



Equipment and machinery is seen on a ridge above a natural gas well known as SS25 in Southern California Gas Company's vast Aliso Canyon facility. Pressure on the company has been mounting as residents of nearby Porter Ranch deal with the odor resulting from a leak at the well which was discovered on October 23. 12/14/2015

Since October 23, 2015, a leak in a natural gas well has been releasing methane gas near the Porter Ranch neighborhood of Los Angeles. Although methane is invisible and odorless, gas companies add odorants to alert people to leaks, and it is these additives, usually mercaptans, that experts believe are causing the physical effects suffered by residents such as headaches and nosebleeds. Gas companies have been storing natural gas underground in this area for decades, and this particular repository is one of the largest in the country. Despite their vast experience with this particular facility, Southern California Gas Company (SoCal Gas), who owns the well, will not be fixing the leak anytime soon - estimates put the end of the leak around late February. That would mean the well continuously emitted methane - a highly potent greenhouse gas - for over four months. The California Air Resources Board (ARB) [estimated](#) as of January 21 that the leak had emitted about 2.1 million metric tons of carbon dioxide equivalent (MMTCO<sub>2</sub>e). To put that number in perspective, the oil and gas sector in California emitted 17.7 MMTCO<sub>2</sub>e of methane in 2013, according to the ARB's GHG inventory,\* so this leak has already emitted almost 12% of the normal annual methane emissions from the entire oil and gas sector.

What is taking so long? Well, [initial efforts](#) to plug the leak with a clay mixture failed twice. First, there was a block of ice clogging the pipe, a product of water and methane. After

shipping in a specialized chemical antifreeze to break up the ice, they tried again. But the pressure of the gas coming up to the surface was far greater than the pressure machines were able to apply from the surface, and building up too much pressure would simply fracture the pipe further. The backup plan, drilling a relief well to siphon off the gas before it reaches the leak, will take weeks. Successfully intercepting the 7-inch diameter pipe a mile and a half below the surface requires meticulously checking the drilling progress with magnetic sensors. And they must avoid any activity that could create sparks - the air is extremely flammable due to amount of methane.

I'm not an engineer, but these complications strike me as things that should have been expected from any leak in such a deep natural gas well. Presumably the engineers at SoCal Gas know that when methane meets water it creates ice, and that there's bound to be some water in the soil. They probably also knew the likely pressure from a leak, since they use that very pressure to extract the gas. And they certainly knew that a methane leak would make the air more flammable. The company's apparent surprise at these complications and the delays they cause should make us skeptical of the common claims by the oil and gas industry that they meticulously prepare for and work to prevent any leaks or spills. To be fair to SoCal Gas, they [petitioned CPUC](#) back in 2014 for a revenue requirement and base rate increase (which would authorize them to raise customer rates and earn more revenue) so that they could make capital investments in what they admitted to be an aged infrastructure with a mainly qualitative risk assessment protocol. That proceeding is still ongoing, and the Aliso Canyon leak has spurred several advocacy organizations to intervene, delaying a decision even more.

On Wednesday, January 6, Governor Brown proclaimed a state of emergency, and directed Air Resource Board regulators to develop a plan for mitigating the climate impact of the leak. He also called for emergency rules mandating at least daily inspections using leak detection technology of all natural gas storage facilities in the state. The event has also garnered federal attention. That same day, three members of the U.S. House of Representatives, Reps. Frank Pallone (D-N.J.), Diana DeGette (D-Colo.) and Bobby Rush (D-Ill.), sent a [letter](#) to Secretary of Transportation Anthony Fox and EPA Administrator Gina McCarthy requesting a briefing on how their agencies are involved in responding to the leak, if at all.

The patchwork of responses from various state agencies also indicates the shortcomings of California's oil and gas oversight. When the leak first occurred, there was very little activity from any agency; now, several months later, multiple agencies are taking parallel and often duplicative actions. The South Coast Air Quality Management District's (SCAQMD) independent Hearing Board issued on [order](#) on Saturday, January 23rd, requiring that SoCal

Gas permanently shut down the well causing the leak after the leak has been stopped. The Hearing Board also ordered the company to fund an independent health study of the possible effects on those living nearby. SoCal Gas must fund continuous air quality monitoring by SCAQMD and create and implement an enhance leak detection program at all wells. Meanwhile, the CPUC Safety and Enforcement Division has launched an investigation into the company's emergency management and safety practices, and the Department of Conservation's Division of Oil, Gas, and Geothermal Resources (DOGGR) issued a [notice of intent](#) to propose emergency regulations of underground natural gas storage facilities on January 15. CalEPA's Office of Environmental Health Hazard Assessment (OEHHA), pursuant to the Governor's State of Emergency declaration, [appointed a panel](#) of eight scientific and medical experts to assess the public health risks of the leak and determine what, if any, additional steps are necessary. The Governor's Proclamation of a State of Emergency alone gives directives to six different agencies (CPUC, ARB, Governor's Office of Emergency Services, DOGGR, and the California Energy Commission). None of this includes the various local agencies that are also involved (e.g. Los Angeles County Department of Public Health, the Los Angeles County and City Emergency Management agencies).

While most of the actions listed above focus on the immediate mitigation of the leak and identifying the possible effects on human health, the leak will likely affect California environmental policy long after the leak is over. Since methane is a very potent short lived climate pollutant (SLCP) (about 80 times more heat-trapping than carbon dioxide over a twenty-year period, and twenty-five to twenty-eight times more potent over a 100-year period according to the latest estimates), the leak is already prompting the state to develop additional GHG reduction projects. The Governor's state of emergency proclamation ordered the ARB to create a plan by March 31 of this year to "fully mitigate the leak's emissions," and specified that the plan should prioritize projects aimed at reducing SLCPs. The ARB has already created a draft strategy to address SLCP emissions, which it began working on in early 2015, long before the leak. However, the leak has injected (no pun intended) the state's SLCP agenda with a new sense of urgency.

It may not be entirely clear at first why the Governor needed to order specific actions to mitigate the climate impacts of the leak - isn't that why the state created a cap-and-trade program? So that total emissions are controlled even if there are unexpected changes in the distribution of sources? The simple answer is that the Aliso Canyon leak is not subject to the cap-and-trade requirements, even though SoCal Gas as a company is. Generally, emissions from the oil and natural gas sector that are not associated with the actual combustion of the oil or gas are categorized as either vented (intentional) or fugitive (unintentional). Venting often occurs when small amounts of methane are released through normal operation of

equipment used in the production, transmission, and distribution of natural gas, such as compressors, valves, and meters. Although SoCal Gas, as an operator of an underground natural gas storage facility, must hold allowances for some vented emissions under the cap-and-trade system, many vented and fugitive emissions from equipment leaks are exempted in the regulation. I will examine the lessons of Aliso Canyon regarding California's climate change laws and regulations in Part 2 of this blog series.

Regardless of how the state decides to address it, the leak may also have political and policy impacts much farther than California. The situation is calling attention to the instability of the nation's oil and gas infrastructure and the frequency of methane leaks. A recent [report on PBS](#) featured a graphic showing a map of Staten Island covered in yellow and orange dots, each one representing a methane leak. A similar [piece in National Geographic](#) featured a world map with similar dots representing gas flares, most of which represented flares that burned more than 10 million cubic feet of gas in 2012. This increased coverage may bolster the Obama Administration's recent proposals for curbing methane emissions, and will hopefully lead to a more thoughtful discussion around the future of fossil fuel extraction in the U.S.

\* The GHG Inventory is based on data reported under the Mandatory Greenhouse Gas Emission Reporting Program. The regulations governing that program require operators and owners of natural gas systems (which includes offshore and onshore oil and natural gas production, onshore natural gas processing and transmission compression, underground natural gas storage, liquefied natural gas storage, import, and export, and natural gas distribution) to report emissions from all industry segments and from equipment venting, flaring, and equipment leaks.