

Compressor Stations—an essential part of a natural gas pipeline

What is the purpose of a compressor station?

Maintains the pressure of natural gas as it flows through a pipeline.

Why are compressor stations needed?

Natural gas loses pressure and may pick up contamination in the pipeline. The compressor stations increase pressure and can include technology to remove liquid and particle contamination picked up in transit. Compressor stations are located at intervals ranging from about 40 to 100 miles along the pipeline. The US pipeline network is extensive; see <https://www.npms.phmsa.dot.gov/>. The location of compressor stations is shown in the image at the left.

How do these compressor stations work¹?

There are several major components: piping in/out of the station, filter separators and scrubbers, compressor, cooling system, lube oil system, mufflers, fuel gas housing, backup generator. Facilities where the initial compression is done are typically larger than those along the pipeline where a 'push' is accomplished. Tour one here: <https://www.youtube.com/watch?v=-nOhsyulV3o>. (see reverse also)

How are compressor stations regulated^{1,2}?

Gathering lines from the well to the processing plant/compressor station or to a connection at a larger mainline are regulated by the State. Further transmission through the interstate system and those compressor stations along the route are under the jurisdiction of the Federal Energy Regulatory Commission (FERC). Safety matters at these interstate stations are the responsibility of the Department of Transportation (DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA). The siting process for new stations is overseen by FERC and DOT.

What is known about potential exposures¹⁻³ and health effects?

Natural gas is odorless; mercaptan ('rotten egg' odor) is added just prior to customer distribution. Some potential exposures are listed here. These mostly result from combustion and are highest during routine blowdowns to clear the system prior to maintenance or servicing, but other exposures may be a concern.

Combustion products from fueling the compressor and methane may be emitted. Also: volatile organic compounds; particulate matter; nitrogen oxides; carbon monoxide; sulfur dioxide; greenhouse gases (carbon dioxide and nitrous oxide); and small amounts of hazardous air pollutants (e.g., benzene, acetaldehyde, formaldehyde, toluene, ethyl benzene and xylenes).

Noise cannot exceed 55 decibels (day-night average, A scale) at the nearest noise-sensitive-area such as residence/school/health care facility.

Vibration is limited to 'no perceptible increase' by FERC.

Fires and explosions have occurred, including a 2019 event in Michigan^{4,5}. Potential health effects have been reported and are being studied⁶⁻⁹. Reported symptoms include nosebleeds, headaches and respiratory effects.

¹http://extension.psu.edu/publications/ee0154/extension_publication_file

²<https://www.ingaa.org/File.aspx?id=31571>

³<http://epa.ohio.gov/portals/47/nr/compressorstations.pdf>

⁴<http://www.nocompressor.com/history-of-accidents/>

⁵<https://www.shaledirectories.com/blog/what-caused-the-mi-natgas-compressor-stn-fire-in-january/>

⁶<https://www.pri.org/stories/2016-08-14/compressor-stations-are-new-flashpoint-debate-over-natural-gas-extraction>

⁷<http://www.safer-nj.org/dev/221-2/>

⁸<http://www.recordonline.com/article/20150312/NEWS/150319725>

⁹<http://www.loe.org/shows/segments.html?programID=16-P13-00031&segmentID=2>



Compressor stations. Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Natural Gas Transportation Information System. <https://hifld-geoplatom.opendata.arcgis.com/dataset/natural-gas-compressor-stations?geometry=-162.265%2C25.314%2C-28.759%2C49.375>

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websites active as of that date.

Diagram and Image of a Compressor Station

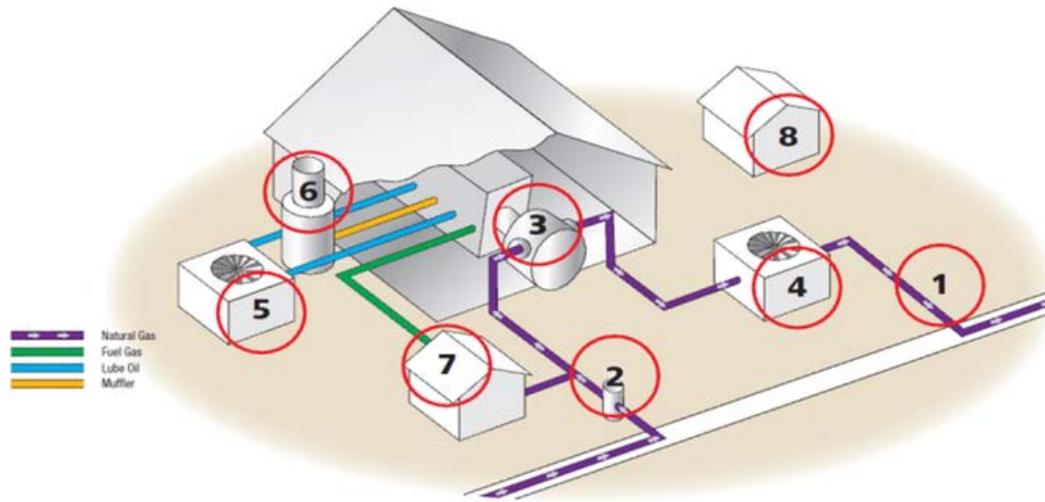


Figure 1. Compression station yard. *Courtesy of Spectra Energy*

1. Station Yard Piping 2. Filter Separators/Scrubbers 3. Compressor Units 4. Gas Cooling System 5. Lube Oil System 6. Mufflers (Exhaust Silencers) 7. Fuel Gas System 8. Backup Generators.

Color code: dashed purple, natural gas; green, fuel gas; blue, lube oil; orange, muffler



Image 1. Compressor Station. *Courtesy of the Marcellus Center for Outreach and Research*

Source Credit for Figure 1 and Image 1: [Understanding Natural Gas Compressor Stations](http://extension.psu.edu/publications/ee0154), Penn State Extension. <http://extension.psu.edu/publications/ee0154>. Accessed January 3, 2020.