Blast Radius – Are You Safe?

- Home

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What is a BLAST RADIUS?

The blast radius is the distance that the fire from the explosion consumes, measured in feet from the epicenter to the outer edge of the burned area. Many factors can increase the estimated blast radius such as residential homes, forests, other gas lines, utilities, businesses and industrial facilities.

Important Quotes

From the report titled “A Model for sizing High Consequence Areas” (HCA) is described as follows.

“The definition of High Consequence Areas is expected to require additional protection for people with limited mobility such as day care centers, old age homes, and prisons. This report suggests the definition for the HCA area of increased protection be set by two parameters, the pipe diameter and it’s operating pressure.”

Furthermore, the report acknowledges that natural gas pipelines do “rupture” and carry “a significant threat.”

“The rupture of a high-pressure natural gas pipeline can lead to outcomes that can pose a significant threat to people and property in the immediate vicinity of the failure location. The dominant hazard is thermal radiation from a sustained fire and an estimate of the ground area affected by a credible worst-case event can be obtained from a model that characterizes the heat intensity associated with rupture failure of the pipe where the escaping gas is assumed to feed a fire that ignites very soon after line failure.”

How Big of a Blast Radius Are We Talking About?

PIPELINE PRESSURES

The Nexus pipeline diameter is estimated to be 42″ and approximately 250 miles long. Typical operating pressures for this size transmission line can range between lower pressures around 800 PSI (pounds per square inch) to higher pressures of 1500 PSI.

Calculated Hazard area radius (blast zone) chart based on pipeline

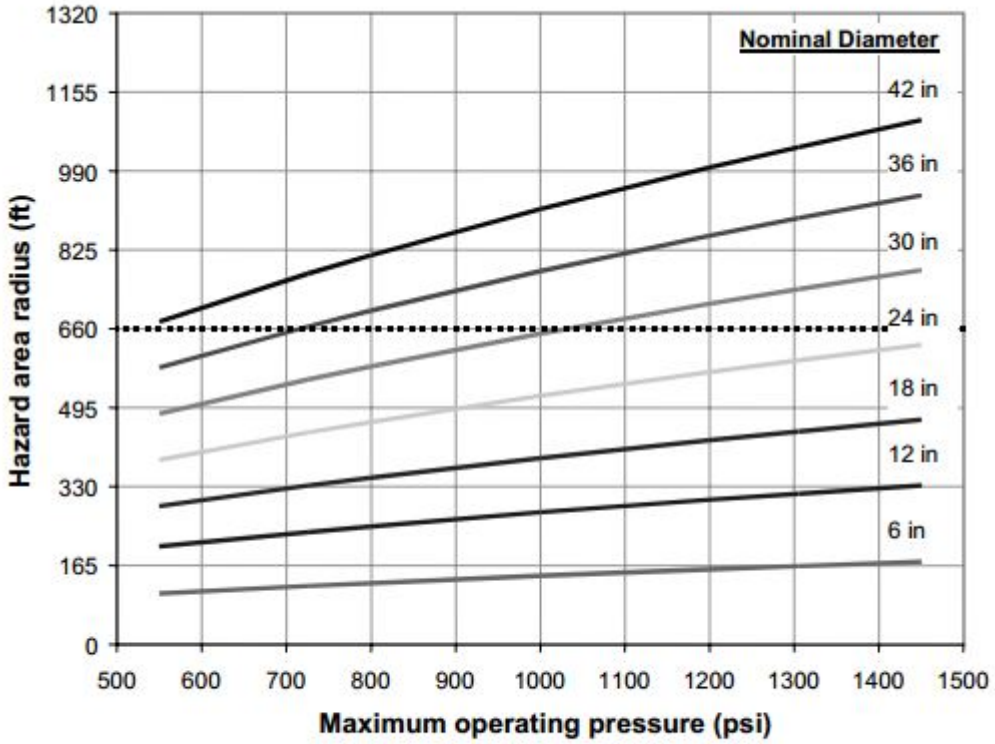

Figure 2.4 Proposed hazard area radius as a function of line diameter and pressure.

CALCULATED HAZARDS AND REAL WORLD STATISTICS

The data on actual pipeline failure incidents tells a slightly different story as many actual incidents report a greater radius of burn than does the actual graph established by this report.

For instance, a blast near Bealeton, Virginia (1975 NTSB-PAR-75-2) burned a radius of 700 feet at less than 800 PSI when the chart above shows burn radius should have been no more than approximately 525 feet.

Thus the actual burn radius was 75% greater than hypothesized.

Another incident involving a 30″ pipe was near Jackson, Louisiana (1984 NTSB-PAR-86-1) burned an area 1450 feet long by 360 feet wide (furthest fire extent 950 feet) while operating at 1016 PSI which claimed 5 lives within 65 feet (0 foot offset) and 23 injuries within 800 feet (180 foot offset).

The actual burn radius for this incident is 45.52% greater than the 660 foot burn radius hypothesized.

Date	Report	Location	Incident	Damage	Maximum Burn Distance	Diameter (in)	Pressure (psi)
1969	NTSB-PAR-71-1	near Houston, Texas	Rupture at 3:40 p.m. on September 9th, explosive ignition 8 to 10 minutes after failure.	Burned area 370 ft long by 300 ft wide (all to one side). Houses destroyed by blast to 250 ft, heat damage to 300 ft, 106 homes damaged, 9 injuries, and 0 fatalities.	300 ft	14	789
1974	NTSB-PAR-75-2	near Bealeton, Virginia		Burned area 700 ft by 400 ft.		30	718
1974	NTSB-PAR-75-3	near Farmington, New Mexico	Rupture at 3:45 a.m. on March 15th, ignition soon after failure.	Earth charred within a 300 ft diameter circle, 3 fatal injuries (within 60 ft offset)		12.75	497
1976	NTSB-PAR-77-1	Cartwright, Louisiana	Rupture at 1:05 p.m. on August 9th, ignited within seconds	Burn area 3 acres (implies a 200 ft radius circle), 6 fatalities (within about 100 ft offset) and 1 injury.		20	770
1982	NTSB-PAR-83-2	Hudson, Iowa		5 fatalities (within 150 ft, less than 50 ft offset).		20	820
1984	NTSB-PAR-86-1	near Jackson, Louisiana	Rupture at 1:00 p.m. on November 25th, ignition soon after failure.	Burned area 1450 ft long by 360 ft wide (furthest fire extent 950 ft), 5 fatalities (within 65 ft, 0 ft offset), and 23 injuries (within 800 ft,180 ft offset).	Offset 180 ft. Distance 950 ft.	30	1016
1985	NTSB-PAR-87-1	near Beaumont, Kentucky	Rupture at 9:10 p.m. on April 27th, ignition soon after failure.	Burned area 500 ft wide by 700 ft long. 2 houses, 3 house trailers and numerous other structures and equipment destroyed. 5 fatalities due to smoke inhalation in house 318 ft from rupture (150 ft offset), 3 people burned running from house 320 ft from rupture (200 ft offset) one hospitalized with 2nd degree burns.	Offset 350 ft. Distance 500 ft.	30	990
1986	NTSB-PAR-87-1	near Lancaster Kentucky	Rupture at 2:05 a.m. on February 21st, ignition soon after failure.	Burned area 900 ft by 1000 ft. 2 houses, 1 house trailer and numerous other structures and equipment destroyed. 3 people burned running from house 280 ft from rupture (requiring hospitalization), 5 others received minor burn injuries running from dwellings between 200 and 525 ft from rupture (250 ft offset).	Offset 700 ft. Distance 800 ft.	30	987
1994	NTSB-PAR-95-1	Edison, New Jersey	Rupture at night on March 23rd, ignition within 1 to 2 minutes after failure.	Burned area 1400 ft long by 900 ft wide. Fire damage to dwelling units up to 900 ft from rupture, dwelling units at 500 ft and beyond caught fire between 7 to 10 minutes after failure, no fatalities but 58 injuries.	Offset 720 ft. Distance 960 ft.	36	970
1994	TSB Report No. P94H0003	Maple Creek, Saskatchewan	Rupture at 7:40 p.m. on February 14th, ignition soon after failure.	Fire burn area 21.0 acres (8.5 hectares).		42	1207
1994	TSB Report No. P94H0036	Latchford, Ontario	Rupture at 7:13 a.m. on July 23rd, ignition soon after failure.	Fire burn area 11.8 acres (4.77 hectares), heat-affected area 18.6 acres (7.52 hectares).		36	1000
1995	TSB Report No. P95H0036	Rapid City, Manitoba	Rupture of 42 inch line at 5:42 a.m. on July 29th, ignition soon after failure leading to rupture and fire on adjacent 36 inch line at 6:34 a.m.	Fire burn area 48.5 acres (19.6 hectares), heat-affected area 198 acres (80 hectares).		42	880

Table 3.1 Summary of relevant North American pipeline failure incident reports.

The map below shows possible scenarios in the event of a pipeline explosion pending the pressure at which the pipeline is operating.

- The pipeline route is represented by the dark red line in the middle of the shaded area.
- The light red shaded area represents a blast radius while operating at a higher pressure capacity (1440 psi).
- The very outer light orange shaded area represents a 2 mile radius evacuation zone.

NOTE: Map Layer control (icon in upper left corner of map) allows you to turn the above zones on and off.

These distance estimates were made after
– consulting the report “A Model for sizing High Consequence Areas” by C-Fer Technologies done on behalf of the Gas Research Institute in October 2000. Read the Full Report: A Model for sizing High Consequence Areas
– consulting C. Rhodes, P. Eng., Ph.D. of Xylene Power LTD. Xylene website: NATURAL GAS PIPELINE SAFETY SETBACK. CALCULATION OF SAFETY SETBACKS FROM LARGE DIAMETER HIGH PRESSURE NATURAL GAS PIPELINES

View Nexus Pipeline Blast Radius **in a larger map**

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2. Village of Chippewa Lake Council Meeting

   March 9 @ 7:00 pm - 9:00 pm

3. Medina County Commissioner Meeting

   March 10 @ 9:30 am - 10:30 am

4. Litchfield Township Zoning Meeting

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5. City of Green Council Meeting

   March 10 @ 7:00 pm - 9:00 pm

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