number of subjects and types of operators.
  - Addresses PIPES 2006 mandates and GAO recommendations.

- Requires electronic reporting where possible.

- Updates reporting requirements.

PHMSA Internet Resources

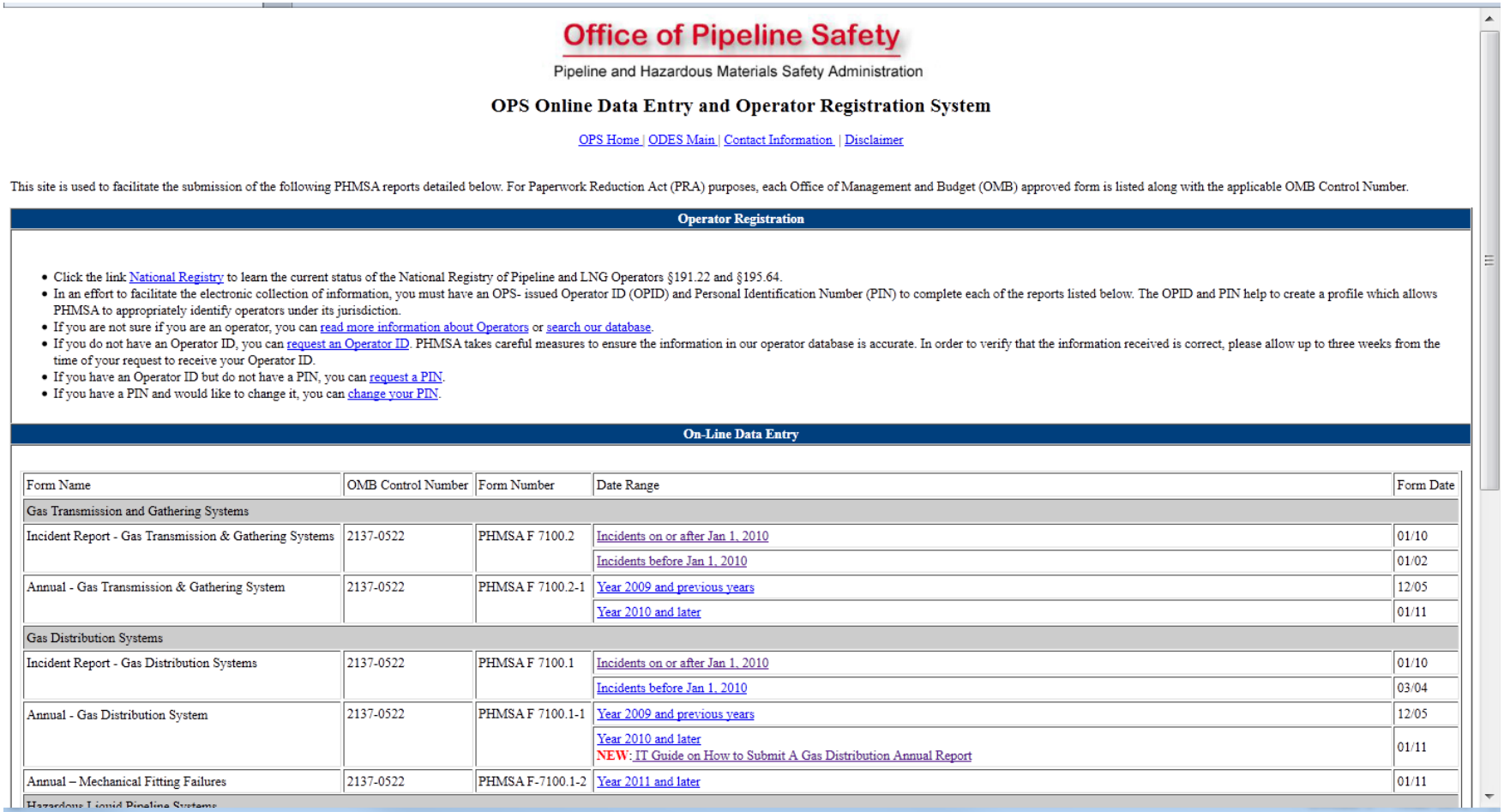
- PHMSA - http://www.phmsa.dot.gov/pipeline
  - All things PHMSA.
  - Gateway to reporting, regulations, interpretations, program information, forms.

- Additional Resources
  - Stakeholder communications
  - National pipeline mapping system
  - Inspection and enforcement
  - State programs

PHMSA Internet Resources

Online Data Entry - ODES

- http://opsweb.phmsa.dot.gov



Office of Pipeline Safety

Pipeline and Hazardous Materials Safety Administration

OPS Online Data Entry and Operator Registration System

OPS Home | ODES Main | Contact Information | Disclaimer

This site is used to facilitate the submission of the following PHMSA reports detailed below. For Paperwork Reduction Act (PRA) purposes, each Office of Management and Budget (OMB) approved form is listed along with the applicable OMB Control Number.

Operator Registration

- Click the link National Registry to learn the current status of the National Registry of Pipeline and LNG Operators §191.22 and §195.64.
- In an effort to facilitate the electronic collection of information, you must have an OPS- issued Operator ID (OPID) and Personal Identification Number (PIN) to complete each of the reports listed below. The OPID and PIN help to create a profile which allows PHMSA to appropriately identify operators under its jurisdiction.
- If you are not sure if you are an operator, you can read more information about Operators or search our database.
- If you do not have an Operator ID, you can request an Operator ID. PHMSA takes careful measures to ensure the information in our operator database is accurate. In order to verify that the information received is correct, please allow up to three weeks from the time of your request to receive your Operator ID.
- If you have an Operator ID but do not have a PIN, you can request a PIN.
- If you have a PIN and would like to change it, you can change your PIN.

On-Line Data Entry

Form Name	OMB Control Number	Form Number	Date Range	Form Date
Gas Transmission and Gathering Systems				
Incident Report - Gas Transmission & Gathering Systems	2137-0522	PHMSA F 7100.2	Incidents on or after Jan 1, 2010	01/10
			Incidents before Jan 1, 2010	01/02
Annual - Gas Transmission & Gathering System	2137-0522	PHMSA F 7100.2-1	Year 2009 and previous years	12/05
			Year 2010 and later	01/11
Gas Distribution Systems				
Incident Report - Gas Distribution Systems	2137-0522	PHMSA F 7100.1	Incidents on or after Jan 1, 2010	01/10
			Incidents before Jan 1, 2010	03/04
Annual - Gas Distribution System	2137-0522	PHMSA F 7100.1-1	Year 2009 and previous years	12/05
			Year 2010 and later NEW: IT Guide on How to Submit A Gas Distribution Annual Report	01/11
Annual – Mechanical Fitting Failures	2137-0522	PHMSA F-7100.1-2	Year 2011 and later	01/11
Hazardous Liquid Pipeline Systems				

PHMSA Internet Resources

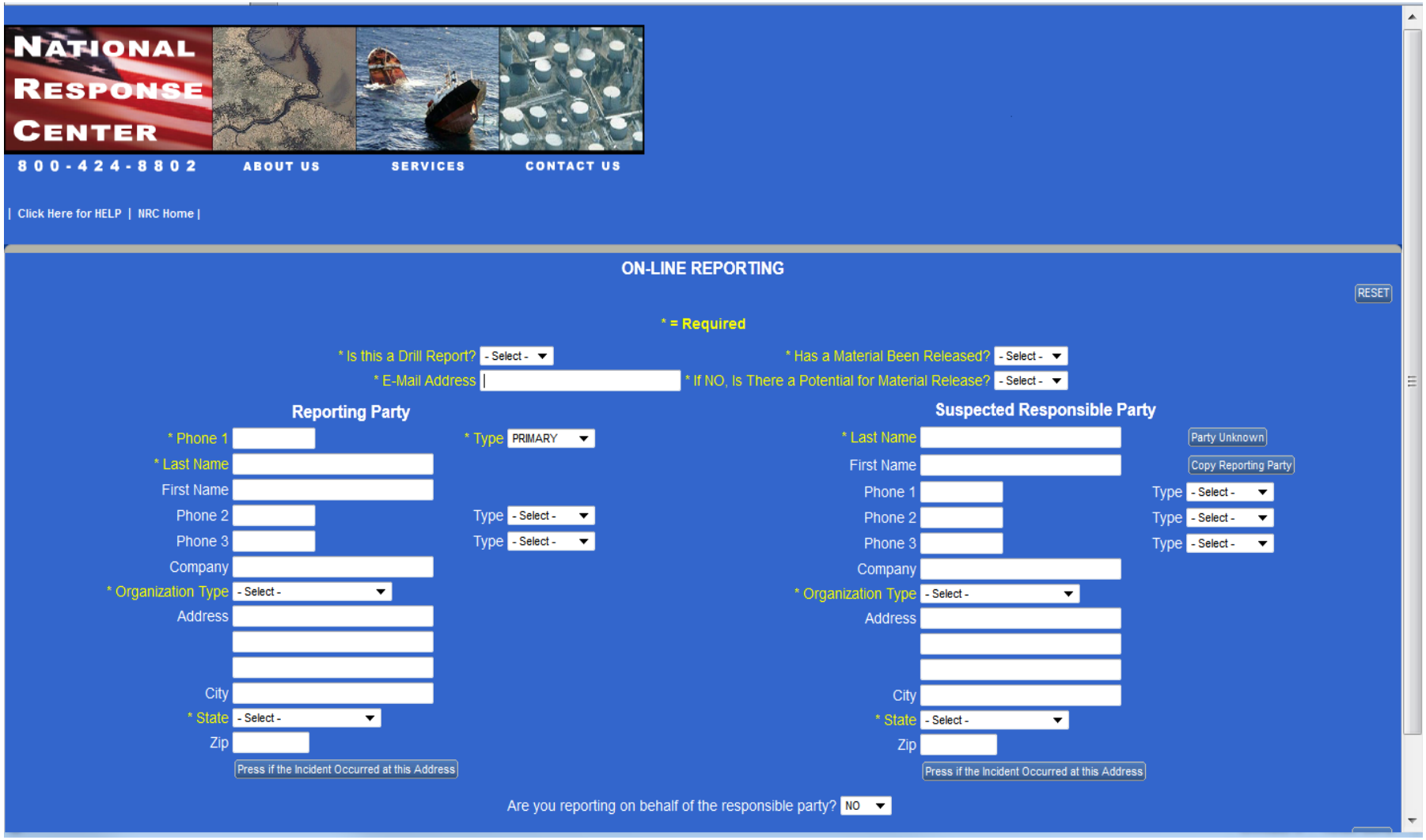
https://portal.phmsa.dot.gov/portal

§191.5 Immediate Notice of Certain Incidents

- Incident report – within 2 hours. (soon to be 1 hour)

- http://www.nrc.uscg.mil

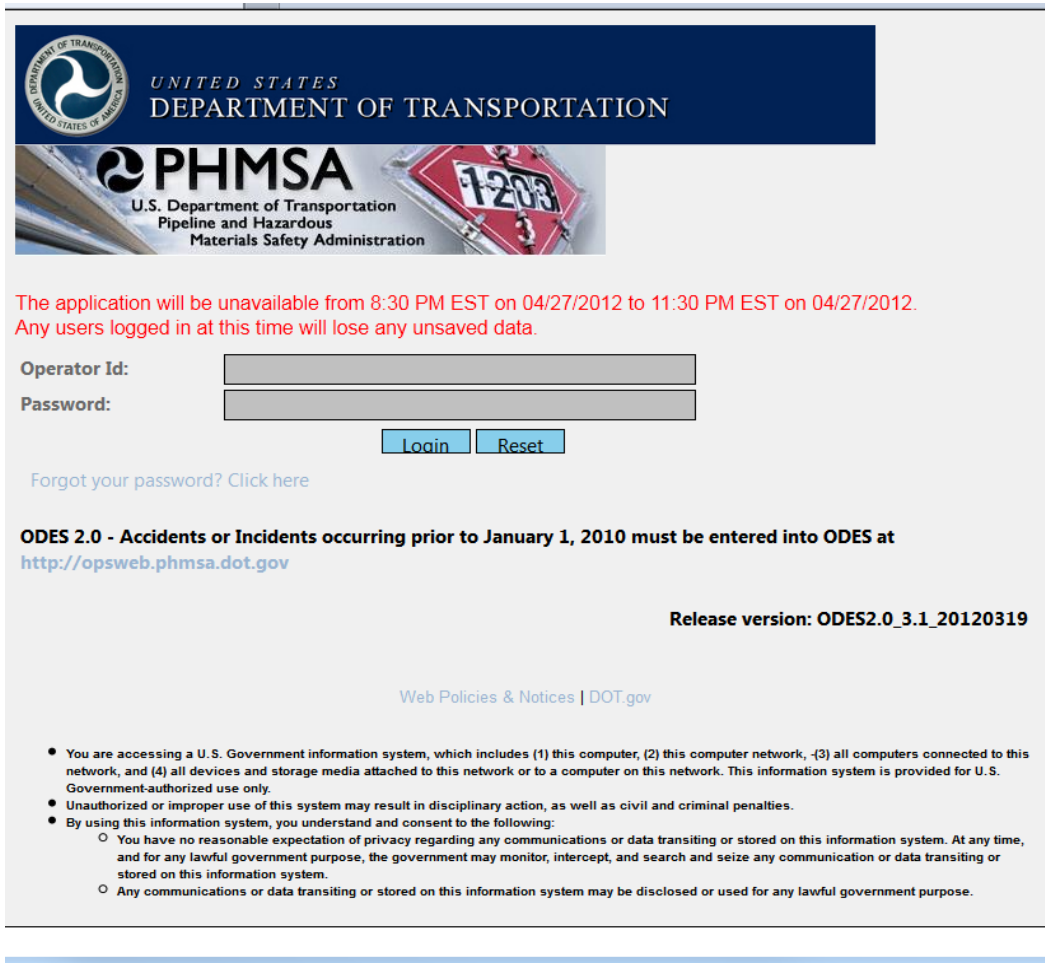
National Response Center



Incident Reports

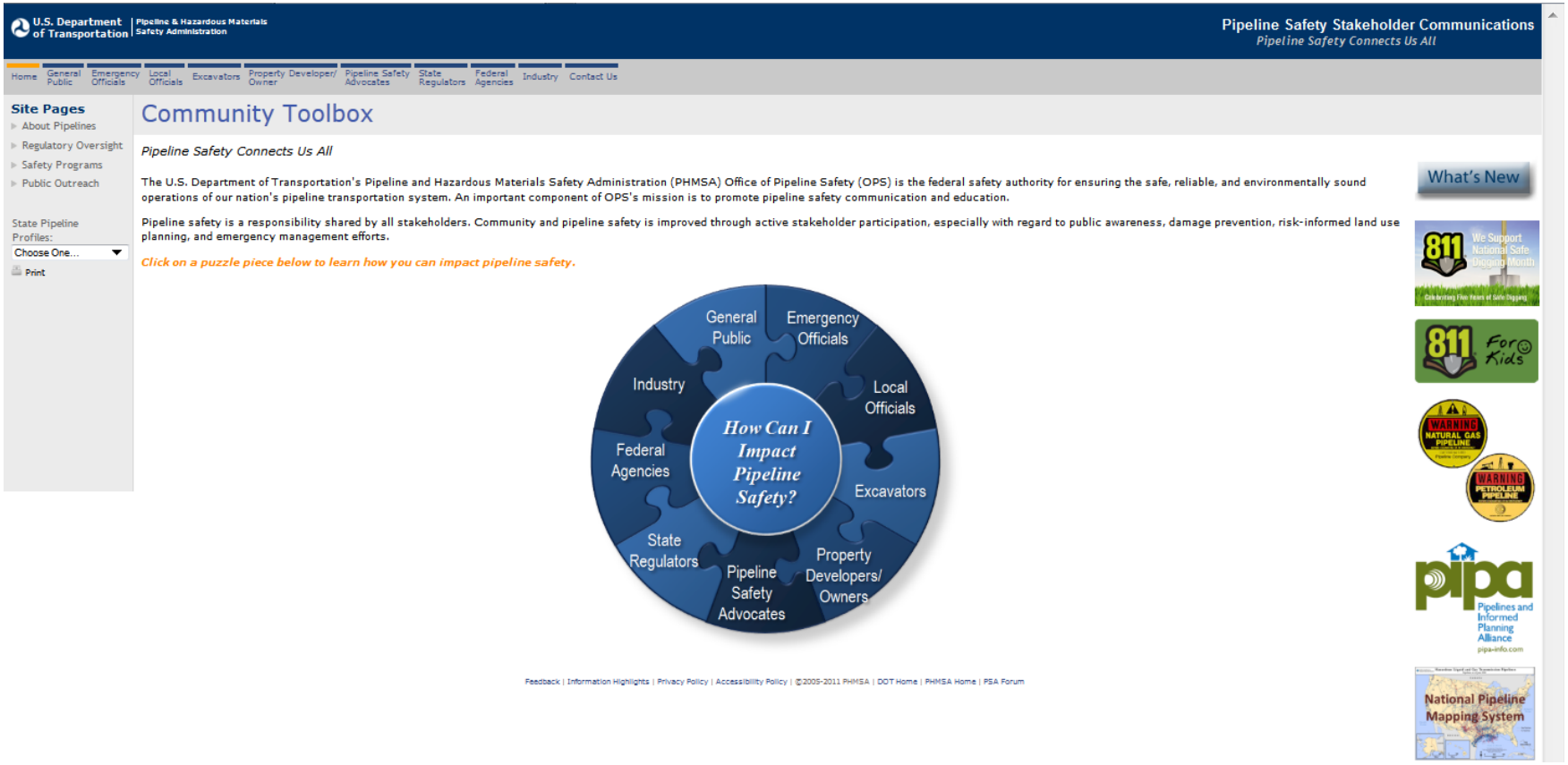
- http://pipelineonlinereporting.phmsa.dot.gov

- Submit within 30 days.



Stakeholder Communications

- http://primis.phmsa.dot.gov/comm/



PHMSA Pipeline Technical Resources

- http://primis.phmsa.dot.gov/ptr.htm

- Start page for key pipeline information:
  - Integrity Management
  - Cased Crossings
  - Pipeline Construction
  - Control Room Management
  - High Volume Excess Flow Valves
  - Pipe Susceptible to Low Yield Strength
  - Operator Qualification (OQ):
  - And more…

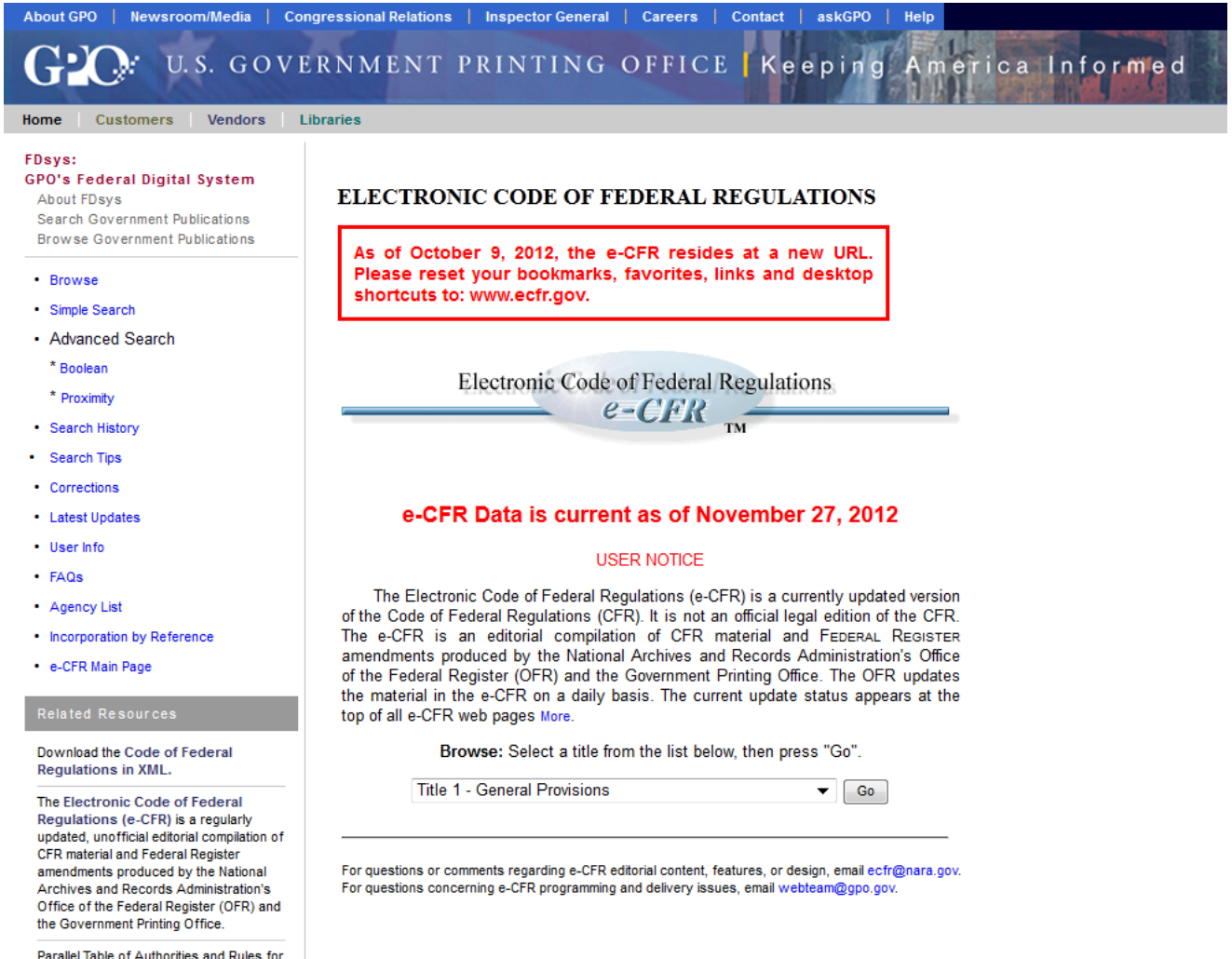
Federal Register

- http://www.gpo.gov/fdsys/browse/collection.action?collectionCode=FR

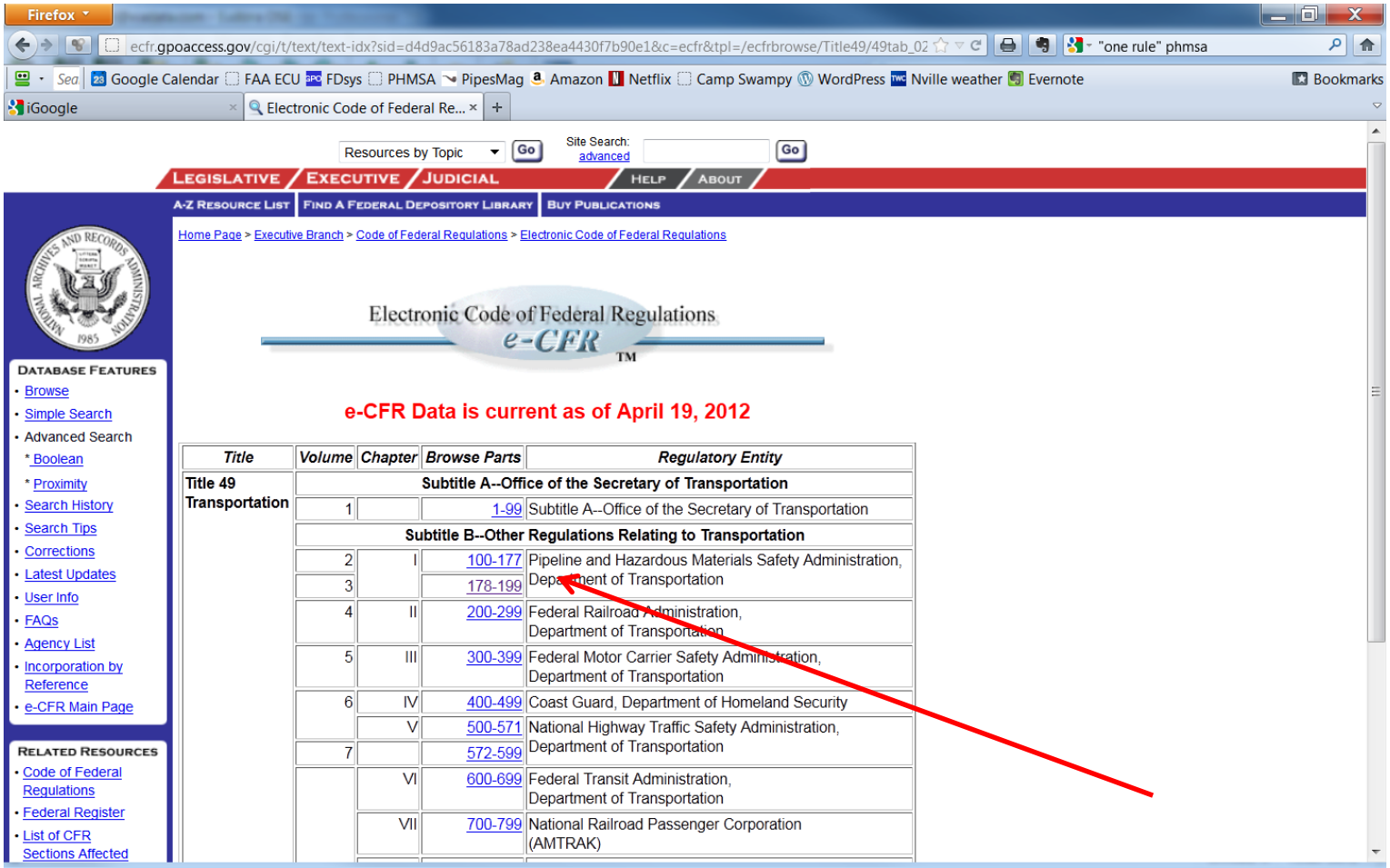
Electronic Code of Federal Regulations

- http://ecfr.gpoaccess.gov/
- Federal regulations online
- Select Title 49 for Dept. of Transportation
  - Then select 178-199 for PHMSA pipeline regulations
  - Select Part of interest under Subchapter D Pipeline Safety

Title 49


About GPO | Newsroom/Media | Congressional Relations | Inspector General | Careers | Contact | askGPO | Help
GPO U.S. GOVERNMENT PRINTING OFFICE | Keeping America Informed
Home | Customers | Vendors | Libraries
FDsys:
GPO's Federal Digital System
About FDsys
Search Government Publications
Browse Government Publications
• Browse
• Simple Search
• Advanced Search
* Boolean
* Proximity
• Search History
• Search Tips
• Corrections
• Latest Updates
• User Info
• FAQs
• Agency List
• Incorporation by Reference
• e-CFR Main Page
Related Resources
Download the Code of Federal Regulations in XML.
The Electronic Code of Federal Regulations (e-CFR) is a regularly updated, unofficial editorial compilation of CFR material and Federal Register amendments produced by the National Archives and Records Administration's Office of the Federal Register (OFR) and the Government Printing Office.
ELECTRONIC CODE OF FEDERAL REGULATIONS
As of October 9, 2012, the e-CFR resides at a new URL. Please reset your bookmarks, favorites, links and desktop shortcuts to: www.ecfr.gov.
Electronic Code of Federal Regulations
e-CFR
™
e-CFR Data is current as of November 27, 2012
USER NOTICE
The Electronic Code of Federal Regulations (e-CFR) is a currently updated version of the Code of Federal Regulations (CFR). It is not an official legal edition of the CFR. The e-CFR is an editorial compilation of CFR material and Federal Register amendments produced by the National Archives and Records Administration's Office of the Federal Register (OFR) and the Government Printing Office. The OFR updates the material in the e-CFR on a daily basis. The current update status appears at the top of all e-CFR web pages More.
Browse: Select a title from the list below, then press "Go".
Title 1 - General Provisions
Go
For questions or comments regarding e-CFR editorial content, features, or design, email ecfr@nara.gov.
For questions concerning e-CFR programming and delivery issues, email webteam@gpo.gov.

PHMSA Parts 178-199



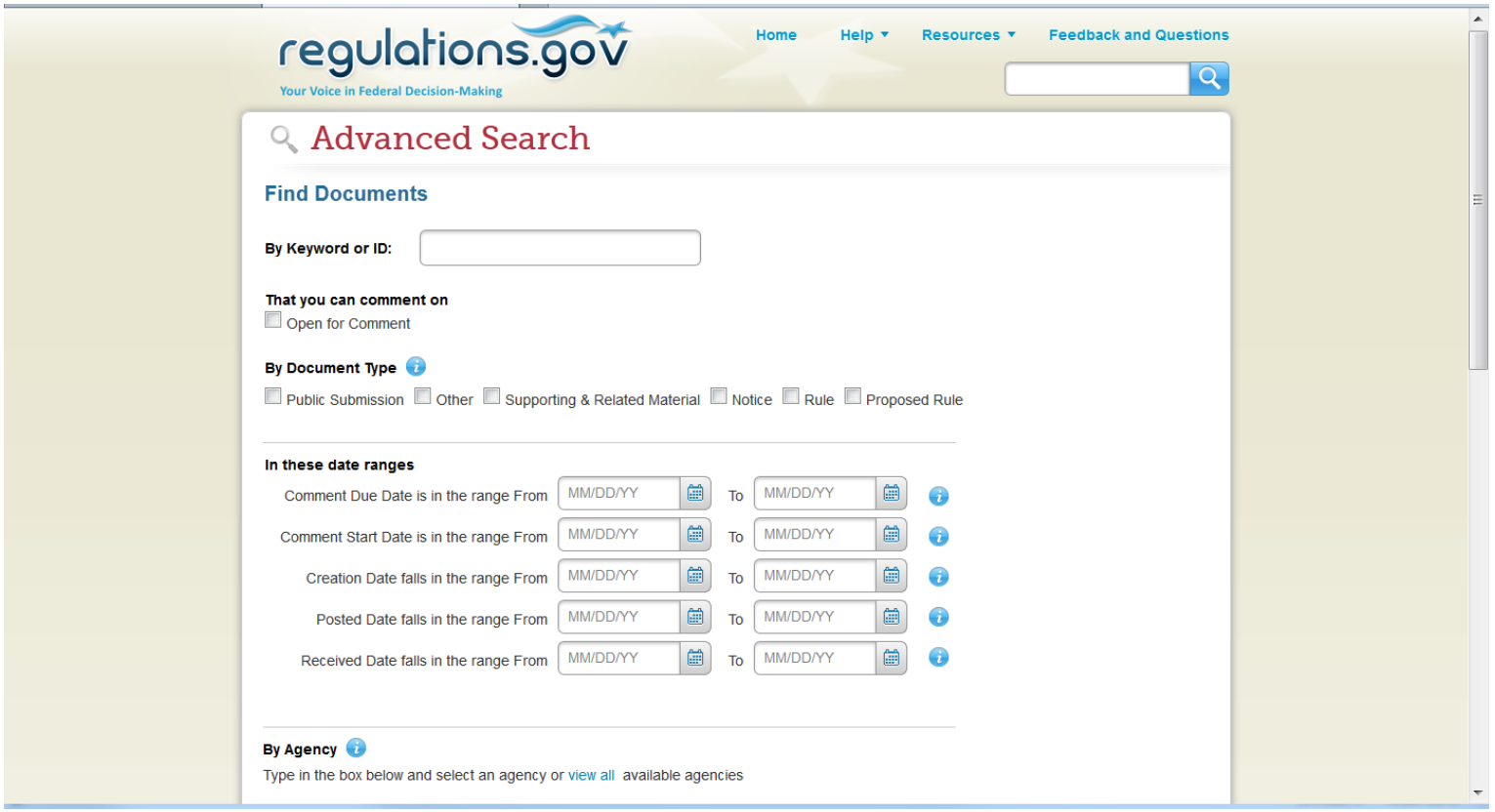
Pipeline Safety Parts

SUBCHAPTER D--PIPELINE SAFETY

186-189		[Reserved]
190	190.1 to 190.341	PIPELINE SAFETY PROGRAMS AND RULEMAKING PROCEDURES
191	191.1 to 191.27	TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE; ANNUAL REPORTS, INCIDENT REPORTS, AND SAFETY-RELATED CONDITION REPORTS
192	192.1 to 192.1015	TRANSPORTATION OF NATURAL AND OTHER GAS BY PIPELINE: MINIMUM FEDERAL SAFETY STANDARDS
193	193.2001 to 193.2917	LIQUEFIED NATURAL GAS FACILITIES: FEDERAL SAFETY STANDARDS
194	194.1 to 194.121	RESPONSE PLANS FOR ONSHORE OIL PIPELINES
195	195.0 to 195.589	TRANSPORTATION OF HAZARDOUS LIQUIDS BY PIPELINE
196-197		[Reserved]
198	198.1 to 198.39	REGULATIONS FOR GRANTS TO AID STATE PIPELINE SAFETY PROGRAMS
199	199.1 to 199.245	DRUG AND ALCOHOL TESTING

Regulations.gov

- View dockets on line and submit comments.

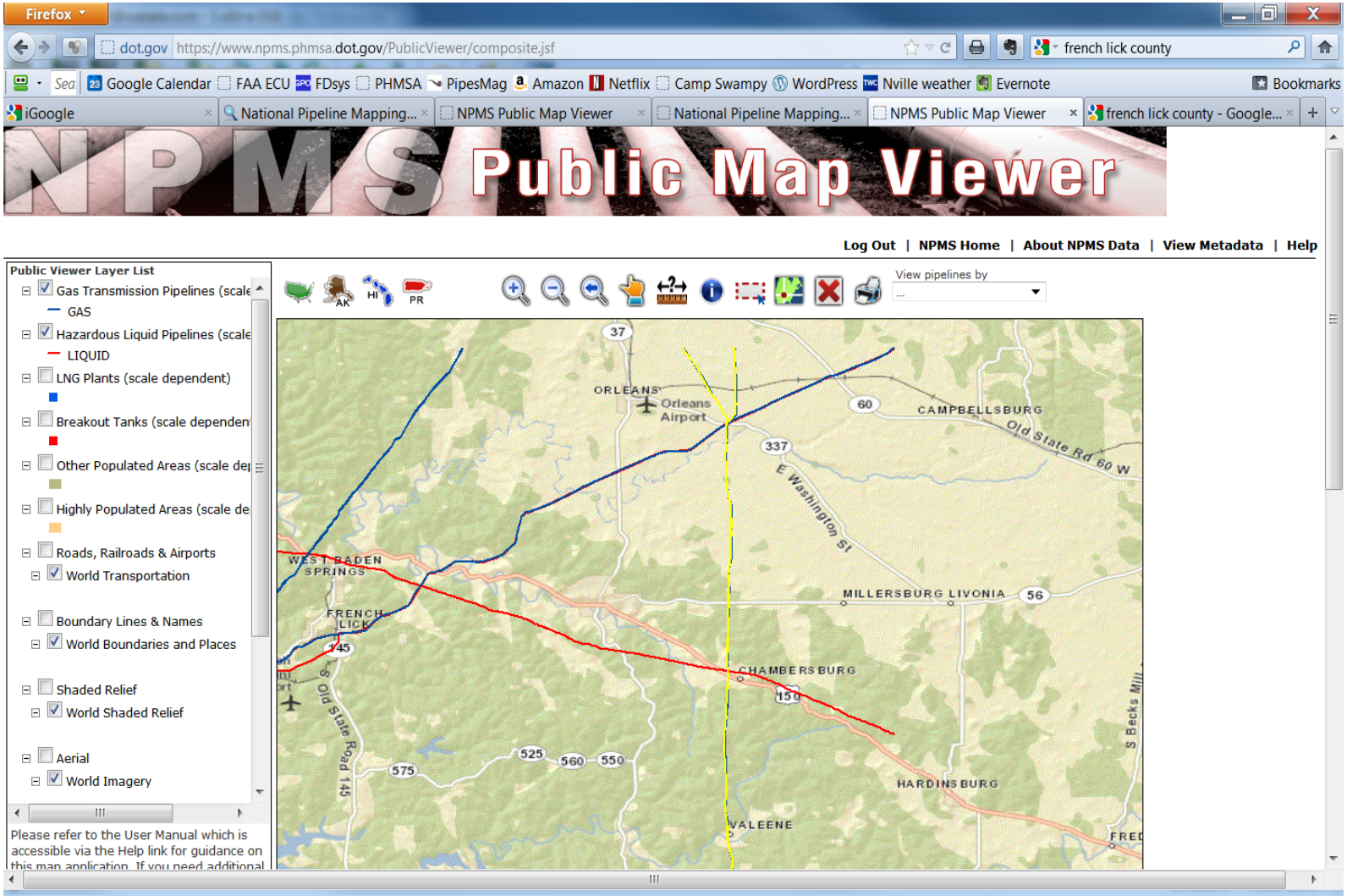


National Pipeline Mapping System

- View maps of pipelines in your area and make required submissions (transmission).

- Find contact information for operators in your area.

Maps


Firefox
dot.gov https://www.npms.phmsa.dot.gov/PublicViewer/composite.jsf
french lick county
Google Calendar FAA ECU FDsys PHMSA PipesMag Amazon Netflix Camp Swampy WordPress Nville weather Evernote Bookmarks
iGoogle
National Pipeline Mapping...
NPMS Public Map Viewer
National Pipeline Mapping...
NPMS Public Map Viewer
french lick county - Google...
NPMS Public Map Viewer
Log Out | NPMS Home | About NPMS Data | View Metadata | Help
Public Viewer Layer List
Gas Transmission Pipelines (scale
GAS
Hazardous Liquid Pipelines (scale
LIQUID
LNG Plants (scale dependent)
Breakout Tanks (scale dependen
Other Populated Areas (scale de
Highly Populated Areas (scale de
Roads, Railroads & Airports
World Transportation
Boundary Lines & Names
World Boundaries and Places
Shaded Relief
World Shaded Relief
Aerial
World Imagery
Please refer to the User Manual which is accessible via the Help link for guidance on
AK
HI
PR
View pipelines by
ORLEANS
Orleans Airport
CAMPBELLSBURG
Old State Rd 60 W
E Washington St
WEST BADEN SPRINGS
FRENCH LICK
MILLERSBURG LIVONIA
CHAMBERSBURG
S Old State Road 145
HARDINSBURG
VALEENE
37
60
337
56
145
150
525
560
550
575

Operators

Search by State Search by County Search by ZIP Code

Select State: Indiana

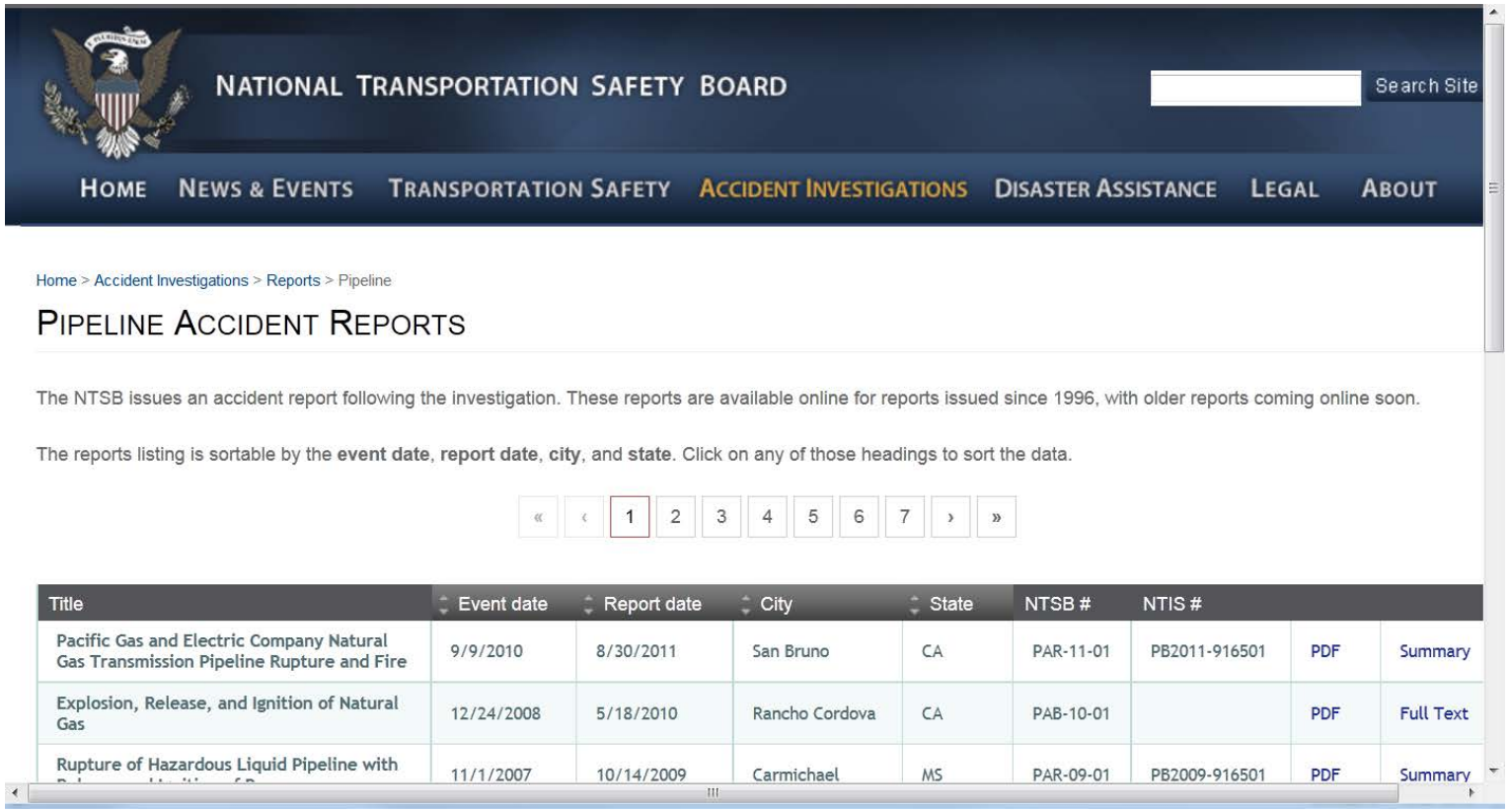
Select County: Orange

Pipeline operator contact for the geographic area you specified :

Pipeline Operator Name	Person To Contact	Entity To Contact	Contact Address	Phone / Fax / Email
ANR PIPELINE CO	Gary Schreffler (Community Relations Specialist)		4715 Traders Way Suite 100, Thompson's Station, TN 37179	Phone: (615)-465-5111 Fax: (615) -465-5112 Email: Gary_Schreffler@transcanada.com
ENTERPRISE PRODUCTS OPERATING LLC	Michael McLaughlin (Manager, Public Awareness & Damage Prevention)		PO Box 4735, Houston, TX 77210	Phone: (713)-381-2802 Fax: Email: MMclaughlin@eprod.com
INDIANA GAS CO INC	Chuck Kanoy (Chief Engineer Asset and Integrity Management)		1 N. Main Street, Evansville, IN 47702	Phone: (812)-491-4966 Fax: Email: bckanoy@Vectren.com
MARATHON PIPE LINE LLC	Craig Potts (Public Awareness Coordinator)		539 South Main Street, Findlay, OH 45840	Phone: (419)-421-3260 Fax: Email: capotts@marathonpetroleum.com
TEXAS EASTERN TRANSMISSION LP (SPECTRA ENERGY CORP)	Dwayne Teschendorf (Principal Engineer)		5400 Westheimer Ct, Houston, TX 77056	Phone: (713)-627-5573 Fax: Email: none
TEXAS GAS TRANSMISSION LLC		Gas Control - Texas Gas Transmission, LLC	P.O. Box 20008 3800 Frederica Street, Owensboro, KY 42301	Phone: (270)-688-6800 Fax: Email: Mike.K.Nance@txgt.com

National Transportation Safety Board

- www.ntsb.gov



Incorporated by Reference Standards

- "Pipeline Safety, Regulatory Certainty, and Job Creation Act of 2011".

- "(p) LIMITATION ON INCORPORATION OF DOCUMENTS BY REFERENCE.—Beginning 1 year after the date of enactment of this subsection, the Secretary may not issue guidance or a regulation pursuant to this chapter that incorporates by reference any documents or portions thereof unless the documents or portions thereof are made available to the public, free of charge, on an Internet Web site".

- Signed by the President on January 4, 2012

Some Standards Are Online

- API docs http://www.api.org/Standards/
- **Free View Only** at http://publications.api.org
- NFPA docs http://www.nfpa.org/categoryList.asp?categoryID=124&URL=Codes & Standards
- **Free View Only** at **http://www.nfpa.org/aboutthecodes/list_of_codes_and_standards.asp**