Introduction to Small Natural Gas Systems

Course Number: ME-02-600

PDH: 10

Approved for: AK, AL, AR, DE, FL, GA, IA, IL, IN, KS, KY, LA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NV, NY, OH, OK, OR, PA, SC, SD, TN, TX, UT, VA, VT, WI, WV, and WY

State Board Approvals

Florida Provider # 0009553 License #868
Indiana Continuing Education Provider #CE21800088
Maryland Approved Provider of Continuing Professional Competency
New Jersey Professional Competency Approval #24GP00025600
North Carolina Approved Sponsor #S-0695
NYSED Sponsor #274

How Our Written Courses Work

This document is the course text. You may review this material at your leisure before or after you purchase the course.
After the course has been purchased, review the technical material and then complete the quiz at your convenience.
A Certificate of Completion is available once you pass the exam (70% or greater). If a passing grade is not obtained, you may take the quiz as many times as necessary until a passing grade is obtained).
If you have any questions or technical difficulties, please call (508) 298-4787 or email us at admin@PDH Pro.com.

CHAPTER I

INTRODUCTION AND OVERVIEW

This chapter contains a simplified description of the pipeline safety requirements. The complete text can be found in 49 CFR Part 192.

INTRODUCTION

Public Law 104-304 requires the U.S. Department of Transportation (DOT) to develop and enforce minimum safety regulations for the transportation of gases by pipeline. The safety regulations became effective in 1970, and are published in Title 49 of the Code of Federal Regulations (CFR), Parts 190, 191, 192, and 199. The Office of Pipeline Safety of DOT's Research and Special Programs Administration (RSPA) is charged with their enforcement.

The gas pipeline safety regulations apply to natural gas systems and operators of natural gas master meter systems. The pipeline safety regulations require operators of natural gas systems to: deliver gas safely and reliably to customers; provide training and written instruction for employees; establish written procedures to minimize the hazards resulting from natural gas pipeline emergencies; and, keep records of inspection and testing based on suggested forms found in Appendix B.

Additionally, operators of all natural gas systems, **except master meter systems**, must test employees in safety-sensitive positions for prohibited drugs and alcohol and provide an employee assistance program. The requirements for drug and alcohol testing of pipeline employees are found in 49 CFR Part 199, which incorporates the overall OPS drug testing requirements found in 49 CFR Part 40.

Natural gas operators who do not comply with the safety regulations may be subject to civil penalties, compliance orders, or both. If safety problems are severe, a "Corrective Action Order" may be issued by OPS. This could result in the shutdown of the system.

State agencies may enforce pipeline safety regulations under certification by OPS. The state agency is allowed to adopt additional or more stringent safety regulations for intrastate pipeline transportation as long as such regulations are compatible with the federal minimum regulations. However, if a state agency is not certified, the DOT retains jurisdiction over intrastate pipeline systems.

Operators should check with the pipeline safety agency in their state (Appendix C) to determine:

- whether a state agency has safety jurisdiction;
- whether the state agency has pipeline safety requirements that exceed the federal regulations;
- the inspection and enforcement procedures of the state agency.

OVERVIEW

The natural gas pipeline industry consists of transmission and distribution companies. These pipeline systems can be simple or complicated. However, all gas pipeline companies are held to the same safety standards.

FIGURE I-1 represents one of the many possible configurations of natural gas transmission and distribution systems. The natural gas:

- Flows from the producing wells into gathering line(s).
- Through gathering lines and compressors or compressor stations.
- After the compressor(s), through transmission lines.
- To a processing plant where the heavy ends, such as propane, butane, ethane or natural gasoline, which are initially components of the gas stream, are removed.
- Through the transmission line and additional compressors.
- From the compressors to underground storage or a liquefied natural gas (LNG) plant (where natural gas is liquefied by reducing its temperature to - 260 °F), or directly to a city gate station or master meter system.

FIGURE I-2 is an example of a distribution system that consists of mains and services operating at different pressures, which are controlled by regulators. Ordinarily, industrial customers receive gas service through high-pressure distribution mains. The small commercial and the residential gas systems can be either low- or high-pressure distribution systems.

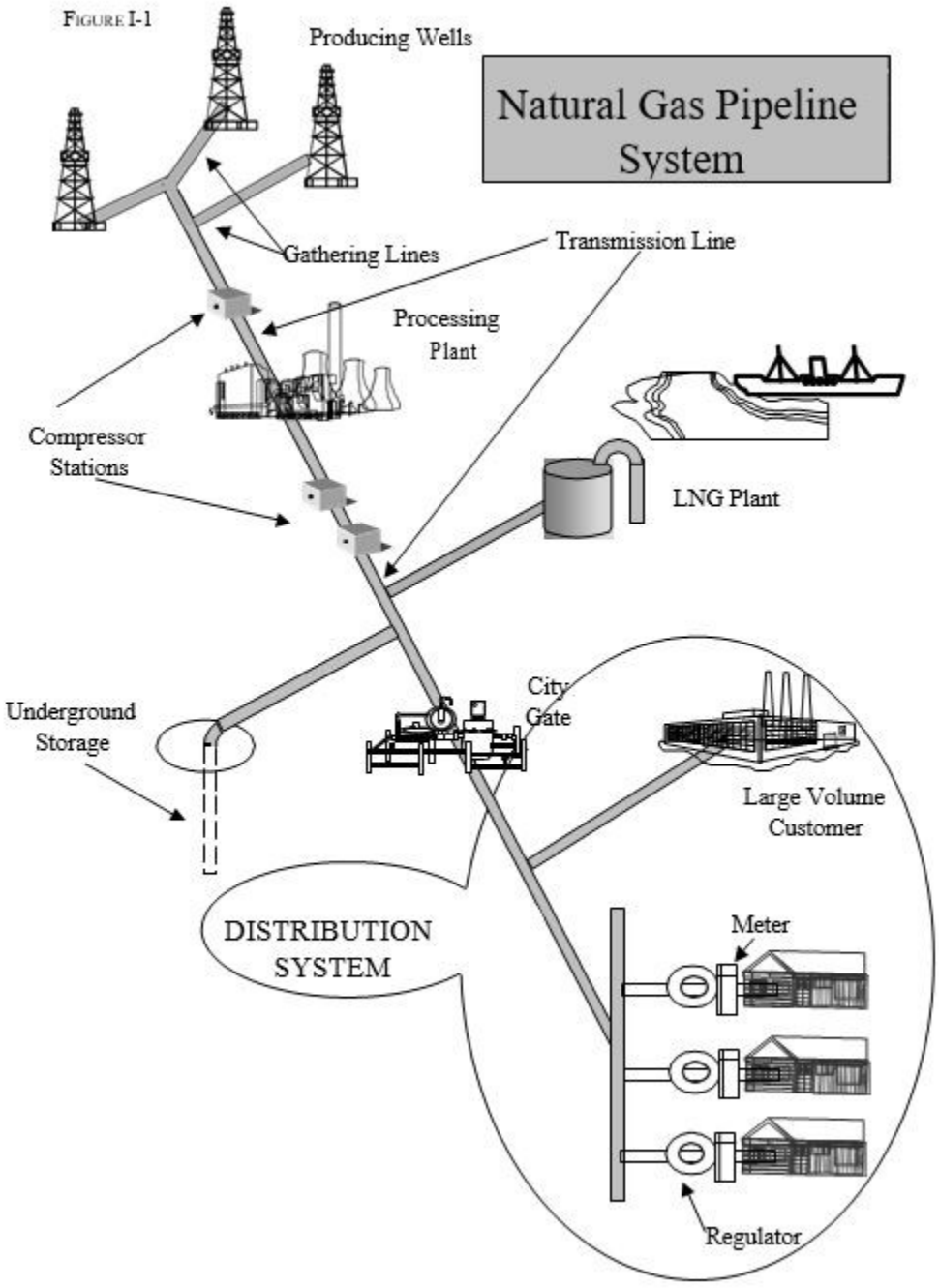
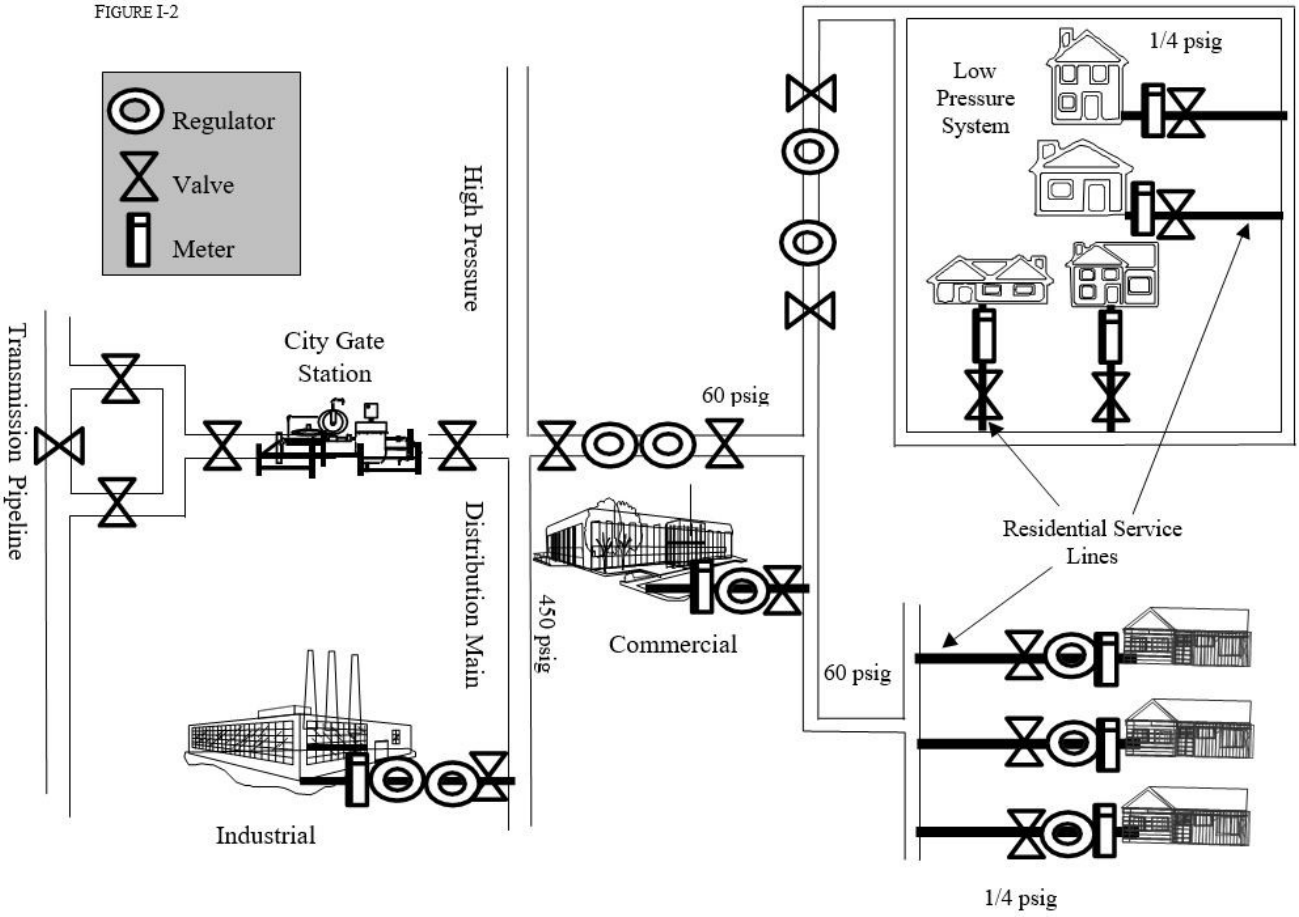


FIGURE I-1
Producing Wells
Natural Gas Pipeline System
Gathering Lines
Transmission Line
Processing Plant
Compressor Stations
LNG Plant
Underground Storage
City Gate
Large Volume Customer
DISTRIBUTION SYSTEM
Meter
Regulator

Natural Gas Distribution System

FIGURE I-2



CHAPTER II

REGULATOR AND RELIEF DEVICES

This chapter contains a simplified description of the pipeline safety requirements. The complete text can be found in 49 CFR Part 192.

BASIC CONCEPT

In understanding the equipment used to regulate the pressure of natural gas, it is helpful to be familiar with some fundamental physical units and concepts. Four are particularly important. Taken in pairs they are:

PRESSURE and FORCE

FLOW and THROTTLING PRESSURE

In the natural gas business, the commonly used pressure units

are: pounds per square inch. psi

ounces per square inch. .....osi

inches water column... in. w.c

For convenience, the three units are usually referred to as pounds, ounces, and inches.

It is important to remember that "pounds," "ounces," and "inches" are the short form of expressing pressure units. There really is no such thing as a pound of pressure or an ounce of pressure. They are incomplete terms. Pressure is defined as force per unit area. Pounds and ounces express only the "force" portion of that definition. The fourth unit of "area" is missing. Thus, the complete terminology should be "pounds per square inch" and "ounces per square inch."

When gas is under pressure, it exerts a given force against each unit of exposed area. For example, gas at a pressure of 10 psi pushes with a force of 10 pounds against each square inch of surface exposed to the gas. Gas at a pressure of 5 ounces (remember. ..ounces per square inch) pushes with a force of 5 ounces against each square inch of surface exposed to the gas.

Such units as pounds or ounces per square foot, per square yard, or other unit area are quite correct. However, for the gas business the unit area used is the square inch. And, to repeat, the complete expressions are pounds per square inch (psi), and ounces per square inch (osi).

Returning to psi, there are some other terms to note as follows:

pounds per square inch absolute. ..psia

Purchase this course to see the remainder of the technical materials.