

# Code Design Requirements

Objective:

To determine which code sections apply

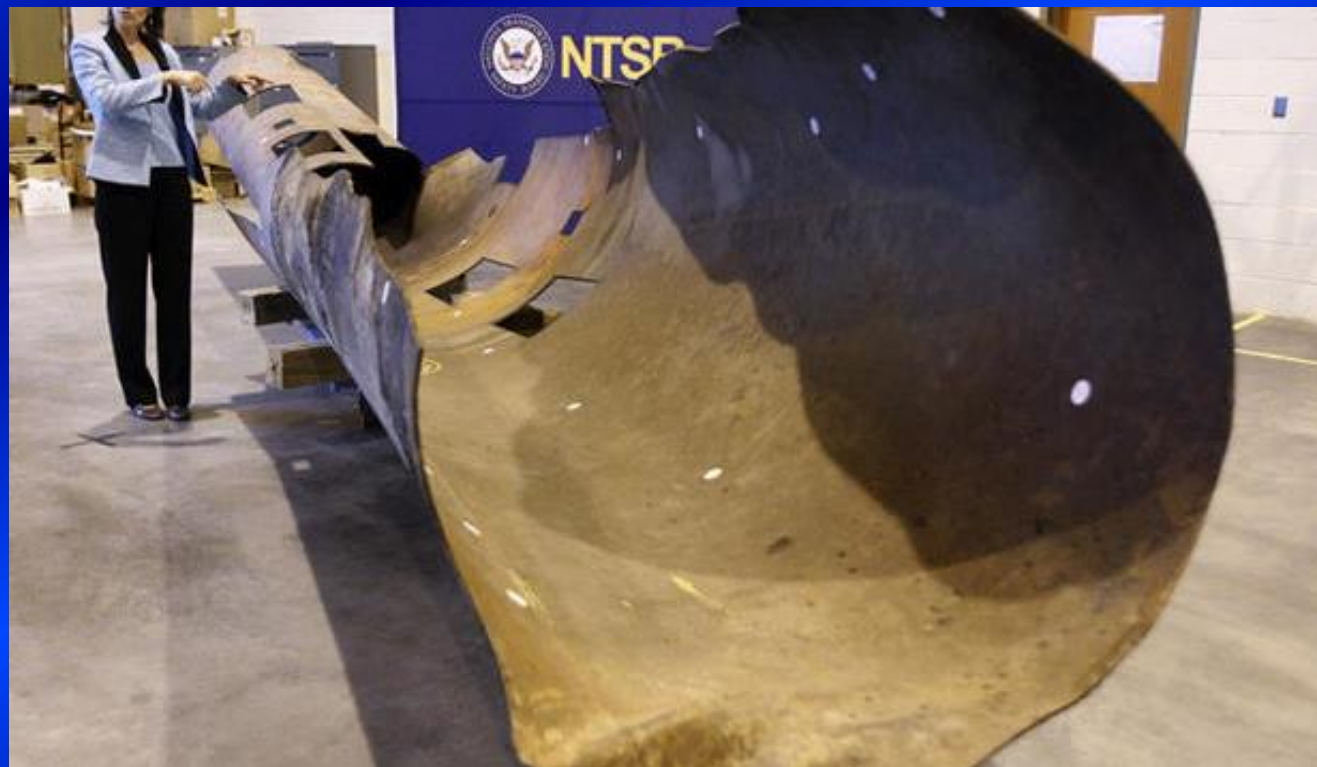
# Gas Pressure Regulation and Overpressure Protection



# Definition of Overpressure

A transient pressure, such as the shock wave from an explosion, that is greater than the normal pressure





# Protection Against Accidental Overpressure

§192.195(a)

- A pipeline connected to a gas source that could exceed **MAOP** as the result of failure, must have relieving or limiting devices meeting §192.199 & §192.201



# Protection Against Accidental Overpressure

§192.195(b)

## ■ Additional requirements for distribution

### ➤ Regulation devices that meet:

- Pressure
- Load
- Other Service Conditions

### ➤ During normal operation



# Protection Against Accidental Overpressure

§192.195(b)

- And that could be activated in the event of failure of some portion of the system; *and*
- Be designed to prevent accidental overpressuring.





# Control of Pressure from High-Pressure Distribution MOP = 60# or less

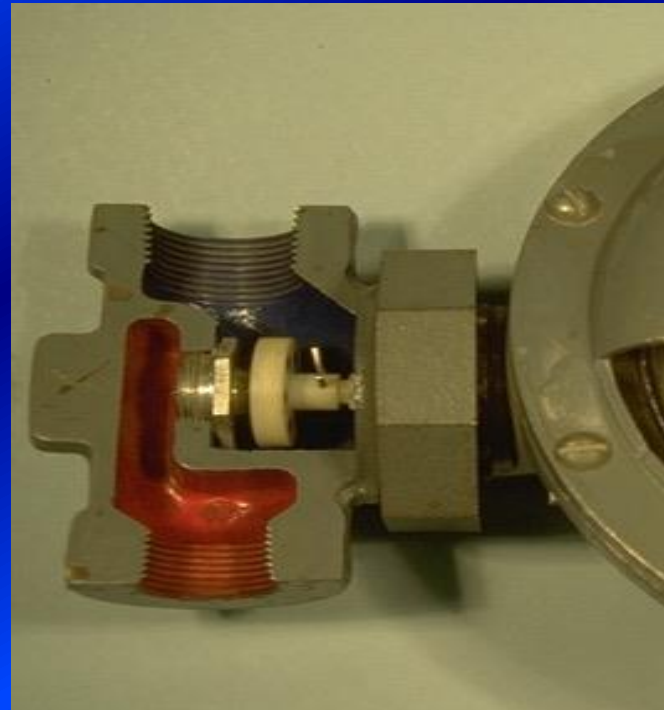
§192.197(a)

- If service regulators have the following characteristics - **no other protection required**
  - 1) Capable of reducing pressure for household appliances.

# MOP = 60# or less

## §192.197(a)

- 2) Single port valve with proper orifice for maximum pressure @ reg. inlet.
- 3) Seat made of resilient material.
- 4) Pipe connections not exceeding 2" diameter.



# MOP = 60# or less

## §192.197(a)

- 5) Capable of accurately limiting during normal and no-flow conditions.
- 6) Self-contained without external static or control lines.



# Protection Required

## §192.197(b)

- If the regulators used do not meet *ALL* requirements
- Or the gas contains materials that interferes with the operation of regulators
  - Must be suitable devices to prevent overpressure of connected appliances

# Control of Pressure from High-Pressure Distribution

MOP > 60#

§192.197(c)

- One of the following methods *must* be used to regulate and limit, to the *maximum safe value*, the pressure delivered to the customer:

# MOP > 60#

## §192.197(c)

- (1) A regulator meeting the six requirements and:
  - Another regulator installed upstream from the service regulator and a device installed between the two regulators to limit inlet pressure on the service regulator less than 60 psig during failure.



# MOP > 60#

§192.197(c)



- (2) A service regulator and monitor





# MOP > 60#

## §192.197(c)

- (3) A service regulator with a relief valve vented to the outside atmosphere.
  - Relief valve may be built into the regulator or installed downstream from the service regulator. Set to relieve to keep customer pressure from exceeding a max safe value.
  - Used when inlet pressure does not exceed manufacturer's rating or 125 psig, whichever is lower.

# Service Regulator with Relief Valve

§192.197(c) (3)



# MOP > 60#

§192.197(c)

- (4) A service regulator and an automatic shutoff device requiring manual reset.



# Design of Pressure Relief and Limiting Devices

§192.199

- Each device must:
  - a) Not be impaired by corrosion;
  - b) Have valves and seats designed not to stick in a position rendering the device inoperative;
  - c) Designed and installed so it can be readily operated;

# Design of Pressure Relief and Limiting Devices

## §192.199

- d) Supports made of non-combustibles
- e) Discharge stacks prevent accumulations and discharge without hazard;
- f) Prevent hammering of the valve and impairment of capacity;








# Design of Pressure Relief and Limiting Devices

## §192.199

- g) Where installed at a district regulator station to protect the pipeline system from overpressuring, be designed and installed to prevent any single incident from affecting the operation of both the regulator and overpressure device; and
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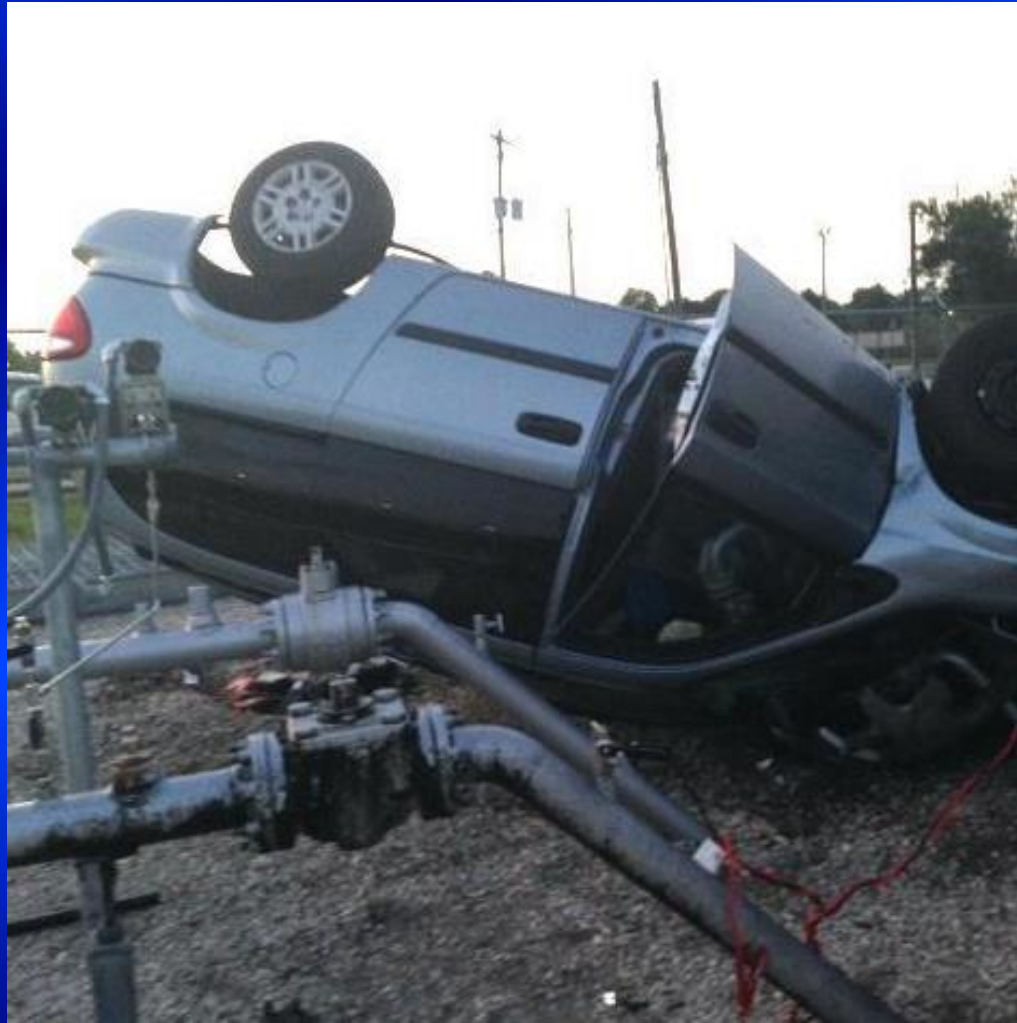


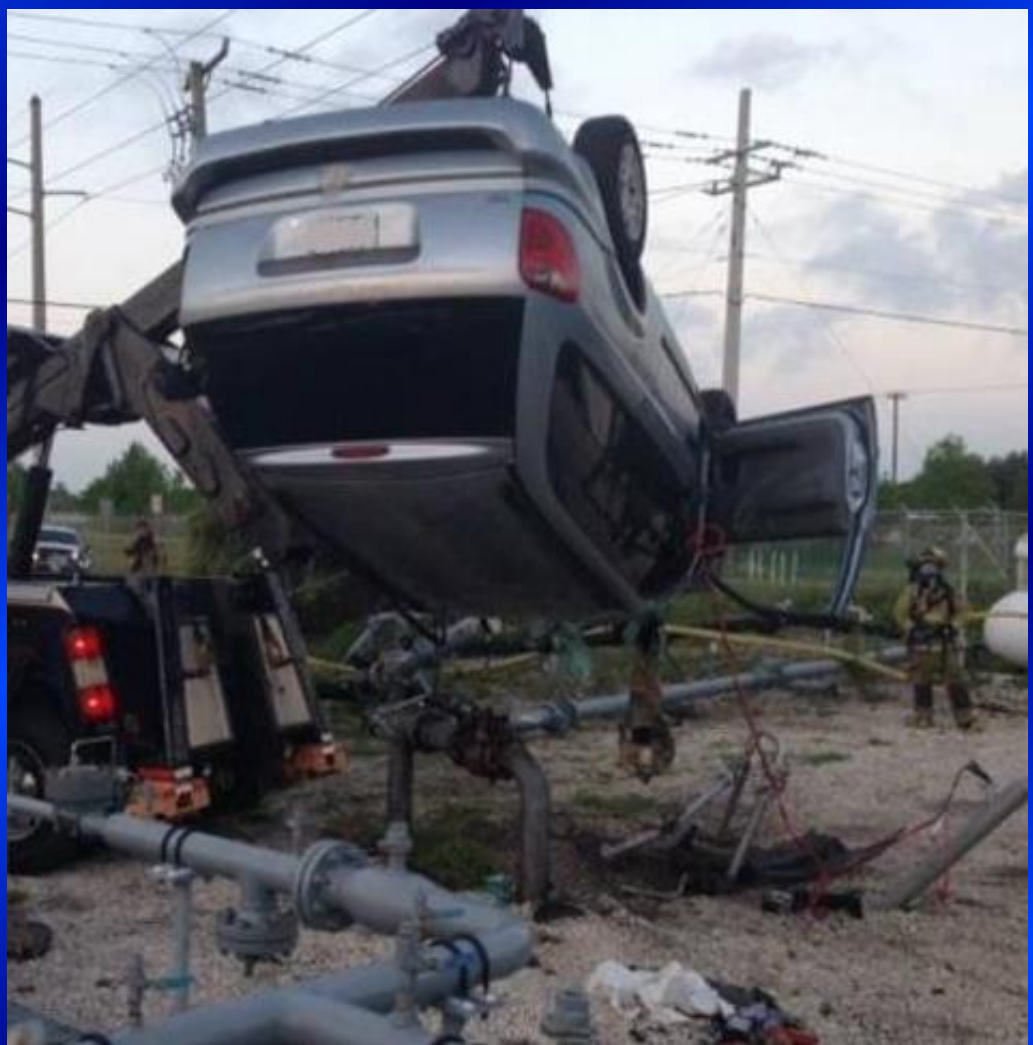
# Design of Pressure Relief and Limiting Devices

§192.199

h) Prevent unauthorized operation of a stop valve rendering a device inoperative







# Required Capacity of Pressure Relieving and Limiting Stations

§192.201(a)

■ Each station or group of stations must have enough capacity, and must be set to operate to insure the following:

- 1) Low pressure distribution, protect connected utilization equipment.



# Required Capacity of Pressure Relieving and Limiting Stations

§192.201(a)

- 2) Pipelines other than low pressure distribution systems:

<b>MAOP <math>\geq</math> 60 #</b>	<b>MAOP + 10% or 75% SMYS, whichever is lower;</b>
<b>MAOP <math>\geq</math> 12 # &lt; 60 #</b>	<b>MAOP + 6 #</b>
<b>MAOP &lt; 12#</b>	<b>MAOP + 50%</b>

# Required Capacity of Pressure Relieving and Limiting Stations

§192.201

(b) Multiple feeds must have devices installed at each station to insure against failure of the largest capacity component.

(c) Devices must be installed at or near each station in a low pressure distribution system, with capacity to limit main pressure at safe values.

# Instrument, Control, and Sampling Pipe and Components

§192.203(b)

- Materials and design. All materials and components must be designed to meet service conditions and the following:
  - 1) Takeoff fittings, bosses, or adapters must withstand temperatures, pressures and stresses without fatigue failure.

# Instrument, Control, and Sampling Pipe and Components

## §192.203(b)

- 2) Except for takeoff lines that can be isolated from sources of pressure by other valving, a shutoff valve installed in each takeoff line and blowdown valves installed where necessary.
- 3) Brass or copper may not be used at temperatures  $> 400$  °F





# Instrument, Control, and Sampling Pipe and Components

§192.203(b)

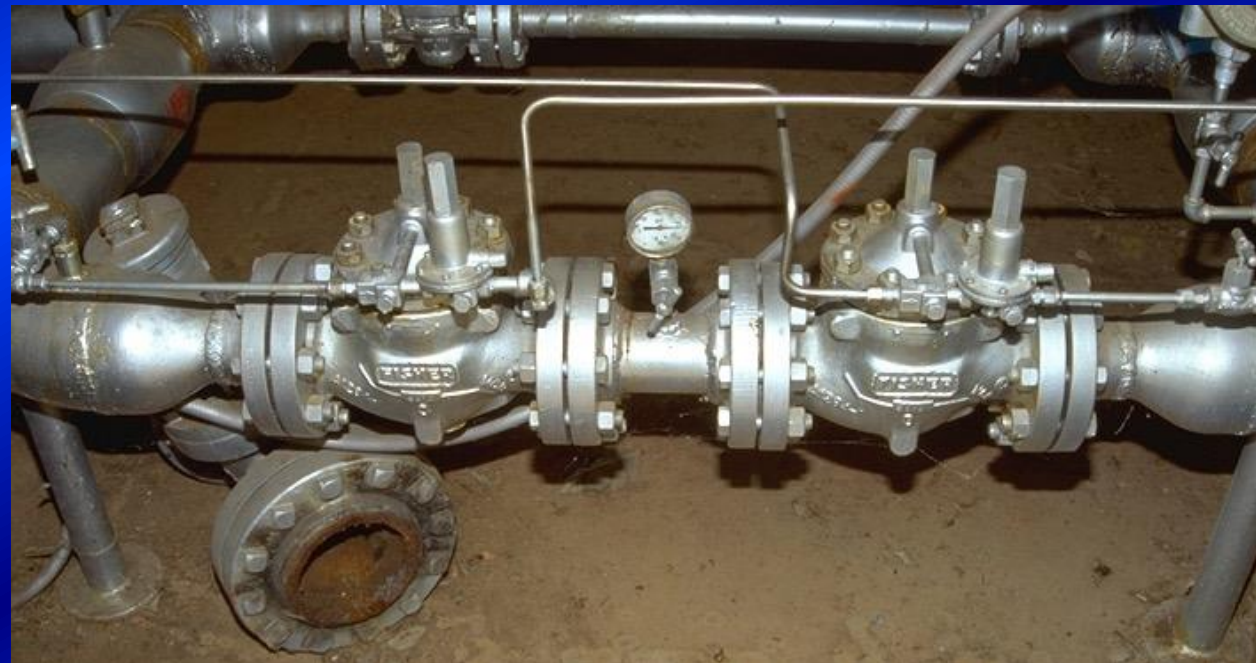
- 4) Pipe or components containing liquids must be protected from freezing
- 5) Pipe or components containing liquids must have drains or drips
- 6) Pipe or components subject to clogging must have provisions for cleaning



# Instrument, Control, and Sampling Pipe and Components

§192.203(b)

- 7) Provide safety under anticipated operating stresses



# Instrument, Control, and Sampling Pipe and Components

§192.203(b)

- 8) Expansion joints may not be slip type



- 9) Damage to any one control line may not make both the regulator and protective device inoperative.

## **49 CFR PART 195**

### **TRANSPORTATION OF HAZARDOUS LIQUIDS BY PIPELINE:**

Pipelines used to carry highly volatile liquids shall have each pressure limiting device, relief valve, pressure regulator or other item of pressure control requirement inspected at least twice each calendar year at intervals not to exceed 7-1/2 months.