

Aliso Canyon Natural Gas Leak

Preliminary Estimate of Greenhouse Gas Emissions to Date (As of November 20, 2015)

On October 23, Southern California Gas informed the State of a natural gas leak at its Aliso Canyon natural gas storage facility. This document provides a preliminary estimate of the amount of methane released since then through today, November 20.

Natural Gas is composed primarily of methane (approximately 80%), which is a potent greenhouse gas. Methane is in a category of greenhouse gases known as short-lived climate pollutants. These types of gases remain in the atmosphere for a much shorter period of time than longer-lived climate pollutants, such as carbon dioxide (CO₂); but when measured in terms of how they heat the atmosphere, their impacts can be tens, hundreds, or even thousands of times greater than that of carbon dioxide. The global warming impact from methane is 25 times and 72 times that of CO₂, for equal amounts by weight, over a 100 year and 20 year timespan, respectively. Due to methane's powerful impact and short life compared to other gases it represents an important element in reducing the near-term effects of global warming.

In order to quantify the methane release rate from the Aliso Canyon gas leak, state agencies in collaboration with the research community are collecting measurements near the ground at the well site, and from towers, airplanes and satellites. These varied measurements can be used to calculate an instantaneous emission rate, which in turn will assist with estimating the total methane emissions associated with the leak.

One such type of measurement was made by Scientific Aviation on November 7 and 10 using a small airplane capable of measuring methane and ethane. Ethane uniquely identifies methane from a fossil fuel source and enables separating the methane plume from the Aliso Canyon from that of a nearby landfill. By flying through the downwind methane plume at several elevations, a methane flux can be calculated.

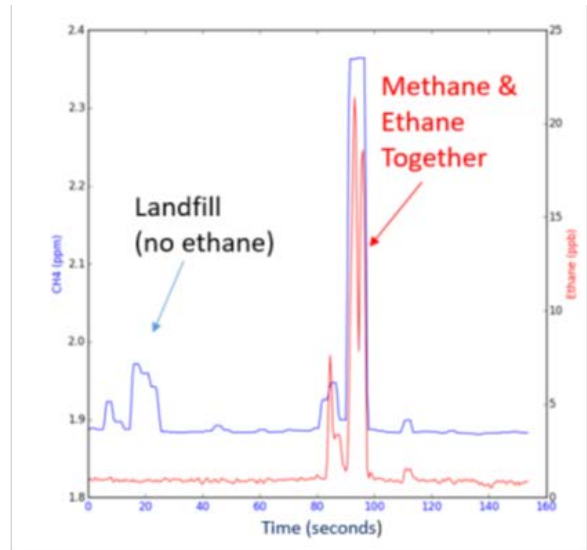


Figure 1 – Left panel shows the view from the plane of the site, marked with the red arrow. Right panel shows the methane and ethane enhancement when flying through the plume downwind of the site.

Data captured on November 7 and 10 from these airplane readings indicates an emission rate during these periods of approximately $44,000 \pm 5,000$ kilograms of methane per hour and $50,000 \pm 16,000$ kilograms of methane per hour, respectively. If the release of methane has been constant at these estimated rates since October 23 and through today November 20th, the Aliso Canyon gas leak would have generated about 0.80 million metric tons of carbon dioxide equivalent (MMTCO₂e) to date. This figure uses a 100-year global warming potential of 25 for methane in order to equate the methane impact with carbon dioxide over a hundred-year period.

To put the preliminary estimate into context, Figure 2 shows the preliminary estimate of the gas leak's methane release next to the total estimated methane emissions across California during the same time, from October 23rd through November 20th, by scaling to 28 days the state's existing inventories of methane release. It suggests that the Aliso Canyon gas leak would have added approximately one-quarter to the regular statewide methane emissions from October 23 to November 20. The relative magnitude of emissions from the leak compared to other sources of methane in the State underscores the urgency of stopping the gas leak. This comes on top of problems caused by odor and any potential impacts from exposure.

Methane Emissions in California October 23rd - Nov 20th, 2015

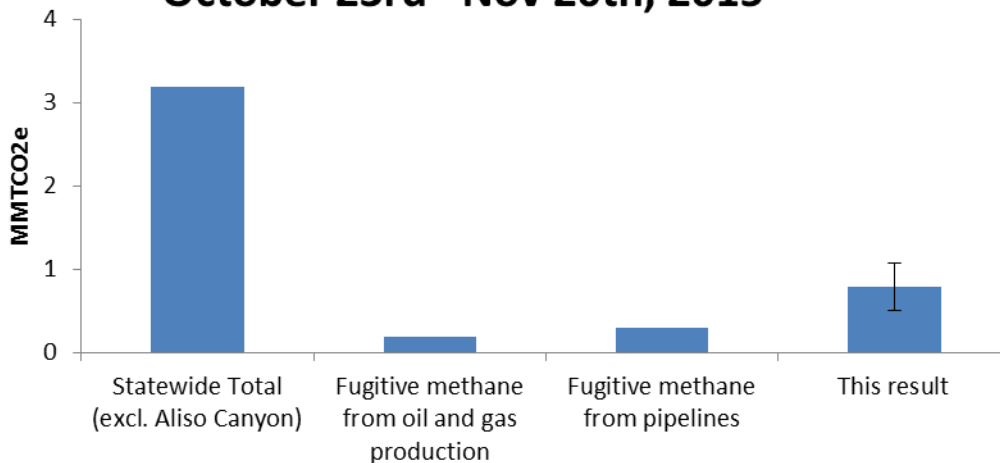


Figure 2. Methane emissions in California since the detection of the Aliso Canyon leak, October 23rd through November 20th 2015. Major assumptions about leak rate variability have been made in the construction of this graph.

It is important to note that this estimate is preliminary, based on a small number of measurements, and assumes a constant emission rate. In reality, that rate is likely variable. The emission rate of methane at the Aliso Canyon is *not* expected to be constant, as Southern California Gas continues to implement a range of strategies intended to stop the leak.

This preliminary estimate will be refined using additional measurements from towers, satellite overflights, remote sensing and other data sources. Scientific Aviation will likely make additional flights as well to measure emissions from the facility. A complete calculation of the total methane emitted from Aliso Canyon based on a full set of data and an assessment of any changes in methane release rate over the duration of the leak will take several months to complete. This refined estimate will be based on continuous measurements of methane made at multiple stationary sites throughout the Los Angeles basin that have been in place for several years and whose measurements span the entire episode. These data will be used in conjunction with computer simulation models to make a refined estimate of the total methane emitted.

The result should also be considered in the context of the recently released Short-Lived Climate Pollutant Reduction Strategy concept paper, in which the state lays out a goal to reduce emissions of methane in the state by 40% from current levels by 2030. Oil and gas production, along with natural gas distribution, is a significant source of methane emissions and regulatory efforts are under way to reduce emissions from those sectors.

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