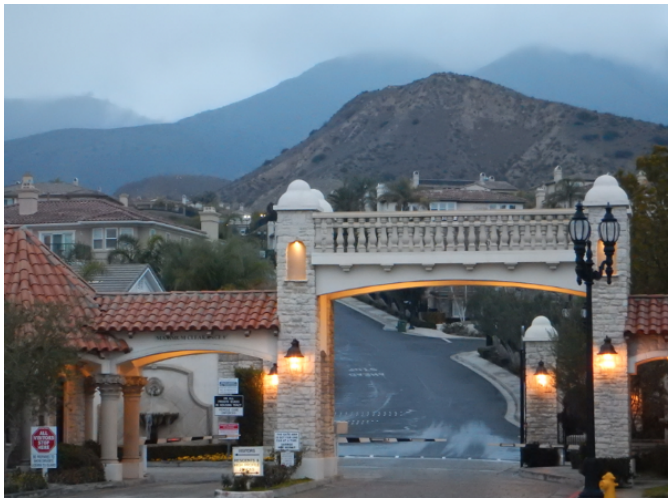
Aliso Canyon: A Candle in the Wind



Porter Ranch Renaissance neighborhood; photo by Rob Jackson.

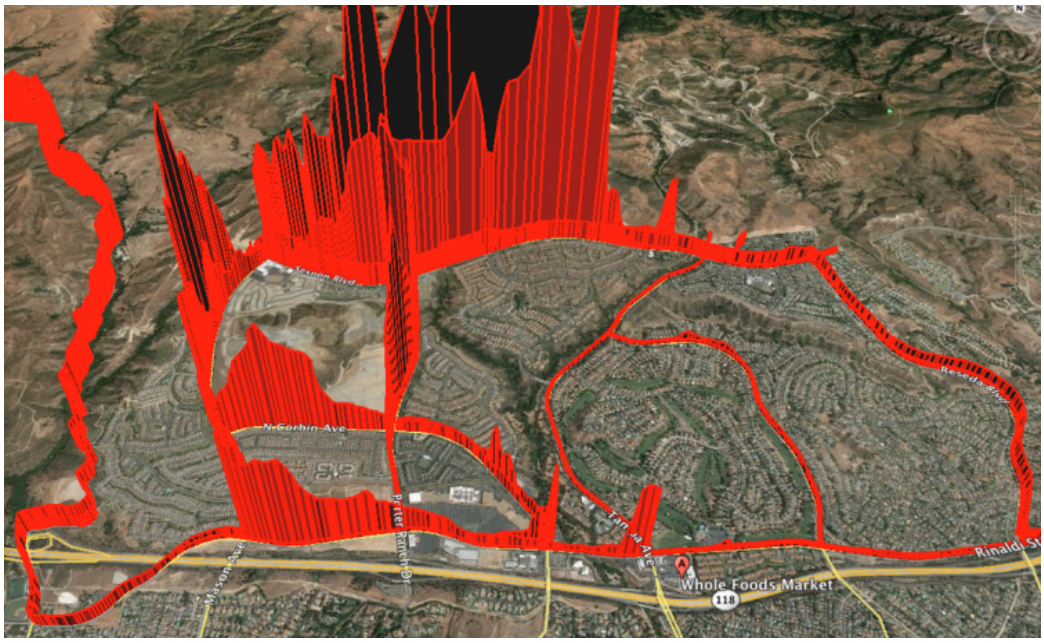
Standing by the shuttered Porter Ranch Community School after two days of sampling last weekend, I was struck by how strange the neighborhood felt.

The roads, like the one in the photo to the left, were eerily quiet. And yet if you went to the Porter Ranch retail area to the south near Hwy 118, the area was bustling. This dichotomy captures the weirdness of what's happening at Porter Ranch.

New methane measurements

Last weekend I was also struck by how intermittent the smell of natural gas was around the neighborhood. When the wind blew from the north, where the leak is, the smell could be unpleasant, even overpowering. You didn't need a laser-based methane detector to sense the methane. When the wind blew off the Pacific Ocean, west to east, you didn't smell a thing.

If you had a laser-based instrument, as Nathan Phillips of Boston University, Bob Ackley (Gas Safety USA), and I did this weekend, you could drive the neighborhood and generate an image like this one:



Observations of methane concentrations (in red) taken while driving. The gas storage field is visible at the top of the image, to the right of and behind the highest methane concentrations we observed. Data taken with a Picarro G2301 Cavity Ring-Down Spectrometer.

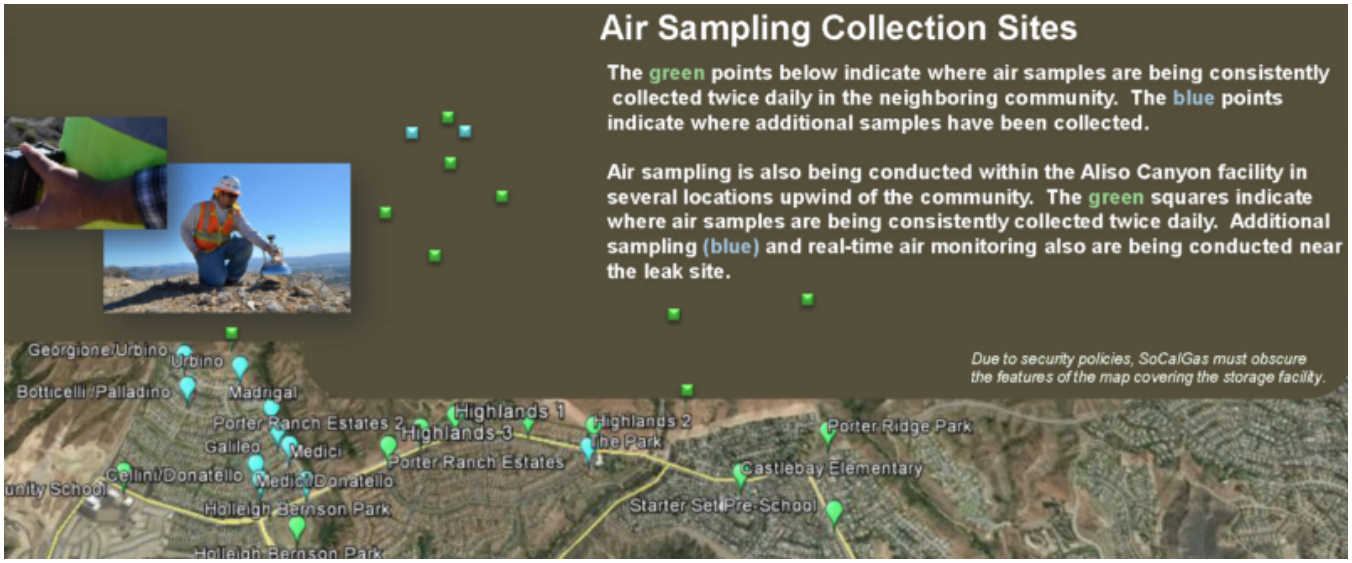
https://medium.com/@Rob_Jackson/aliso-canyon-a-candle-in-the-wind-bbb95a2c3888#.het0nencc

The methane is at background levels of a few parts per million to the south but an order of magnitude or more greater in the northwest corner of the neighborhood nearer the gas leak. The upper part of the subdivision in the figure is the part of Porter Ranch that has been evacuated (for obvious reasons). As I said before, though, these figures don't tell the whole story. Sometimes the methane concentrations in the northwest corner were the same as those farther south. It all depended on the wind direction. Methane concentrations of 25 or 50 parts per million, as we measured (our instrument maxes out in this range), aren't dangerous. They are evidence of the natural gas plume, and they're high, but any health risks come from what else might be in the gas.

Trace gas measurements and unusual observations

It's the presence of other trace gases such as benzene and hydrogen sulfide, and the intermittency of contaminated air reaching the neighborhood, that's the challenge at Porter Ranch. Benzene is a carcinogen. Hydrogen sulfide, or "sour gas", is poisonous.

SoCal Gas has been monitoring trace gas concentrations at these sites around Porter Ranch:



SoCal Gas sampling stations at the northern edge of Porter Ranch. Three sampling locations to the south are not shown.

You can download their data here, starting with October 30th, a week *after* the leak started. (Prepare to wade through twice-daily pdfs instead of a single spreadsheet, which the company should be providing.) If you look at the earliest data, you see methane concentrations greater than 1,000 ppm. That's amazingly high. What SoCal doesn't tell you is where those samples came from - in Porter Ranch or, instead, somewhere in the Aliso Canyon storage field nearer the leak. If the Porter Ranch neighborhood saw concentrations of 1,000 ppm methane, that would be disturbing.

Let's examine a few extreme samples from the SoCal website to consider some of the issues. Sample #13045–12 (SUMMA S14) on October 31st had 1027 ppm methane in the air. The SoCal datasheets for that day provide some analyses of the trace gases we've mentioned, such as benzene and hydrogen sulfide, but not for this sample. Why not? The same is true for sample #13045–14 (SUMMA S13), which had a methane concentration of 414.9 ppm.

Were trace-gas data not provided because these samples were taken in the gas storage field rather than the neighborhood? (See the green dots in the area blacked out for reasons of "security" in the top of the figure above.) If so, that's unfortunate. Any other reason is more than unfortunate.

Two quick caveats. I could be missing where the trace gas data are reported for the samples in the document, but I don't think so. The other is that I can't find any available data analyzing the gases in the natural gas storage field itself. It's the most obvious information for the public to have. If those data are available, someone please point me to the site. If they aren't, SoCal should make them available right away.

The good news: dangerous trace gases don't look too high

There's more good news than bad buried in the pdfs, though. California's Office of Environmental Health Hazard Assessment (OEHHA) recently released their analysis of the SoCal gas samples and concluded: "Overall, the available air sample data does not indicate that an acute toxicity health hazard exists from benzene in the Porter Ranch neighborhood as a result of the Aliso Canyon natural gas leak." The highest benzene measurements in the dataset after the first week showed levels at about 70 percent of the benzene acute Reference Exposure Levels (RELs), a conservative threshold for one-hour exposures.

More good news is found in the hydrogen sulfide measurements. Hydrogen sulfide concentrations in Porter Ranch's air have generally been below detection limits. OEHHA noted one particular exception on November 12, 2015. That day's air sample had hydrogen sulfide levels of 183 parts per billion (ppb), well above the acute REL of 30 ppb. No other sample shows anything close to this concentration, however.

Overall, SoCal gas deserves credit for monitoring the air and for making the data publicly available. So far the numbers don't show concentrations that would cause long-term health effects. SoCal should have been doing more continuous testing in the Porter Ranch neighborhood; the blue dots in the figure above represent short-term grab samples, I believe. Taking a sample once or twice a day, even at ten locations, doesn't capture what people experience when they breathe over the course of a day. The wind changed direction so many times during the two days I was there that a short-term sample, while helpful, isn't enough.

"Aliso Canyon is about to light one of the biggest torches anyone's seen in a long, long time."

Last week SoCal announced plans to flare the natural gas escaping from the well. That sounds dangerous, and it is dangerous during the initial steps of capturing the gas and routing it through a burner. Once it's accomplished, though, flaring is better for people and the environment than letting the gas escape unburned into the air.

Flaring turns air pollutants, such as benzene and hydrogen sulfide, into less dangerous pollutants like carbon dioxide and sulfur dioxide. Yes, carbon dioxide is a greenhouse gas, but methane is a far stronger one molecule for molecule. Sulfur dioxide forms acid rain, but it's less of health issue than hydrogen sulfide. Flaring will also destroy the mercaptans, the sulfur-based odorants added to natural gas, that have driven people from their homes in Porter Ranch.

Flaring natural gas is common in the oil and gas and petrochemical industries. The venting and flaring of natural gas across the U.S. tripled in volume from 2000 through 2014, reaching 290 billion cubic feet a year ago. That's a lot of energy up in smoke. You also see flaring used commonly around refineries or in chemical manufacturing plants. The Gulf Coast region of Texas and Louisiana has lots of these.

Assuming the flaring goes off without a hitch at Aliso Canyon, this won't be the first time a well blowout has burned there. There were two oil-well blowouts in the hills overlooking Los Angeles in 1968 and 1975. Legendary "firefighter" and maverick Red Adair and his company put those out.

Aliso Canyon is about to light one of the biggest torches anyone's seen in a long, long time. It will color the night sky over Los Angeles for months. Will the torch, and the leak, at Aliso Canyon become a symbol, lingering in people's minds for decades? Or, six months from now, will it be just an unfortunate footnote?

Time will tell.