

# **A New California Oil Boom?** Drilling the Monterey Shale



## **Part 2: The Most Dangerous Chemical You've Never Heard Of**

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Next Generation

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*Editor's note: In [part 1](#) of our series on the Monterey Shale, Next Generation researcher Rob Collier outlined the technical challenges of developing the Monterey Shale oil field – and how a technique known as “matrix acidizing,” which uses hydrofluoric acid to dissolve underground rock formations, may be the key to its development. In Part 2 we explore the risks of widespread HF use.*

“No industrial process risks more lives from a single accident than does the subject of this report – alkylation using hydrogen fluoride in oil refining. Fifty American refineries use HF alkylation to improve the octane of gasoline. Many are situated in or close to major cities, including Houston, Philadelphia, Salt Lake City and Memphis. In some cases, more than a million residents live in the danger zone of a single refinery. All in all, more than 26 million Americans are at risk.”

So says a [2013 survey of 50 U.S. oil refineries by the United Steelworkers union](#), which represents refinery workers. The survey found that “over a five-year period, the refineries in the study experienced 131 HF releases or near misses and committed hundreds of violations of the OSHA rule regulating highly hazardous operations.”

In July 2009, an explosion blasted the Citgo East oil refinery in Corpus Christi, Texas, critically injuring a worker and sparking a fire that burned for more than two days.

In September 2012, in Gumi, South Korea, about eight tons of HF gas burst from the Hube Global chemical plant. The leak killed five workers and severely injured at least 18 others, including plant employees and emergency personnel. An [estimated 3,000 local villagers](#) required medical treatment.

Because of these well-documented risks, the USW is advocating for refineries to stop using HF and to substitute safer chemicals and processes.

A [joint investigation in 2011](#) by ABC News and the Center for Public Integrity came to an equally chilling conclusion:

At least 16 million Americans, many of them unaware of the threat, live in the potential path of HF if it were to be released in an accident or a terrorist attack, a joint investigation by the Center for Public Integrity and ABC News has found. The government maintains closely controlled reports outlining worst-case scenarios involving highly hazardous chemicals. The Center reviewed reports for the 50 refineries that use HF. The reports describe the most extreme accidents anticipated by the plants' owners. The information is not published and is not easily accessible by the public.

A recent spate of refinery equipment breakdowns, fires and safety violations has heightened concerns. Over the past five years, authorities have cited 32 of the 50 refineries using HF for willful, serious or repeat violations of [rules](#) designed to prevent fires, explosions and chemical releases, according to U.S. Occupational Safety and Health Administration data analyzed by the Center. These “process safety management” standards require companies to conduct inspections, analyze hazards and plan for emergencies.

In all, at those 32 refineries inspectors found more than 1,000 violations, including nearly 600 at the BP refinery in Texas City, Texas, where 15 workers were killed and 180 injured in a 2005 explosion. Although only some of the violations involved HF, they can be an indicator of operational weaknesses, particularly worrisome at refineries using the chemical, industry and government insiders say. Even a fire causing little damage can foreshadow a more serious event, the American Petroleum Institute, the oil industry's main trade association, notes in a 2010 guidance document for its member companies.

Some worst-case scenarios described in company filings with the U.S. Environmental Protection Agency are particularly chilling: An HF release from the BP refinery in Texas City, for example, could total 800,000 pounds, travel 25 miles and put 550,000 people at risk of serious injury, according to BP's own calculations, provided to the EPA.

And a release from the Marathon refinery near Minneapolis could total 110,000 pounds, travel 25 miles and threaten 2.2 million people.

In response to safety concerns, the two California refineries that use HF – Valero in Wilmington and ExxonMobil in Torrance – have adopted a modified form of HF that is less volatile. This new form remains extremely dangerous, as described in a [2010 fact sheet](#) by Honeywell, a leading manufacturer of modified HF, which called its product: “extremely corrosive and destructive to tissue. Causes severe burns. May be fatal if inhaled, absorbed through skin, or swallowed. Specialized medical treatment is required for all exposures.”

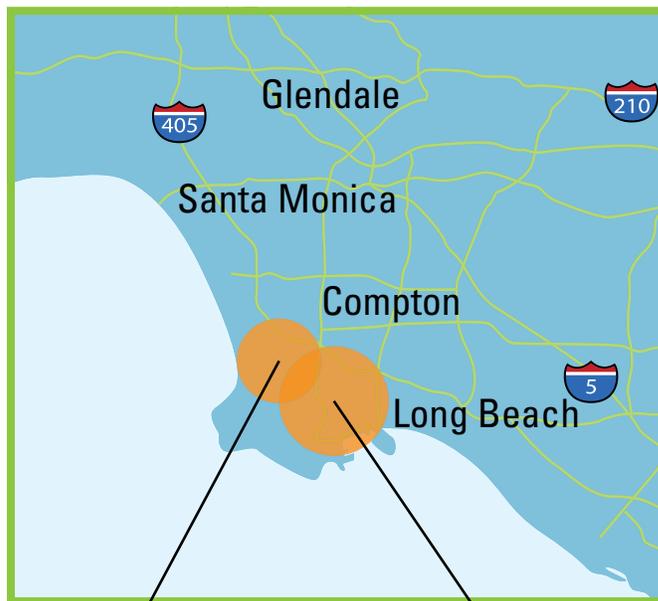
Despite all this information about HF use in refineries and other industrial settings, little is known about HF practices in California oilfields, and oil companies are tight-lipped.

Remarkably, California health and safety regulators appear to be unaware that HF is being used. Clyde Trombetta, Cal-OSHA's chief supervisor for both oilfield and refining operations, wrote in a June 14, 2013 email that he didn't know that HF was being used in oilfields. “When it comes to Hydraulic Fracking in California I do not believe the industry uses hydrofluoric acid and hydrochloric acid in its matrix,” he wrote.<sup>1</sup>

Chemical safety experts say that California's pioneering use of HF poses unique challenges. “You have uncounted numbers of trucks moving HF around the state, it's unclear whether the workers are trained in proper safety protocols, whether local first responders are prepared, or whether anyone is prepared for a potentially lethal accident of significant proportions,” said Kim Nibarger, a health and safety specialist for the United Steelworkers. “It seems totally unregulated.”

## HF Danger Zone: Los Angeles

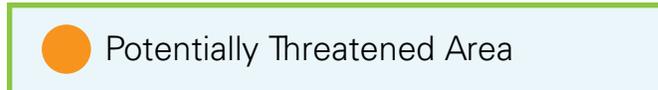
While hydrofluoric acid is likely in use in California oil fields, it is already in use in some refineries. A leak in an urban setting could affect thousands of Californians.



**Torrance Refinery**

**Wilmington Refinery**

In the worst-case scenario, a leak at these sites could place as many as 360,000 individuals at risk of exposure to HF.



Source: The Center for Public Integrity

A 2008 report by the Center for American Progress, “[Chemical Security 101: What You Don't Have Can't Leak, or Be Blown Up by Terrorists](#),” listed HF as the nation's second most dangerous industrial chemical at risk of being used in terrorist attacks. The report highlighted HF's prevalence in oil refineries, but did not mention its use in oilfield production – perhaps because there had been almost no attention to date to the Monterey Shale.

The author of that report, Paul Orum, now says that because of the typically low security in oil services trucking and oilfields themselves, HF is a risk. “The consequences of a deliberate HF spill could be catastrophic, depending on the location, and California would be well advised to consider this in its policies,” he said.<sup>2</sup>

## A giant regulatory gap

In recent years, as the national debate over fracking became a cause celebre from New York to Hollywood, acidizing remained relatively obscure – and cloaked in relative secrecy. In California and elsewhere, oil companies face no disclosure requirements for acidizing. As a result, there is little information available to the public about when, where or what kinds of acids, what depth, what strength, what volumes, or even whether they are doing it.

There is [no mention of the topic](#) in the U.S. BLM’s new draft rule for well stimulation methods, which includes hydraulic fracturing, on federal and Native American lands.

In California, the attention to acidizing came belatedly. After years of being a backwater in the fight over fracking, California entered the fray in earnest in early 2013. A flurry of [media coverage](#) about fracking’s potential in the Monterey Shale prompted environmental groups and legislators to jump on the national bandwagon. It was all fracking, all the time. Acidizing, however, was unmentioned.

The California Division of Oil, Gas, and Geothermal Resources (DOGGR) finally agreed to write regulations to govern the fracking process. Its [initial draft](#), released in December 2012, made no mention of acidizing, but DOGGR’s chief deputy director recently [indicated](#) the practice might be included in a forthcoming draft. Industry officials, who have supported DOGGR’s initial version, [suggested they would fight](#) to stop any inclusion of acidizing.

A new draft of regulations is expected to be released in August 2013, with final approval, after additional hearings, likely in mid-2014.

## Gearing up for regulatory battle

The door was cracked open in April, when the South Coast Air Quality Management District [issued new](#)

[regulations](#) that would mandate disclosure of “the names and quantities of chemicals, non-trade and trade secret, and other process information within 60 after days after completion of well activities.” The measure did not impose any limits on acidizing, but it marked the first time anywhere in the United States that oil companies were even required to disclose acidizing.

But soon after, acidizing came into the sphere of interest among activists and legislators. In June, Senator Fran Pavley scheduled a [hearing](#) in the state Senate to investigate the use of acidizing. She invited Chevron, Occidental and Venoco and the oilfield services company Halliburton to testify at the hearing, asking them to provide information on “the type and number of oil stimulation treatments, including acid-based treatments” that the companies use and plan to use in California.

All three companies declined, deferring to two industry associations to address the panel’s questions. “We use acid because it’s effective,” [testified Paul Deiro](#) of the Western States Petroleum Association. “I’m unaware of any disasters related to this.” He urged the legislators to avoid “unnecessary” regulation of acidizing.<sup>3</sup>

Faced with stonewalling, Pavley promptly amended her bill – which until then had been focused exclusively on fracking – to add a requirement requiring full disclosure of acidizing activities. She also added acidizing to the bill’s authorization for the state to commission an independent, peer-reviewed study of the environmental health effects of well drilling techniques.

This study, to be completed by Jan. 1, 2015, would fill in critical gaps in the nation’s knowledge of fracking’s impacts, which have not been widely studied; it would also be the only study to date about the potential impacts of acidizing. The study’s findings could prove to be a major boon to other states and nations that are seeking a responsible approach to the rapid expansion of fracking and acidizing.

Whatever the study’s conclusions, it could give the general public and policymakers alike the information they need to make informed decisions about a formerly obscure drilling technique that is now entering the limelight.

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**1** Personal communication to author, June 14, 2013.

**2** Telephone interview with author, July 13, 2013.

**3** A written non-response came from Halliburton, one of the state's primary oilfield services providers. In [a June 12, 2013 letter to Pavley](#), the company's Director of State and Local Governmental Affairs, Stephen Flaherty, responded that the company's "services comply with all applicable health and safety laws and regulations, and works with its customers to ensure that compliance ... I am sure you understand that as a matter of company policy and practice Halliburton does not speak to questions about the particular services it provides to, or the circumstances of, its individual customers."