A danger lurking underground

September 11, 2010 | By Jessica Garrison, John Hoeffel and Marc Lifsher, Los Angeles Times

Reporting from Los Angeles, San Bruno and — The same kind of natural gas transmission line that exploded Thursday in San Bruno forms a 4,000-mile network through Southern California.

Though energy companies know where gas pipelines are, residents are not routinely told. Security concerns are part of the reason that exact line details are not widely publicized, experts say.

Transmission pipelines are like highways for energy — anywhere there are people, natural gas follows to heat homes, power stoves and run factories.

Though energy companies know where the lines are, residents are not routinely told. In San Bruno, some residents said they didn't realize a gas transmission main ran through the neighborhood.

"If I had known that a gas pipeline was there, I never would have moved there," said Maria Barr, 69, who has lived near the blast site for 34 years. Late Friday, she was waiting to hear if her home was still standing.

Security concerns are part of the reason that exact line details are not widely publicized, experts said, although general location information is publicly available.

"They are critical infrastructure," said Professor Jean-Pierre Bardet, chair of USC's civil and environmental engineering department. "If you point them out to anybody, they could have malevolent intentions."

But he said such security concerns set up a "a very interesting conflict" with the desire of residents in places like San Bruno to be informed about potential hazards outside their doors.

Although officials at Southern California Gas Co., which provides service to 20 million customers in the region, could not recall any deaths in decades as a result of a pipeline explosion, emergency experts and engineers have long known that the potential for such a disaster lurks beneath the ground, almost everywhere, especially after an earthquake.
"We are confident with our system," said gas company spokesman Raul Gordillo. "We've been in Southern California for 140 years, but we are continually servicing our pipelines."

High-strength steel pipes, often as wide as a large truck tire, transport natural gas at up to 1,400 pounds per square inch, a pressure roughly equivalent to the weight of five passenger cars. Some run just 3 feet underground in dense urban and industrial areas, such as central Los Angeles, while others crisscross the desert.

In general, gas lines are much less susceptible to failure than, for example, aging water pipes, which have been rupturing across Los Angeles with great frequency lately.

When something does go wrong, the damage can be far greater than flooded streets and homes. Over the years, pipeline breaks have killed dozens of people and resulted in millions of dollars in damage to property across the country. The gas line that exploded in San Bruno was operated by Pacific Gas & Electric. On Dec. 24, 2008, a leak in a small pipe also operated by PG&E caused an explosion that killed one person and injured five in Rancho Cordova, near Sacramento.

"This is a troubling event, and it is a great mystery," James E. Moore, a professor of engineering at USC, said of the San Bruno disaster. "The system is designed to avoid exactly this kind of failure. I regard the need to answer the question 'How did this happen?' as rather urgent. In the worst case, it has implications for the entire system."

State lawmakers said Friday that the San Bruno explosion raises questions about whether the state is doing enough to regulate and inspect gas pipelines and enforce safety standards.

"This horrible accident is a wake-up call that California needs to do more to protect the public and meet the highest safety standards," said state Sen. Alex Padilla (D-Pacoima), chairman of the Senate Energy Committee.

California is the second-largest natural gas-consuming state in the nation, after Texas. Eighty-seven percent of it comes in through five pipelines from Canada, the Rocky Mountain states and the Southwest. The state's average daily consumption is about 6,300 million cubic feet.

The interstate transmission system uses about 180,000 miles of pipe. From the large lines, gas is delivered to "city gate stations" owned by local distribution companies. Then, smaller distribution pipes carry the fuel into homes and businesses.
Gas Co. Vice President Bret Lane said the last major incident involving his utility was in 1994, after the Northridge earthquake. A smaller transmission line ruptured, igniting a fire in the San Fernando Valley. A few homes were burned, but no one was killed.

In Northern California, however, PG&E has come under fire for its safety record.

Mark W. Toney of the Utility Reform Network, a ratepayers advocacy group, pointed to the fatal gas explosion in Rancho Cordova in 2008 as recent major failure.

In that event, the National Transportation Safety Board concluded that the probable cause of the explosion was the use of substandard pipe. The line included "a section of unmarked and out-of-specification polyethylene pipe with inadequate wall thickness that allowed gas to leak from the mechanical coupling installed on Sept. 21. 2006," said an NTSB report adopted on May 18 of this year. A contributing factor was the two-hour-plus delay in the arrival of a PG&E crew, the report said.

Earthquakes pose a big danger to gas pipelines.

Many modern homes have an earthquake shut-off valve, which automatically cuts gas service when it detects seismic activity. In Los Angeles, valves are required when a home changes ownership.

But they would not have prevented a disaster like the San Bruno explosion because the leak was not in a home but in a nearby transmission line.

Nor would they provide full protection in an earthquake.

"A major earthquake is going to wreak havoc on our infrastructure system, whether it is water, power, gas, all of it. And we're going to have fires like the one ... in San Bruno," said Moore, the USC engineering professor. "It's no accident that there was a fire after the San Francisco earthquake."

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