Flaring at the Chevron Refinery

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FLARING AT THE CHEVRON REFINERY

Chevron Richmond Refinery

"Instead of the sun going down, you saw flames going up," recalls Dorothy Lightner when describing the view from her North Richmond home near the Chevron refinery. For years, people like Dorothy Lightner have suffered from air toxins released by local refineries, predominantly in the form of periodic "flares" from smokestacks. "They look like black clouds floating around," she explains. Ms. Lightner lived in Los Angeles for ten years and only developed asthma when she moved back to North Richmond in the mid 1990s. At that time, the number of flaring episodes at the refinery and the amount of pollution being released were not monitored.

In 2003, after intensive community organizing and advocacy, the agency in charge of regulating local air quality, the Bay Area Air Quality Management District (Air District), passed the groundbreaking flare monitoring rule and then later passed a flare reduction rule which requires refineries with significant flaring to develop and follow a plan for reducing flares.[1] For Richmond and North Richmond residents, the flare rules are an important step toward ending ongoing problems with flaring at the Chevron refinery because they create a way to find out the frequency and intensity of refinery flaring.

A flaring event occurs when the refinery does not have a way to store or use unwanted gases built up in the process of refining oil. The gases are released through smokestacks with flares, devices for burning gases as they are released into the air. When gases are lit on fire as they are released, most of the chemicals are combusted into less harmful components (mostly carbon dioxide and water). Although this burning reduces the amount of toxic chemicals in the gas, it never eliminates all of them. These toxic gases can flow into the air along with the black smoke emitted.[2]

The release of these gaseous pollutants and the particulate matter present in the flare smoke have both immediate, short-term (or acute) impacts on the health of residents, and long-term health impacts as well. The acute health impacts occur when people are exposed to very high levels of these pollutants over a short period of time (a few minutes

to a few hours), and include respiratory problems, asthma attacks, and eye, skin, and nose irritation. These physical effects are compounded by the stress that can be experienced by residents during a severe flaring event, which may require emergency "shelter in place" procedures. The long-term impacts, which occur when people are exposed to certain levels of these pollutants over a long period of time (several years) include increased cancer risk, permanent respiratory conditions such as asthma, and, in the case of particulate matter pollution, premature death.[3] Health surveys have linked refinery flaring with elevated levels of cancer, lung disease, asthma, and reduced attendance in local elementary schools.[4]

Community organizing around flaring in Richmond has been born from the experience of residents who live next door to Chevron and have suffered eye, skin, and respiratory irritations for years.[5] An analysis of data from air quality monitors in neighborhoods near the refinery found that measurements of known air quality toxins, particularly sulfur gases, reached record levels on days of flaring at the refinery.[6]

In a 2003 study, hospitalization rates for children with asthma under 15 years old in Richmond and San Pablo zip codes were found to be double the state's rate, and nearly double other areas in Contra Costa County such as Pittsburg/Bay Point, Concord, and Walnut Creek.[7] The Air District has identified Richmond as a "priority community" for air quality mitigation measures because of the area's high rates of toxic air contaminants and asthma and other medical conditions, compounded by high rates of poverty.[8]

A refinery smokestack flaring

Photo: Joe Gough/Dreamstime.com

WHAT DID OUR RESEARCH FIND?

We reviewed flaring event data from the Air District to report the number of days per year when significant flaring occurred at the Chevron refinery from 2004 to 2007. Our research builds on the work that groups such as Communities for a Better Environment, West County Toxics Coalition, and the Laotian Organizing Project of the Asian Pacific Environmental Network have done over the past decade. Largely due to their efforts, the flare monitoring rule was created and data on the daily flaring at refineries can be easily accessed through the Internet. The Indicators Project analyzed data from one of the Bay Area's five refineries, the Richmond Chevron refinery, which operates six of the Bay Area's 23 active flares.[9]

Seventy percent of the flare days between '04 and '07 had flares that released more than double one of the Air District thresholds.

Recognizing that gaseous pollutants emitted above certain levels during flaring events harm human health in nearby communities,[10] the Air District passed a flare reduction rule in 2005, establishing thresholds based on how much total gas is released and how much sulfur dioxide is released in a 24-hour period. Flaring that emits gases above these threshold levels is considered "significant" and must be reported to the Air District.[11] In addition, each refinery must create a plan to reduce flaring after any significant flaring event. The Indicators Project looked at reported instances when the flaring emissions were above the Air District threshold to find out how many days per year the Chevron refinery had significant flaring.

The indicator focuses on the number of days in which significant flaring episodes occurred, rather than looking at monthly or annual averages of the pollutants released during flaring events. Research has indicated that averages

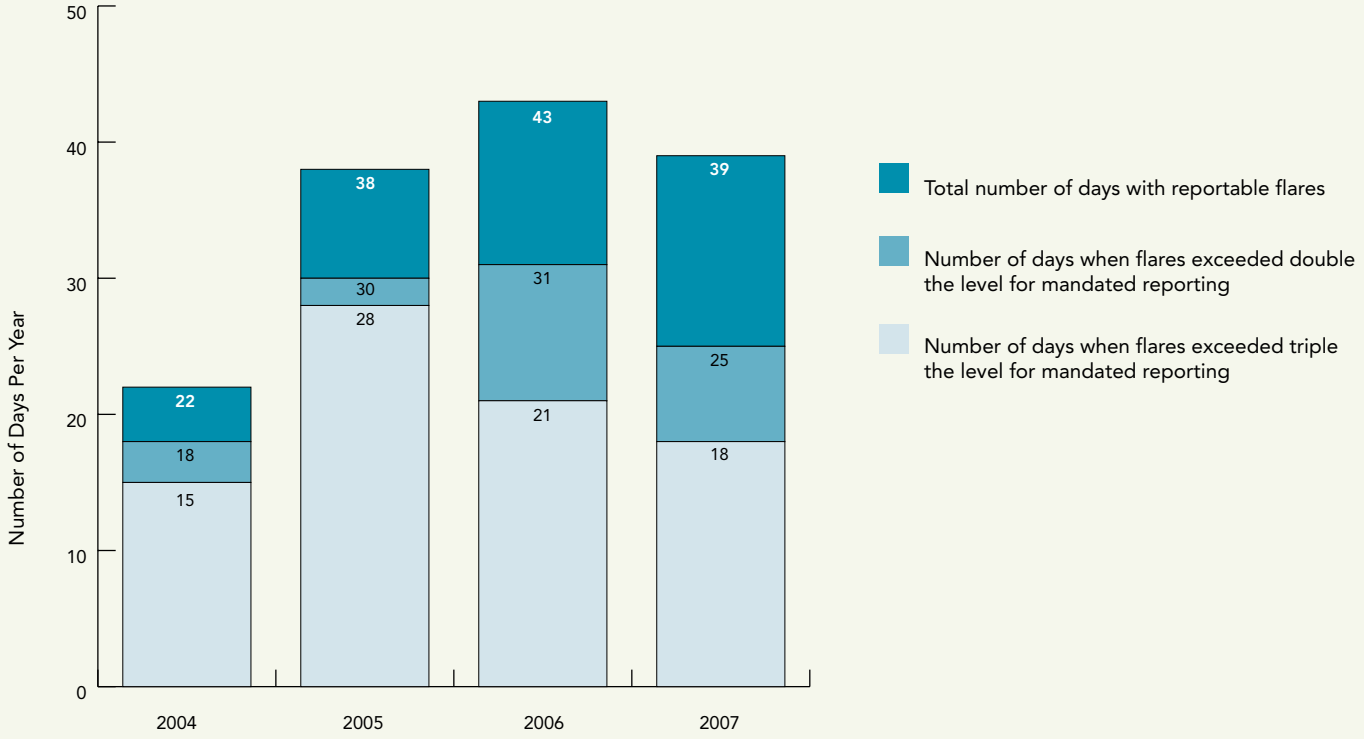
Table 1: NUMBER OF DAYS WITH SIGNIFICANT FLARING, 2004–2007

Flare days are defined as days when total vent flow is above 500,000 standard cubic feet of gases per day, and/or emits more than 500 pounds of sulfur dioxide per day.

Year	Total number of days when flares exceeded air quality thresholds	Number of days when flares more than doubled the thresholds	Number of days when flares more than tripled the thresholds
2004	22	18	15
2005	38	30	28
2006	43	31	21
2007	39	25	18
4 year total	**142**	**104**	**82**

Source: Bay Area Air Quality Management District Flare Data, various dates, available online at http://www.baaqmd.gov/enf/flares/.

Figure 1: NUMBER OF DAYS WITH SIGNIFICANT FLARING, JANUARY 1, 2004 TO DECEMBER 31, 2007



Source: Bay Area Air Quality Management District Flare Data, available online at http://www.baaqmd.gov/enf/flares/.

for flare emissions do not accurately show the impacts on air quality; the most severe problems occur when there is a large flare event.[12] Our indicator focuses on significant flare days as short time periods during which massive quantities of gases are emitted, leading to short-term exposure to contaminants at very high levels.[13] These "acute" exposures are of particular concern in communities near the Richmond refinery.

Our analysis shows an average of three significant flare episodes per month at the Chevron refinery since 2004. Figure 1 and Table 1 show the number of days when episodic flaring exceeded the Air District's established flare thresholds. Further analysis shows that over 70% of the flare days between 2004 and 2007 had flares that released more than double one of the thresholds, and over half had flares with more than triple these levels.

WHAT DOES THIS MEAN FOR WEST COUNTY?

Despite increased regulation, Chevron has not demonstrated an ability to proactively address its flaring occurrences. Flaring continues on a regular basis–and Chevron's flares frequently emit very large amounts of gases at levels the Air District has identified as a threat to public health. This causes recurrent acute exposures that threaten people's health in nearby neighborhoods, disproportionately affecting low-income communities and communities of color.

Theoretically, flares are only supposed to be used in emergency situations or when there are no other feasible options, but the U.S. Office of Inspector General has found that in many refineries, flaring is used routinely.[14] Other research has indicated that most flares are unnecessary and preventable, many of them resulting from outdated technologies and equipment or operational failures.[15] In 2007, Communities for a Better Environment found Chevron could reduce flaring by 65% by implementing measures already being used at another Bay Area refinery.[16]

The Chevron refinery is one piece of a national and international system of oil and gas production, and in many ways, the residents of Richmond are subsidizing this system with their health and quality of life. As Chevron prepares to modify its production processes to include dirtier crude to meet a continually growing market for oil use in the U.S., the direct burdens Richmond residents must bear may grow.

WHAT CAN WE DO?

Get to know and use the public information on flares.
Data on refinery flares is at the fingertips of anyone who can access the Internet. Checking the Air District flare rule website (http://www.baaqmd.gov/enf/flares/index.htm) and downloading the data for the refineries affecting your community is an important step in affecting change. Look at the Research Methods section of this chapter for step-by-step directions on how to find and analyze flare data.

There are several operational and policy changes that can be made to better protect the health of Richmond residents from flaring events. The following proposals are drawn from the work of Communities for a Better Environment:

Utilize the full authority of the Air District to compel refineries to adopt measures to prevent flaring.
The Air District flare reduction rule states that all refineries should use "all feasible measures" to prevent and minimize flaring. The Air District should ensure full implementation of this provision, and Chevron should eliminate flaring caused by non-emergency situations. One of the most feasible measures to do this is by installing back-up compressor capacities that are dedicated to recovering flare gases. The Shell Martinez refinery operates such a system, and it is effective.[17]

Cap the quality of oil processed at the refinery.
A new policy should establish an enforceable cap on the quality of oil processed by Chevron. Such a cap would reduce the increased rates of flaring documented when Chevron refines lower quality crude oil.[18]

Accurately measure the acute impacts of flaring on local communities.
Policymakers often base decisions on flare analyses that are averaged over a long period of time, such as an annual average of flaring. In a July 2008 hearing regarding Chevron's proposed refinery expansion plan, the Richmond City Council accepted such an annual average analysis presented by the refinery. This type of analysis does not consider the acute air quality impacts caused directly by a flare event, and thus does not present the full impacts on community health. Decisions that relied on annual average of flaring should be revisited.

COMMUNITY RESOURCES FOR INFORMATION AND CHANGE

Asian Pacific Environmental Network (APEN)

310 8th Street, Suite 309
Oakland, CA 94607
510.834.8920
www.apen4ej.org

APEN provides support for environmental justice campaigns in Contra Costa County, particularly in the Asian and Asian-American communities, and has been active in the campaign to hold Chevron accountable for its pollution.

Communities for a Better Environment (CBE)

1440 Broadway, Suite 701
Oakland, CA 94612
510.302.0430
www.cbecal.org

CBE works on environmental justice issues in Contra Costa County, providing organizing, legal, and scientific support for community campaigns, and has been active in the campaign to hold Chevron accountable for its pollution.

Refinery Reform Campaign

739 Cortland Ave.
San Francisco, CA 94110
415.643.1870
www.refineryreform.org

The Refinery Reform Campaign provides information and resources on campaigns to clean up refineries around the U.S. and background information on refineries.

West County Toxics Coalition

Dr. Henry Clark, Director
510.232.3427
www.westcountytoxicscoalition.org
Henryc11@prodigy.net

The West County Toxics Coalition is a community-based organization fighting Chevron pollution and flaring for the past twenty years.

RESEARCH METHODS

The Indicators Project used data from the Bay Area Air Quality Management District (Air District) to analyze flare emissions from the Chevron refinery. The Air District is required to post monthly reports from refineries on the results of flare monitoring. We collected and analyzed data from 2004 to 2007 from the Chevron refinery.

We used the definition of a significant flare that the Air District uses: any 24-hour period when flaring emits over 500,000 total pounds of gases or more than 500 pounds of sulfur dioxide. We also looked at how many of these incidences exceeded two and three times these thresholds: 1,000,000 total pounds and/or 1,000 pounds of sulfur dioxide, and 1,500,000 total pounds and/or 1,500 pounds of sulfur dioxide, respectively.

Flare Data Limitations

The largest limitation in flare data is that gas emissions are not directly measured. An equation, called a combustion efficiency (CE), is used to predict how much of the recorded total vent flow will be destroyed in the flare. However, the CE is not always accurate because it is dependent on a wide variety of factors, such as the size of the vent, the technologies used, wind speeds, etc.[19]

Accessing Bay Area Flare Data

1. Go to the website where the Bay Area Air Quality Management District posts the data on refinery flares: http://www.baaqmd.gov/enf/flares/index.htm. (Note that data does not download well when you use Firefox as your Internet browser; Explorer works better.)

2. Decide what refinery and what month and year you want data for. Refineries have different numbers of smokestacks, also called flares, and flare data is available for each smokestack at each refinery. Under the name of the refinery are the names of the smokestacks or "Flare name." Next to each flare name are the months for which flare data is available. The Chevron Richmond refinery has six smokestacks or flares for which data is collected. Their names are listed as: Alky-Poly, Fluidized Catcracker, Low Sulfur Fuel Oil, North Isomax, Richmond Lube Oil Project, and South Isomax.

3. To view the data on a particular flare, click on one of the months to the right of the flare name. The next screen will show a table with rows for each date during that month, the volume of gas released (Vent Gas Flow), and the estimated pounds released of Methane, Non-methane Hydrocarbon (NMHC), and Sulfur Dioxide.

For example:

Date (mo/day/yr)	Vent Gas Flow (volume in scf)	Methane (lbs)	NMHC (lbs)	Sulfur Dioxide (lbs)
2/1/2008	0	0	0	0
2/2/2008	0	0	0	0
2/3/2008	10,278	1.75	13.52	14.16

The screen will also show three graphs, each showing a line representing the volume of gas released by that flare during each day during the month, and a point symbol (a small x, a small square, or a small diamond) that shows the estimated level of each of the three chemicals: Methane, Non-methane Hydrocarbon, and Sulfur Dioxide.

4. To download the flare information for the month you have selected, click on the words "Download this report as a CSV file" near the top of the screen. The file may appear in an Explorer window that looks like the window you see when browsing the Internet. To keep the file, you need to click "Save as," give it a name, and choose a folder where you want to save it.

5. To compare flare data from multiple months or multiple smokestacks, you may want to copy the data from a specific month and paste it in an Excel (.xls) file where you are pasting multiple months and multiple smokestacks.

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11 "Significant" flaring, also known as "flare days," is defined as days when total vent flow is above 500,000 standard cubic feet of gases per day, and/or emits more than 500 pounds of sulfur dioxide per day. It should be noted that these thresholds are not legally enforceable standards.

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